

ARMY FOOD AND MESSING



THE COMPLETE MANUAL OF MESS MANAGEMENT

14110400R



NLM 05098685 1

NATIONAL LIBRARY OF MEDICINE

ARMY MEDICAL LIBRARY

WASHINGTON

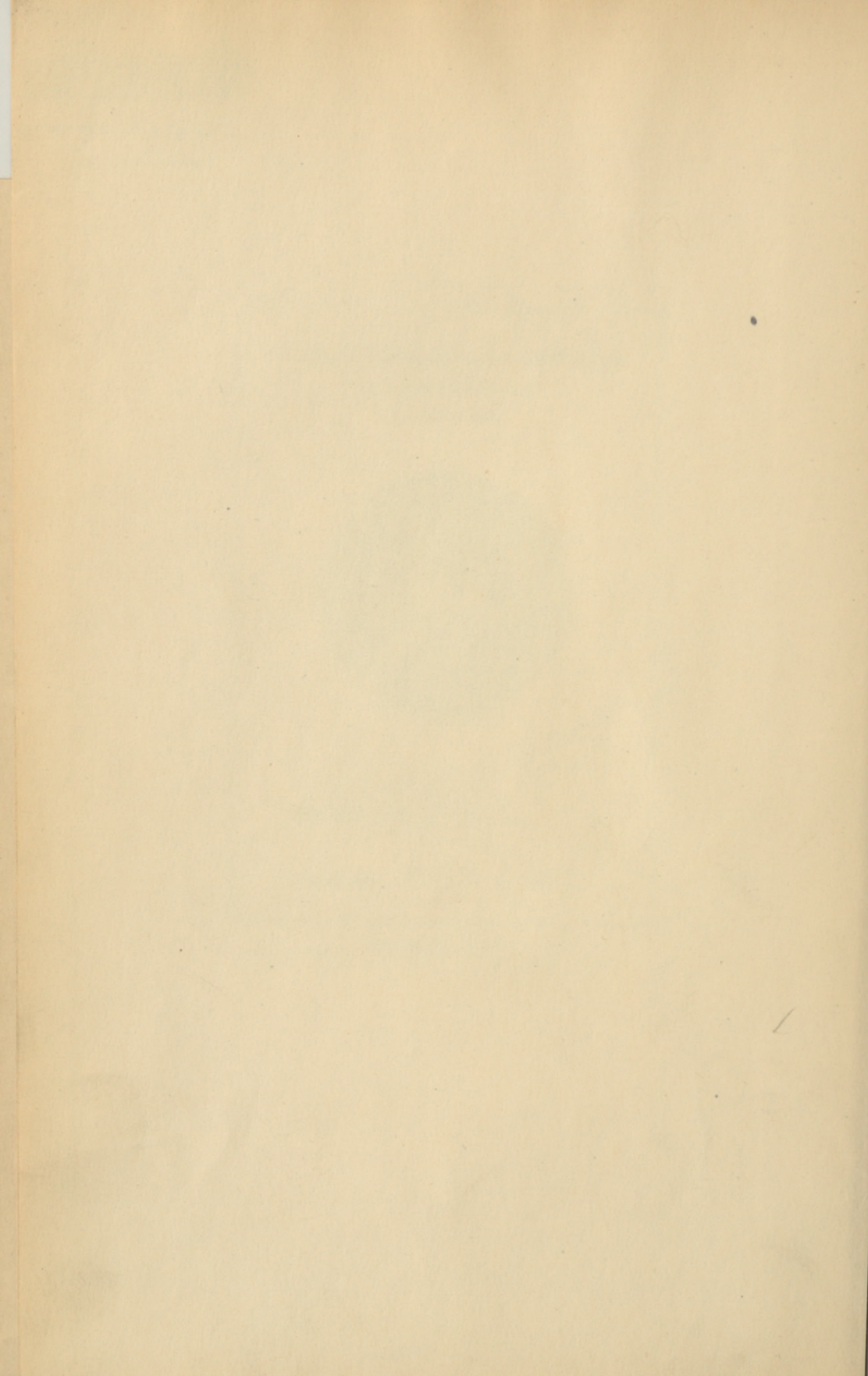
Founded 1886



Section 5746

Number 353287

2⁰⁰ 42-29605

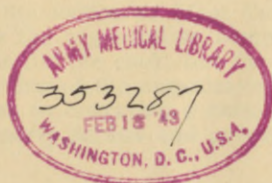
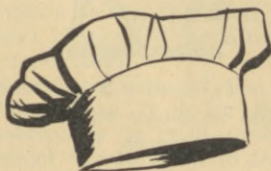


Army Food
and Messing

✓T
h
The
and
ARMY FOOD
and MESSING;

*The Complete Manual
of
Mess Management*

2. edition



MILITARY SERVICE PUBLISHING COMPANY
HARRISBURG, PA.

[1942]

Copyright 1942
By
The Military Service Publishing Co.
Harrisburg, Pa.

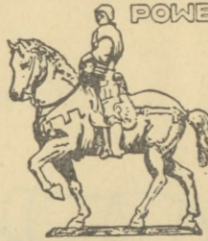
Second Edition October 1942
Formerly Titled "Manual of Mess Management"

ALL RIGHTS RESERVED

UC
703
A741
1942

Li
2-11-43

KNOWLEDGE IS
POWER



THE MILITARY SERVICE PUBLISHING CO.
100 TELEGRAPH BUILDING
HARRISBURG, PA.

Printed in
The United States of America
by
The Telegraph Press
Harrisburg, Pennsylvania

INTRODUCTION

The day is past, or should be past, when the mess was the stepchild of the military organization. Commanders have come to realize that feeding men is no longer merely a matter of keeping their stomachs full—that a properly managed mess is one of the greatest aids to health and morale available to the Army.

Many officers in the Army have given thought to improvements in feeding organizations. The efforts of some of those men have resulted in several fine official publications touching on the subject; others have written unofficially. This book is based on the material found in the following official publications:

Technical Manual 10-405, The Army Cook

Technical Manual 10-410, The Army Baker

Technical Manual 10-205, Mess Management

Technical Manual 10-210, Inspection of Subsistence Supplies

Field Manual 8-40, Field Sanitation

Field Manual 21-10, Military Sanitation and First Aid.

In addition to the above publications, the pamphlet *Notes on Mess Management*, by the Coast Artillery School, and the experience of the editor in mess management have contributed to this book.

It is, of course, understood that this effort is not an official publication. It is merely the result of the efforts of one mess officer who was moved to assemble the material herein because many times he felt the need for such a compilation. There were times when the publications he needed were not available; other times when he did not know the publications existed.

It will be noted that in several portions of the book, material is apparently duplicated. Where this has been done, it is for the convenience of the reader who otherwise might find it necessary to read (and find) elusive paragraphs in several different chapters to effect the solution to the problem of the moment.

In this second edition, acknowledgment must be made to several mess officers who suggested improvements that have now been incorporated into the new edition, and to the National Live Stock and Meat Board, for permission to use many of the illustrations that appear in the section on Meat Cutting.

The book was written not for the organization commander, or for the mess officer, or for the mess sergeant, or for the cook, but for every man in the organization whose duties affect the messing of the organization. If each reader finds material in this volume that aids him in operating a better mess, and in providing the personnel with better food, properly served and properly safeguarded, the editor's purpose will have been served.

TABLE OF CONTENTS

	Page
CHAPTER 1. FEEDING THE AMERICAN SOLDIER	1
CHAPTER 2. MESS MANAGEMENT.	
Section I. Supervision and Control	8
II. The Ration	14
III. Mess Accounting	21
IV. Nutrition and Menus	30
CHAPTER 3. KITCHEN MANAGEMENT.	
Section I. Garrison Kitchens	41
II. Field Kitchens	46
CHAPTER 4. COOKING.	
Section I. Principles	76
II. Practice	82
CHAPTER 5. BAKING.	
Section I. Definitions	91
II. Grains and Flours	94
III. Other Ingredients	98
IV. Bread Baking	107
V. Bread Formulas	113
VI. Bread Faults; Their Causes and Corrections	122
VII. Sweet Dough, Cakes, and Pastry Products	126
VIII. Field Baking Expedients	140
IX. Infestation, Rope, and Mold	142
CHAPTER 6. FOODS	145
CHAPTER 7. MEATS, FISH, AND POULTRY.	
Section I. Meat Cutting and Storage	166
II. Cooking of Meats	197
III. Fish and Poultry	211
CHAPTER 8. INSPECTION AND STORAGE OF SUBSISTENCE SUPPLIES.	
Section I. General	215
II. Canned Fruits and Vegetables	215
III. Fresh Fruits and Vegetables	221
IV. Dried Fruits and Vegetables	233
V. Leavening Agents	236
VI. Cereals and Cereal Products	237
VII. Beverages	246
VIII. Pickles, Relishes, Olives, and Sauces	252
IX. Seasoning Agents	254
X. Sweet Products	256
XI. Meat and Meat Products	257
XII. Dairy Products	284
XIII. Poultry and Eggs	288
XIV. Fish	292
XV. Excerpts from Federal Food, Drug, and Domestic Act ..	293

	Page
CHAPTER 9. RECIPES.	
Section I. Introduction	295
II. Recipes	296
CHAPTER 10. MESS SANITATION.	
Introduction	350
Section I. Intestinal Diseases	351
II. Food Handlers	352
III. Disposal of Kitchen Wastes	353
IV. Buildings and Storage Facilities	363
V. Cleansing of Utensils	366
VI. Outline for Inspection	367
VII. Fly Control	370
VIII. Rat Control	377
IX. Water Sterilization	380
APPENDIX.	
I. Issuing Table of Provisions Per Man Per Meal	382
II. Tables and Useful Information	388
III. Minimum Standard Ten-Day Menu	396
INDEX	399

CHAPTER 1

FEEDING THE AMERICAN SOLDIER

SECTION I

GENERAL

1. Emphasis. It is agreed by most people that the American soldier eats better than the soldier of any other nation. He should. The money is allotted, the food is available, and the equipment is on hand. In the instances where certain organizations have reason not to be satisfied with their messes, the fault lies within that organization.

The organization commander who delegates the duty of mess officer to the least able of his junior officers has taken the first step toward breaking down the morale of his command. The mess officer who, under the press of other assignments, relegates the mess to the position of one of his minor functions is guilty of an error that may have serious repercussions. The mess sergeant who does not take his job seriously is sand in any organization's gears. Incompetent cooks are dangerous. Good feeding requires teamwork, from the captain down to the KP.

These opening paragraphs may seem superfluous. Most military personnel know the importance of the mess. But in that word *most* we find the reason for another plea for emphasis on mess management. There are still officers and even enlisted mess personnel who feel their mission is performed if the men are fed—merely fed.

A worried young lieutenant was once mess officer of a CCC company. The mess hall was clean—he could see that for himself. The food was good—everybody said so, from the captain to the latrine orderly. The menus were balanced—the medical officer was sure of that.

But the men were not satisfied. Something was amiss. It could be felt but not identified. One afternoon the mess officer was in the supply room taking inventory when mess call blew. He heard one man outside say, "There she goes. Let's go down and stick our noses in the trough." Another voice answered, unenthusiastically, "O.K., but I swear one of these days I'm going to take a poke at Blank. I work for this chow, and it's coming to me—I don't like to have it thrown at me like a bone to a dog."

A few minutes of investigation at the mess hall laid bare the sore spot. No man could enjoy a meal coming from the surly Blank. The enjoyment was gone before the eating began.

A small thing, to be sure. But it made a world of difference to the men. Add up several of those small things, and you have a case for close attention to duty by every man connected with the mess.

There are many elements necessary to a good mess. Of course, good food well prepared is the basis of the whole. Some of the other considerations are cleanliness, attractiveness, manner of serving, economy, balance of diet, variety in menu, and timing of cooking and serving.

All these elements, and the other elements that will intrude themselves from time to time, require that every member of the mess team devote full attention to duty. There can be no settling into routine, no slipshod work anywhere along the line, no letdowns at any time. Men are accustomed to eating three meals daily, holidays and duty days, and regardless of the enemy or the weather. When the men do not get three meals every day, regardless of conditions, somebody has slipped.

2. Imagination. The spark that is missing in too many messes is that of imagination. The cooks need imagination to prevent dishes having a deadly sameness. The mess sergeant, the mess officer, and the organization commander need imagination to keep the mess in a progressive state. The mess, like most other activities, goes backward unless it goes forward. New techniques, new equipment, new routines must be sought continually. Every mess can be improved.

In one organization, difficulties of supply and transport limited the variety. The men, with good reason, were beginning to tire of the same old dishes, prepared in the same old way. The mess sergeant and the company clerk got together and published mimeographed menus. Baked beans became *Beans a la Battery B*.

Beef stew appeared on the menu as *Carne de Cordite*. A dessert concocted of canned cherries and coconut was named *Caviar de \$21*.

Interest in meals perked up. The men never knew exactly what they were going to get when they saw the menu, and the good feeling occasioned by the rather crude humor tided the organization over until sufficient transportation was received to run regular market trips. The menus were not a substitute for proper variety, but they were an effective expedient.

A cook without imagination is little better than an ordinary laborer. It is the extra pinch of spice, the raisins in the salad, and the frosting on the cake that makes the difference. Of course too much imagination can be dangerous when applied to food, but the proper balance of experience and imagination makes chefs of KP's.

The mess officer who finds a better way of serving food, or the mess sergeant who can figure something new (and good) to do with that same old quarter of beef, or the company commander who can find funds for more attractive table tops, is worth a squad.

3. The proper atmosphere. In garrison especially, the proper atmosphere in the mess hall is important. As one old soldier phrased it, "The poor private doesn't get much out of life except eating and sleeping. If he doesn't get a comfortable sleeping place and a decent place to eat decent food, there ain't much left."

The enjoyment of the best meal is lost if the surrounding conditions are not good. Of course, sanitary conditions are the most important single factor—there is little need to go into a discussion of sanitation here. But there are other elements of atmosphere.

Plain board table tops hold food, but there are scores of tabletop materials that can make food more enjoyable. When they can be "salvaged" or purchased, don't hesitate. Old-army men may sneer at curtains on mess hall windows, but the present generation finds them more pleasant to contemplate than GI windows.

Orderly conduct, circumspect language, proper dress at meals, and the rudiments of table etiquette have their place in affording the proper atmosphere. Even so slight an item as paper napkins in attractive holders can add to the enjoyment of a meal. Battered mess gear, interruptions for announcements that could well be made at other formations, and inferior heating arrangements for the mess hall are examples of things that can detract from the proper atmosphere. All mess personnel should keep thinking about improvements that will help the men enjoy their food.

4. Kitchen police. The lowly KP is still the butt of much low-grade humor. Certain organization commanders violate the spirit of the instructions that KP is not a punishment detail. In some organizations the KP's are the most inept men in the unit—shoved into the kitchen to keep them out of the way.

Kitchen police is an important military duty. The man who can't make the grade on the drill field is hardly the man to be trusted with the health and contentment of the organization. The man who can be relied on to do a workmanlike job in the kitchen and mess hall, on the other hand, deserves treatment and recognition for his efforts. His hours should be no longer, his holidays no shorter, and his standing in the organization no less than those of general duty men.

The cooks have a duty—cooking. If their time is taken in prodding the KP's, the cooking does not get the proper attention. In any organization there are bound to be untrained men who are interested in the preparation and serving of food. Seek these men out, promise them assignments as student cooks when openings occur—and keep the promise! Don't force them to work beside disgruntled male-factors or goldbricks. *Espirit* is just as important in the kitchen as in the trenches.

5. Organization. Some kitchens will be hives of industry from 2:00 A.M. to 10:00 P.M.; in other organizations the work will progress at an easy pace from an hour or two before breakfast to an hour or so after supper, with morning and afternoon hours off for most personnel. Both outfits will feed equally well. The answer is organization.

Where everybody cooperates, the work is easy. If the cook on shift finds it possible to do some little thing that will make the work lighter for the next shift, he may have his favor repaid. If the mess officer and mess sergeant plan their menus with a view to range capacities and the amount of work involved in each dish, the work in the kitchen can achieve an even flow that wears nobody out.

The same rules that suffice for handling men on the drill field or the battlefield operate also in the mess hall. Force, reasonableness, consideration, insistence on performance of the mission—all have their places. Many organizations are troubled with temperamental cooks—men who know they are good and trade on the dependence that is placed on them. To the wise mess officer or mess sergeant, no cook is *that* good. If the cook feels that his skill with skillet and cleaver is so unusual that it gives him license to drink on duty, be disrespectful to his superiors, be disobedient, or to be surly to his subordinates, turning him to straight duty often works wonders. Surprisingly enough, the mess won't suffer nearly as much as it was feared. The well-organized kitchen always has somebody else groomed to step into every pair of shoes.

A mess officer once found himself at odds with his best cook. The occasion arrived when the cook disobeyed an order. The cook was blistered in fine style by the officer and was ordered back to work.

Several days later it was reported to the mess officer that the company supply of lard substitute was exhausted, six days before the regular 10-day shipment was due. A discreet investigation proved without question that the cook was burning up the shortening, deliberately permitting the valuable substance to go up in smoke by not regulating his cooking temperatures. The cook found himself carrying a rifle in the third squad; the mess officer found that one of the KP's was a better cook than the prima donna.

This story has three morals. *First:* Investigate every occurrence in the mess hall that doesn't fit the pattern; in this case, the sudden increase in consumption of shortening. *Second:* No cook is so good that he cannot be replaced. *Third:* Always have a waiting list of cooks.

Another item of organization that deserves attention is the matter of having meals on time. When mess call blows, the mess hall should be ready to feed the men. If the men must wait in line for even a few minutes, part of the enjoyment of the meal is lost. If the wait is longer, it means the men must hurry through their meal to get ready for the next formation. It is equally undesirable to have meals ready too early. There are few foods that will not deteriorate in some respect if they are cooked and ready to eat for periods longer than ten minutes before the men get to them; some dishes, fried eggs for example, lose their palatability within a minute or two. Mess formation is no time for announcements or other company business. The mess sergeant has a right to expect that the men will enter the mess hall as quickly as possible after mess call blows.

6. Table or cafeteria service. Where the equipment and the personnel are available, table service is to be preferred to cafeteria service. Aside from the fact that it is human nature to want to be waited on, table service has other advantages. The men will be able to choose the size of their portions and will have some choice as to whether they take "fat or lean." They will have less standing in line. There will be less chance of spilling food.

Cafeteria service, if properly organized, is the fastest method of feeding large groups; it requires fewer mess personnel and less equipment. Table waiters are not required, and serving dishes are not needed. Company and similar size messes ordinarily can have table service without straining their resources; larger messes usually will be limited to cafeteria service.

7. Mess hall discipline. There is no reason why any organization of the Army of the United States cannot have order, quiet, and ordinary politeness in its mess hall. A noisy mess hall, peopled with men out of proper uniform, where the diners snatch food, curse, go in for horseplay, and generally act like gutter rowdies, is a sign of poor organizational discipline.

Uniform regulations applicable to the mess hall should be posted where the men will have no excuse for missing them. The regulations should be strict but reasonable. It is not asking too much to have the men at least wash their hands and faces and comb their hair before entering the building. Soiled fatigue clothes may be permitted if the men are to go right out for drill or work in fatigues after the meal; but, if there is to be no duty for a reasonable period after the meal, O.D. uniform should be required. It is a simple matter for an officer or "noncom" to walk through the mess hall, pick out those who are not properly dressed, and order them out of the building. The same man will hardly violate the ruling twice.

There is a point where ordinary table conversation ceases and excess boisterous-

ness starts. It is a function of leadership to hold things below that point. Cursing and filthy language have no place where food is served or eaten. There are squeamish men in the ranks; it is no sign of weakness that a soldier prefers to do without filthy talk at meals.

Some organizations prefer to have a noncommissioned officer at each table, to be in charge of discipline there. Other units would rather have their "noncoms" eat together at a certain group of tables for the stimulating interchange of ideas that often characterizes an officers' mess. If the second system is used, it is good training in leadership to appoint a private as table monitor for a one-week or two-week tour, at the end of which period another man is appointed.

8. Religious taboos. Freedom of religion is one of the bulwarks of our democracy. Practically every religious sect gives men in the uniform of their country dispensations as to food prohibitions. The Catholic soldier may eat meat on Friday; the Jewish soldier may eat pork or beef that has not been slaughtered according to ritual. Where men of any religious faith find fault with the menu on the grounds of their faith, it is a good idea to call in the Chaplain for a three-cornered discussion of the problem.

Many organizations do arrange their Friday menus so that Catholics may get satisfactory nourishment without eating meat, and at the same time the rest of the men get a more or less normal menu.

9. Sufficient food. It is basic doctrine, at any Army mess hall, that no man need leave the table hungry. The ration provides food enough for the hungriest. Naturally, if the main dish is roast beef and certain men do not like roast beef, it would be idle to waste any tears on their plight. However, if a dish is served that the *majority* of the men do not like, and therefore eat little of it, a change in the menu is indicated. It is the worst kind of selfishness to feed a dish that the men do not like just because the mess officer does like the dish or because he thinks they should learn to like it.

On the other hand, it happens occasionally that something is spoiled in the cooking, and the men actually cannot eat it. Then is the time to break out the corned beef or the tinned salmon—they may not like it, but it is food. If you run out of the main dish before the men are satisfied, break out a substitute immediately.

One mess officer found that a great morale builder was to give every man in his battery the privilege of telling him at the close of the meal that he hadn't had sufficient food. In five months four men availed themselves of the privilege. In three of the cases it was proved to the satisfaction of the complainant that the vast majority of the men found the main dish plentiful, palatable, and satisfactory. The fourth man was given a note to the mess sergeant to give him all he could eat. He ate eleven fried eggs and a suitable quantity of toast—proving that he had been hungry. Everybody was satisfied except the mess sergeant, who thought the whole idea smacked of pampering the men. The system worked because complaints were forestalled; the men knew an attempt was being made to treat them right.

10. Variety in menus. The best food will taste flat if it is served over and over again. The basic plan of army messes to avoid the old "beef on Monday, stew on Tuesday, hash on Wednesday" complaint is the ten-day menu. The advantage of this plan is that no day of the week may become identified with any particular dish, which is a deadly situation. One ten-day menu is not enough. At the end of the thirtieth or fortieth day the men will begin to sense the rhythm of the menus. At least three basic ten-day menus should be on hand, and there should never be any hesitation about changing them when different foods become available. If the mess officer is able to buy sole (which the men have not had for a long period) at an advantageous price, he should not hesitate to substitute it for the haddock that has been on the menu every tenth day for several months.

11. Ration savings. Some mess officers and most mess sergeants are prone to build up unduly large mess funds. Service Command and other headquarters will often try to discourage this practice by placing limits on the value of the mess funds; all amounts over the regulated value are turned back to the Treasury or held in trust for the organization.

The ration money that is issued an organization is for the use of the men in that organization. It is not contemplated that meals shall be skimpy so that a fund may be built for the future glory of the organization. The men who are

being deprived of the food that money can buy may die, be transferred, or be discharged before the time comes to spend the money. It is only fair that the man have the benefit of the ration allowance that comes to the company as a result of his assignment to that company.

It is well to have some ready cash and a fair amount of stock on hand. Ready cash is necessary at times to take advantage of favorable markets, for special dinners, and to tide the organization over periods when for any of several reasons it is particularly hard to feed within the allowance. But don't overdo it. It is hardly fair for an organization commander to build a large fund to protect himself in the event that poor management may put the fund in the hole.

It is possible to make savings that can be put back into the mess by using judgment in purchasing. For instance, the markets of the past ten years show almost a continual see-saw between the price of pork and beef. By feeding more beef when pork is high, and feeding more pork when beef is high, the men get their normal allowance of meat, but savings are made which may be spent for luxury items. This system cannot be used when the field ration is issued.

12. Baked goods. The chapter on Baking in this manual is more complete than any company or similar organization will ever find use for. However, the wisely-run mess feeds large quantities and wide varieties of baked goods, and there are times when Quartermaster and commercial bakeries are not available. Situations have occurred where there was no Quartermaster bakery sufficiently close to a unit to supply fresh baked goods, and nearby commercial bakeries were either prohibitively high in their rates or low in their quality, or both.

The organization that has a competent baker will find that men can be fed quantities of inexpensive rolls, cookies, and pastries at a cost far less than that of the articles they displace from the menu, and that the men will be pleased with the idea of fresh baked goods in quantities that obviate the necessity of limiting portions. Aside from the fact that baked goods lend variety and are filling and healthful, they take the place of more expensive desserts.

Bread baking within the organization, though not desirable where other arrangements can be made, is often a necessity. At least one member of the mess organization should know how to bake bread.

The recipes in this manual are good and are easily followed. In one organization, a soldier approached the mess officer and made the offer that he would take over the kitchen in the evening, when the cooks went off shift, and bake pastries for the unit on his own time. If his work was satisfactory after two weeks, he was to be given permanent assignment as company baker. The offer was taken; the man made the grade. It was found out, several weeks later, that the man had never baked in his life; that his recipes and instructions came from TM 10-410, most of which is published in Chapter 5 of this manual.

13. Mess records. It is important to keep accurate mess records, for the reasons listed in Chapter 2. To keep accurate mess records, it is necessary to make entries as the transactions occur—twenty-four hours' delay in making entries, the human mind being what it is, may result in wrong entries or missed ones. Cooks, mess sergeant, and mess officer must all do their part in keeping records up to date.

14. Conclusion. Operating a good Army mess is little different from any other Army activity. Close supervision, good organization, initiative, imagination, and plenty of hard work to learn the fine points will insure success. Mess management is not a spare-time job, nor is it a routine job. The organization commander, mess officer, mess sergeant, or cook who is too easily satisfied with what the men are getting and how they are getting it, is taking chances with the health and morale of the troops—a dangerous policy.

SECTION II

TRICKS OF THE TRADE

15. Not in the book. The material in this section comprises the things that are "not in the book," but that have been learned by experience in many messes. There are many expedients and other "angles" that do not, and cannot, appear in official publications as a matter of War Department policy. However, experienced

mess personnel have learned these things by experience, and they are passed on in this section for use *where needed*.

16. "Stretching." It is stated elsewhere in this Manual that the Army ration is more than sufficient to feed the American soldier. That is true. However, situations may arise, due to causes ranging from ineptitude of mess personnel to bad luck with spoilage, where it may become necessary to pare expenses—but *not* at the expense of well-balanced, wholesome menus. Here are a few hints on "stretching."

a. Soup. In spite of all that has been written about stock pots, it is a fair bet that five messes out of six do not keep a stock pot—and that a fair proportion of those messes that do keep a stock pot do not use it, but merely have it on the stove to satisfy inspecting officers. This is a sad mistake. Good soup, once the men learn to eat it, is an inexpensive filler of empty stomach, and reduces the quantity of expensive meats that are consumed by hungry men. In organizations where "the men just won't eat soup," it might be traced to the fact that soup is served on very hot days, or that the soup itself is not tasty and nourishing. Remember, soldiers don't care for bouillon or other thin soups—they want thick soups that stick to the ribs. Serve it on cold days; the men will learn to like it.

b. Baked goods. Read paragraph 12 again. Good baked goods keep men happy.

c. Butter. Unless there is more money in the mess fund, or more butter in the icebox, than you need, serve butter in individual pats rather than in quarter-pound blocks. In the first place, butter seldom looks appetizing after eight or more men have used their greasy knives on a block of it. The second consideration is that of economy. When butter is served in pats, using a central dish, many men will be satisfied with an individual pat as their portion, and will not reach for more. Slicing it from a block with their knives, soldiers almost invariably take more on their plate than they can use. Try serving butter in individual pats, placed in a central dish *with ice*. It will go further, and be more sanitary.

d. Slicing. Thin slices will cut down the consumption of meat and cheese, providing the slices are not *too thin*. To most men, a pork chop is a pork chop, whether it be $\frac{3}{8}$ of an inch thick or two inches thick. Of course there is a point of diminishing returns, beyond which thinness must not go. When thin slices become shavings, the men will begin to take more on their plates at the same time they complain about starvation slicing. Remember the story of the Indian recruit who took his slice of beefsteak to the cook and said, "You slice 'im?" The cook said, "Yes, so what?" The Indian grunted, as Indians are supposed to, and said, "Damn near miss 'im!"

e. Cold drinks. Many mess sergeants of the old school, especially when feeding young soldiers or recruits, take very good care to have huge quantities of ice-cold lemonade or iced tea on the table when the men come in from a hot morning of drill. This is not done through kindness, but in the knowledge that a man with a quart and a pint of delicious lemonade under his belt will go light on the rest of the meal. This is *not good practice*. Lemonade is a poor base for a day's work. Besides, the shock of large quantities of ice-cold liquid on an overheated body may lead to illness.

f. Sauces and eyewash. A small piece of ordinary white cake is a poor dessert, but that same piece of cake with a tasty sauce containing lemon extract and raisins will pass muster with any organization. The extra little touches, like the toast under meat and the jam on the table, cost very little and pay off large dividends in contentment.

17. About inspectors. It is well to understand that no inspector who has ever been a mess officer can fail to find something wrong with a mess hall and kitchen if he wants to. However, the things he finds wrong may be basically serious, or merely the little things that he knows he himself found no way of curing when he was a mess officer. Concentrate on the serious things—but don't forget the trivial things.

The first, important thing in dealing with inspectors is honest-to-goodness cleanliness. To achieve that result, everybody must think cleanliness and sanitation all day long. Obvious dirt, flies, foul odors, and unkempt personnel are the first objectives. There is no excuse for lapses in these particulars. Then go after the less obvious dirt—the spaces between the knife blade and knife handles; the underside of the table boards and the frames of the tables; the corners of the bread rack; the storeroom shelves; the lids of the G.I. cans; under the steps; the mess

sergeant's office; the icebox. When you have these under control, you can breathe more freely, but never relax vigilance.

Iceboxes are a prolific source of inspector trouble. Don't permit paper cartons in iceboxes; keep things separated; don't put odoriferous items beside odor-absorbing items (onions and butter, for instance); keep the drain pipes as clean as a table top; take everything out of the icebox weekly and swab it out with some deodorant approved by the medical officer. Even baking soda will help keep an icebox clean.

Greasetraps will haunt mess personnel as long as there are armies. No matter how often you clean greasetraps, there will be odors. Men naturally do not like to work in the foul-smelling devices, with the result that the cleanouts, unless supervised, will be hit-or-miss or miss entirely. But the greasetrap is one of the first things an inspector with savvy will head for. This takes leadership—but it's your baby. While we have inveighed against K.P. as a punishment detail, a few greasetrap-cleaning sessions will bring recalcitrants to their right senses.

Any inspector worthy of the name will find out within a very few moments whether the food the men have been getting for the past few days agrees with the menus as posted. See that the menus agree with what has been served, if you can't do the *vice-versa*. If there are changes, have good reasons ready. No inspector will be unreasonable about substituting a *better* menu, but explanations are in order when the actual menu is inferior.

18. For mess officers only. Your cooks and your mess sergeant are human, and human beings often take the line of least resistance. In a messhall, the line of least resistance often leads to warm and wilted salads, cold and greasy meat dishes, and dried-out foods of all kinds. It is so easy to make your salads at 10:00 A.M. and let them sit out until noon, and to prepare the French fries an hour before mealtime and serve them as blocks of wood. Help your mess personnel plan their work so that the hour before the meal will see all the food reaching final preparation at once, except for the few items that standing around will not harm. Blistering and blustering *after* mess call blows will not help—the cooks will tell you it's impossible and that will be that. Spend a day in the kitchen occasionally, and prove to the men that salads can be cool and crisp, that ice-cream bars need be served neither in liquid form nor hard as iron, and that most good food doesn't bounce when dropped.

19. For all mess personnel. Always remember that the garbage can draws no rations, but often gets more food than a platoon. Good judgment and an active conscience are necessary to keep the garbage can empty of everything but garbage.

CHAPTER 2

MESS MANAGEMENT

SECTION I

SUPERVISION AND CONTROL

1. Mess management. *a. Definition.* Mess management is the supervision and control exercised over every phase of the operation of an Army mess. This supervision is a function of command; all commanders of armies, corps, divisions, brigades, regiments, battalions, and companies exercise some supervision over messing. Direct control is exercised by the mess officer who is assisted by the mess sergeant, cooks, and other mess personnel. The mess officer of an organization may be the commander or an officer designated by him.

b. Functions. Good mess management requires advance planning and timely preparation. This is important. A frequent cause of poor messes is failure to plan. Each company, troop, and battery usually conducts its own mess with the personnel assigned to the organization. Under some conditions it may be advantageous to combine two or more units in one general mess. It may be done when the strength of organizations becomes low, in order to effect economy and efficiency in management and operation. The fundamental principles of mess management are the same for all arms and services, but the equipment may vary somewhat because of the different kinds of service certain organizations may be called upon to perform. It is not necessary for a mess officer to be an expert in cooking and nutrition to manage a mess efficiently. But, he must apply fundamental principles and check the operations daily to see that the food is well prepared and served without waste; that left-over foods are used and not thrown away; that mess attendants are free from disease; and that cleanliness and sanitation are observed in all respects.

2. Duties of personnel. *a. Organization commander:* (1) The organization commander is responsible for the maintenance of a satisfactory mess. He will lay down definite principles of mess management for the guidance of the mess officer.

(2) The organization commander is responsible that his instructions are properly carried out. This necessitates constant inspection. Lack of attention to these duties usually results in a poor mess.

b. Mess officer. The mess officer is directly responsible to his immediate commanding officer for the operation of the mess. The commanding officer of a company, battery, troop or similar unit is not relieved of responsibility for the operation of the mess by appointing a subordinate as mess officer.

(1) The mess officer will obtain the required subsistence, equipment, and supplies necessary for the operation of the mess, and the feeding of the troops.

(2) He will inspect all subsistence received for quality and quantity. Only in emergencies will he delegate this responsibility to the mess sergeant.

(3) He will make frequent daily inspections of the mess. During these inspections he will see that—

(a) All subsistence is properly stored according to its perishable nature.

(b) The menu is being followed. Only authorized substitutions will be made.

(c) Correct methods of preparation, cookery, and serving are employed to avoid waste and preserve the nutritive value of foods.

(d) Left-overs are kept to the minimum and are utilized to the fullest extent.

(e) Accounts and records pertaining to the ration in effect are posted and accurately maintained at all times.

(f) Inventories pertaining to the mess are properly recorded.

(g) All mess equipment is properly maintained and kept in a good state of repair.

(h) All phases of mess sanitation are enforced at all times.

(4) The mess officer will encourage all mess personnel to further their training and efficiency at all times.

(5) The mess officer, assisted by the mess sergeant, prepares the menu when the garrison ration is in effect.

(6) An ideal mess will have additional mess personnel available in the organization at all times.

(7) The mess officer will frequently sample dishes to determine their palatability and attractiveness.

c. Mess sergeant. (1) The mess sergeant is directly in charge of the detailed operation of the mess and responsible to the mess officer for it. He will supervise the work of the mess personnel in a manner to promote harmony and efficiency.

(2) He will supervise the actual preparation, cooking, and serving of the food.

(3) He is responsible for keeping the mess building, equipment, and area in an excellent sanitary condition at all times.

(4) He will organize the work in the mess assigning such detailed duties to individuals working under his supervision as are necessary for successful operation.

(5) He will maintain order in the mess at all times.

(6) He will assist the mess officer in planning menus and keeping the necessary records and accounts.

(7) He will check appliances, equipment, etc., frequently, reporting any shortage and recommending all necessary repairs.

(8) All breakages will be promptly reported to the mess officer to enable him to establish responsibility therefor and to prepare the required Statement of Charges.

(9) He will take all steps necessary to insure the proper utilization of all food and to eliminate waste.

d. Cook. (1) The cook will constantly bear in mind that the food he prepares is the ration of the troops, entrusted to him for its preparation and serving. He will personally prepare all dishes called for on the menu. He will take an interest in his duties and constantly endeavor to produce the best possible meals to promote the health, contentment, and pride of the organization.

(2) He will observe the rules of personal hygiene at all times. He will keep his kitchen and equipment clean and eliminate all methods of work that will cause waste.

(3) He will personally fire the ranges and see that there is an ample supply of fuel available at all times.

(4) During any absence of the mess sergeant, he will assume the duties and responsibilities of that office.

(5) He will study the menu, plan his procedure and, before starting each task, will assemble the equipment and ingredients to increase his efficiency.

(6) Prior to closing the mess hall at night he will see that it is put in order, that all windows and doors are secured, lights extinguished, foods properly stored, that fuel is on hand, and that advance preparations have been made for the breakfast meal.

e. Kitchen police. The kitchen police are under the direct supervision of the mess sergeant and cooks and will perform the following duties:

(1) They will assist in all tasks necessary to keep the entire mess hall and all utensils scrupulously clean at all times.

(2) They will assist the cooks in the preparation of foods prior to cooking to the extent of washing, peeling, and slicing vegetables, fruits, etc.

(3) They will assist in serving the food to the troops under the direct supervision of the mess sergeant.

(4) They will assist in the receiving and storage of subsistence and will perform such other duties in connection with the mess as may be directed.

f. Dining room orderly. The dining room orderly is responsible to the mess sergeant for the cleanliness and arrangement of the dining room. He will set the tables with the necessary china and glassware, silver and condiments and, under the supervision of the mess sergeant, will assist in the serving of the food.

3. Kitchen planning and supervision. *a.* Cooks should change shifts at noon. This enables each shift to have a break in its hours of duty.

b. The organization of cooks into shifts depends upon the size of the mess and the availability of cooks. Several suggested arrangements follow:

(1) Three cooks available.

(a) Two shifts of one cook, using the third cook for pastry only.

(b) Each cook performing one day in charge and one day assisting out of each three days.

(2) Four cooks.

(a) Two shifts of two cooks each.

(b) As in (1) (b) above with one cook used for pastry only.

(3) Five cooks. (This is most satisfactory.)

(a) Two shifts of two cooks, one cook for meats, and one for vegetables. The fifth cook is a pastry cook.

(4) Six cooks. Same as above with two pastry cooks.

c. In planning menus, the mess officer should take into consideration the available oven space and cover space to permit maximum use of range during normal hours and to avoid cooking at night. Pastry should, if possible, be prepared on the day it is to be used. The need for good pastry at every meal cannot be overstressed. It has a close bearing on the reputation of the mess and on providing a satisfying mess within the value of the ration.

d. Every effort should be made to feed only three meals a day and to have these meals served promptly at the specified hour. Two sittings throws an undue burden on the cooking force, wastes valuable time of the organization, and tends to lower the quality of the cooked foods.

e. Proper standards of behavior, dress, and cleanliness of men at meal time is essential to a good mess. One officer should be present at each meal to see that these standards are maintained.

f. The mess officer should inspect the kitchen about an hour before each meal to see that the food is properly prepared, that it will be ready at mealtime, that it is properly seasoned and that it is palatable.

4. Inspection. a. Although the quartermaster inspects all foods when received by him, this does not relieve mess personnel from the responsibility of inspection when received in the mess. In the absence of the mess sergeant it becomes the duty of the cook on shift to receive, inspect, sign for, and properly store all food items received, unless other definite arrangement has been made by the organization commander.

b. Mess personnel should see that all food received in the mess is clean, sanitary, wholesome, in full weight and measure, and of the grade required by Government specifications. Food which is decomposed or rotten, insect infested (wormy), moldy, musty, etc., should not be accepted. While it is not expected that mess personnel be experts in determining whether the grade is that required by Government specifications, whenever it is suspected that food delivered is below the required grade, the matter should be reported to the organization commander. Discrepancies in weight, measure, or count should be noted on the delivery ticket or invoice before the foods are accepted. A few minutes spent in making the proper inspection of foods at the time of delivery will insure receipt of clean, sound, and wholesome food and will result in an annual saving of many dollars to the mess.

c. It is especially important to inspect for condition all highly perishable foods as meats, fish, poultry, fresh milk, fresh fruits and vegetables, butter, eggs, etc. It also is important to inspect canned foods to see that there are no swelled or leaky cans and to inspect cereals to see that there are no insects or worms present. Examples of foods which should not be accepted are slimy, evil smelling, or bruised meats, fish, and poultry; scabby or rotten potatoes; wilted or badly rusted lettuce; scaly or spotted apples; bruised peaches; swollen or leaking canned foods; and insect-infested or wormy flour or cereals.

d. Accurate scales should be available in every mess. The Government contracts for net weights—that is, the weight of the food with weight of the container deducted. A mess should not pay for something it does not receive. The weight of wrapping paper, burlap bags, cardboard containers, etc., should be deducted when checking weights.

e. Meat which has spoiled or is starting to spoil has an unmistakable odor and usually is slimy on the surface. In carcass beef, spoilage starts first on the inner side under the skirt or where portions of the meat touch each other. A test to reveal the beginning of spoilage in fresh meat is the knife-blade test. Thrust a knife blade through the flesh until the point strikes the hip or shoulder joint. Withdraw the knife and smell the point of the blade immediately. Putrefaction usually starts at the joint and causes a foul odor. If the meat is spoiled, the incision made by the knife blade will remain open and the blade is easily withdrawn. In any case of doubt the decision should be made by a qualified inspector.

f. Spoilage of canned food is generally indicated by swelling cans. The con-

tents of a can with swelled or bulged ends or sides should never be served. Starchy vegetables, as corn, pumpkin, squash, etc., sometimes spoil without swelling the can, but on opening the can the spoiled condition is unmistakable, as the odor and taste are very disagreeable.

5. Storage of foods. *a.* All foods spoil more rapidly in warm temperatures than in cold. This especially applies to highly perishable foods, as meats, fish, butter, eggs, milk, etc. Spoilage of most foods is hastened by dampness. In general, foods keep best when dry and cold.

b. Refrigeration—temperature, humidity, air motion. (1) The purpose of refrigeration in the mess is to reduce, by means of controlled cold air, the growth and activity of factors which cause spoilage. The refrigerator should be used only for highly perishable items. Products placed in the refrigerator unnecessarily may cause overcrowding and result in poor operation and unsanitary conditions. Foods which are spoiled should never be placed in the refrigerator. Excessive dampness may be caused by poor air circulation or spilled liquid and is as undesirable in the refrigerator as anywhere else.

(2) The mess refrigerator should produce a storage temperature of 50° F. or lower, whether cooled by ice or mechanical means. A lower temperature is more desirable and 40° F. may be obtained in refrigerators properly designed for that purpose.

(3) Care should be used when storing food in the refrigerator, in order to avoid interference with the air circulation. Cold air is heavier than warmer air, hence the air is naturally circulated downward from the cooling coils or melting ice, and upward through the storage space, continuing to the ceiling where it moves across to the cooling section, is cooled, and again moves downward on another cycle. Good air circulation is necessary to produce a refrigerator temperature of 42° F., which is 10° above the melting point of ice. Larger size refrigerators may be equipped with small electric fans to make the air motion more positive and effective. In this design, the air is drawn upward by the fan, through the cooling section, and discharged across the ceiling where, due to its temperature and weight, it moves downward through the storage space.

c. Operation of refrigerators. (1) Keep the refrigerator clean by frequent washing and wiping. Thoroughly scrub it out at regular intervals, at least once a week with soap and hot water.

(2) Ice-cooled refrigerators, and so-called wet-coil mechanically cooled refrigerators, are equipped with drain lines to carry away water from melting ice and condensate. Keep the drain pipe open. It should be disconnected and flushed out with hot water once a week to remove accumulations of slime which will form. The drain trap in the floor of the refrigerator should likewise be kept in good working order. Provision should be made to drain away the water outside the kitchen so that insect breeding is minimized.

(3) The doors should fit tightly all around. There should be no uncovered openings in the floor of the refrigerator which will permit the loss of cold air or the admission of insects. If repairs are needed, report the matter.

(4) Keep the refrigerator doors closed as much as possible. Air circulation is disrupted and cold air is lost with each opening of the door.

(5) Do not place food in the ice compartment of an ice-cooled refrigerator. Do not wrap the ice with paper or any other material. This interferes with the air movement over the surface of the melting ice and reduces the air cleansing and refrigeration capacity of the refrigerator.

(6) Hang fresh meat on hooks. Avoid piling. Do not hang meats so that pieces touch each other. Where blood may drop from meat, dishes should be placed underneath. Do not pack vegetables too closely.

(7) Food carried too long will eventually spoil in the best refrigerator. Use all left-over foods as soon as possible. Avoid stocking an oversupply.

(8) The ice compartment of an ice-cooled refrigerator should be kept well filled for best results. It should never be permitted to get below one-third full.

(9) Do not expect any refrigerator to perform efficiently when subjected to abuse of the foregoing rules, or if located in too close proximity to cooking ranges.

d. Mechanical refrigerators. (1) Mechanically cooled mess refrigerators may be of two different types:

(a) The so-called dry-coil type operates with a cooling unit temperature which is below 32° F., the freezing point of water. Moisture deposits on this

surface in the form of frost. Although this type may be adjusted to produce a lower refrigerator temperature, the wide temperature difference between the cooling unit and the air of the refrigerator causes a low relative humidity or dry air. Leafy vegetables, such as lettuce, spinach, and celery may be wrapped in a wet covering to prevent wilting. Products high in moisture content, which may pick up undesirable flavors, may best be placed in covered containers, although it is not considered good practice to tightly cover products consisting of living cell structure, such as fresh fruits and vegetables. Frosted coils should be frequently defrosted by means of shutting down the unit, never by the use of hot water or by scraping or chipping. Accumulations of frost reduce the cooling value of the unit.

(b) The extended surface wet-coil type operates with a cooling unit temperature above 32° F., the freezing point of water. Moisture deposits on this surface in the form of drops of water. An electric fan circulates the air of the refrigerator through this cold, wet surface where the air is cooled and some cleansing effect is accomplished. The excess water is taken off through a drain. Due to the narrower temperature difference prevailing, the relative humidity in the refrigerator is higher and no difficulty should be experienced with wilting or drying out of products. The functioning of this type of refrigerator is quite comparable to a well-designed ice-cooled refrigerator.

(2) Ice cubes are frozen only in the units that operate at a temperature below 32° F., the freezing point of water. The water may absorb undesirable flavors before it is frozen and these may be transmitted when the ice cubes are used in food or drink.

e. *Arrangement of food in refrigerator.* (1) The proper grouping of products in mess hall refrigerators will promote sanitation, help to prevent contamination from the absorption of unpleasant flavors, and thus protect the original quality of the product.

(2) Two refrigerators are generally provided in each mess hall. However, when only one is available, it should, if possible, be divided and operated as two separate refrigerators.

(3) Fresh fruits and vegetables give off respiration gases (odors) which in some cases are quite obnoxious. Fluid products, or those high in moisture or fat content, readily absorb odors from other products resulting in off-flavors and loss of quality. Fresh eggs, butter, milk, cream, lamb and veal, etc., are easily damaged in this manner. Likewise, prepared foods, such as coleslaw, salads, gelatin (while liquid), gravies, and sauces are subject to flavor damage. As an example, the wet surface of a cut watermelon will become almost inedible after being placed in a confined space with some fresh fruit and vegetables.

(4) One refrigerator should be used only for eggs, dairy products, fresh meat, and prepared or cooked foods of high moisture content which are not highly odorous.

(5) The other refrigerator should be used for fresh fruits and vegetables and other products prepared or cooked, which are relatively low in moisture content and distinctively flavored.

(6) Products in sealed containers may be placed in either refrigerator without becoming damaged or causing damage to other products. However, it is not advisable to use covered containers for other than cooked or prepared foods.

(7) Some perishable products need not be placed in the mess hall refrigerators. It is seldom that products are carried beyond 2 or 3 days and the general supply room should be entirely suitable for these.

(8) The following is a list of products which *should always be properly placed* in one of the two refrigerators.

(a) *First refrigerator.*

Butter.

Cheese.

Cream.

Fresh eggs.

Fresh meat and meat products.

Milk and buttermilk.

Fresh poultry.

Cold cuts—delicatessen meats.

Cooked or prepared foods (high in liquid content and not highly odorous) such as coleslaw, salads, custards, puddings, liquid gelatin, gravies, sauces, cooked vegetables, cooked fruit, and cooked meat.

NOTE.—All cooked food should be permitted to cool before placing in the refrigerator.

(b) *Second refrigerator.*

Asparagus.
Beans, green or wax, snap.
Beans, green limas.
Beets, small, tops on.
Broccoli.
Brussels sprouts.
Carrots.
Cauliflower.
Celery.
Corn, green.
Cucumbers.
Endive.
Lettuce.
Okra.
Peas, green, pod.
Peppers.
Radishes.

Spinach.
Summer squash.
Turnips, tops on.
Tomatoes, ripe.
Apricots, ripe.
Berries.
Cherries.
Currants, fresh.
Cranberries.
Figs, fresh.
Grapes.
Nectarines, ripe.
Peaches, ripe.
Pears, ripe.
Plums, ripe.
Watermelons, not cut.

(c) *Smoked meats, etc.* Uncut smoked meats, such as whole ham, bacon, and bologna are preferably placed with the fruits and vegetables in the second refrigerator. When sliced or with exposed cut surface, the first refrigerator is preferable.

(d) *Ice.* Where the refrigerators are mechanically cooled and ice is to be carried in one, it is more desirable to place the ice in the second refrigerator. The resulting increased humidity will help keep the products fresh and crisp and the ice is also beneficial in that the melting surface absorbs and carries away to the drains organic gases developed by the products in the confined space.

(9) Following is a list of products which should be kept in the supply room. They need not be placed in a refrigerator as some of them may be damaged or cause damage if placed there. As an example, dry onions may become damp and moldy.

Artichokes.
Apples.
Avocados.
Bananas.
Beets, mature.
Cabbage.
Casabas.
Citrus fruits.
Dates, fresh.
Eggplant.
Fruits, dried.
Garlic.
Melons, honeydew, cantaloupes.
Nectarines, green.
Onions.
Parsnips.
Pears, green.
Peppers, cured, pod.
Peaches, green.

Plums, green.
Potatoes, white or sweet.
Pumpkins.
Rutabagas.
Squash, hubbard.
Tomatoes, firm.
Turnips, large.
Lard and lard substitutes.
Fish, dried, smoked or salted.
Glucose, sirups.
Honey.
Meat, canned.
Milk, evaporated, canned.
Molasses.
Nuts.
Oil, cooking.
Pickles and relish.
Sirups.

f. *Storeroom.* (1) It is of great importance that the food storeroom be kept clean and sanitary, as otherwise it may become the starting point of sickness. All the foods on hand should be examined frequently for spoilage. This applies especially to canned foods, spoilage of which usually is indicated by swollen cans. Neat and orderly arrangement of foods in the storeroom is important and should be a matter of pride to the cook. The same kind of foods should be stored together so that foods available can be easily and quickly found. Open packages of foods should not be kept on the floor in dark corners, as it is in such places that they are more liable to become insect infested, or to be attacked by mold or rot.

(2) No spoiled food should be kept in the storeroom or the kitchen. Spoiled

foods awaiting return to the seller should be set apart from other foods, preferably in boxes or closed containers, so they will not contaminate other foods.

(3) Roasted and ground coffee should always be kept in a tightly closed container, as otherwise it loses strength rapidly.

(4) Dark corners and places under shelves, etc., should be examined frequently to determine whether there are any roaches, ants, etc., present. One of the best ways to keep down insects and vermin is *not* to leave any dirt or scraps of food, crumbs, etc., scattered about the kitchen or storeroom. Vermin naturally gather where they can get food.

(5) Many foods absorb odors, and many other foods such as onions give off strong odors. Keep such foods segregated (onions in slatted bins), and do not keep any articles such as varnish, kerosene, oily rags, etc., in the storeroom.

SECTION II

THE RATION

6. Rations. *a. Definition.* A ration is the allowance of food for one person for one day provided by the Government for the subsistence of soldiers and other authorized personnel. An officer is not entitled to a ration, but in the field one may be issued to him for which he makes a proper money value deduction on his pay voucher.

b. Method of issue. A ration may be issued in the form of a money allowance which messes are permitted to use for the purchase of any kind of food. The garrison ration is issued in the form of a money allowance. The sales officer gives each mess a money credit for the money value of the ration. For example, if a company mess has a strength of 100 men on August 1 and the value of the ration for August is \$0.30, the sales officer gives the mess a credit for \$30. The mess then purchases food from the quartermaster as it desires. If the mess purchases less than \$30 worth it is entitled to the saving in cash. This is called the "ration savings" privilege. The cash savings are placed in the company fund and may be spent at any later date for food. For convenience, the amounts are settled by the quartermaster once a month. The ration may be issued in kind; that is, in the form of actual food, whereupon there would be no cash allowance or "ration savings" privilege. The field rations are issued in kind. In time of war or mobilization the "ration savings" privilege is usually suspended, and rations are issued in kind whether troops are in the field, in camp or garrison, or traveling.

7. Kinds. The Army uses several kinds of rations, each intended for special conditions of service. They are:

Garrison ration.

Filipino ration.

Travel ration.

Field ration.

a. Garrison ration. (1) The garrison ration is that prescribed in time of peace for all persons entitled to a ration, except under specific conditions for which other rations are prescribed, and consists of the components listed in Par. 8.

(2) The garrison ration is issued in the form of a money credit and *not* in the form of food. The cost of the ration is computed monthly by each post, camp, or station quartermaster, based on the current local cost of the components listed in Par. 8.

(3) Each organization rationing troops at a station where the garrison ration is authorized is given a money credit in the amount of the total value of the ration for the number of men in the organization, and the mess may purchase any articles of food desired, within the provisions of AR 210-50.

(4) All purchases must be accurately controlled to enable the mess to operate within the allowances credited. Accounts will be closed and settled monthly. Any savings effected can be expended in subsequent months.

b. Filipino ration. The Filipino ration is that prescribed in time of peace for the Philippine Scouts. Its components are listed in AR 30-2210. The Filipino ration is issued in the form of a money credit in the same manner as the garrison ration. In time of war, Philippine Scouts are issued the prescribed field ration.

c. *Travel ration.* The travel ration is prescribed for troops traveling otherwise than by marching and separated from cooking facilities.

The ration is issued in kind and the components are listed in AR 30-2210.

d. *Field ration.* The field ration is that prescribed for use only in time of war or national emergency when the garrison ration is not used. It is issued in kind and no ration savings are allowed. Its components and substitutes will be prescribed by the War Department or the commander of the field forces and will consist of the following:

(1) *Field ration A.* This ration will correspond as nearly as practicable to the components or substitutes thereof of the garrison ration. This type of field ration will be issued as often as circumstances will permit.

(2) *Field ration B.* This ration will correspond as nearly as practicable to the components of field ration A with the exception that nonperishable processed or canned products will replace items of a perishable nature. (See paragraph 9).

(3) *Field ration C.* This ration will consist of previously cooked or prepared food, packed in hermetically sealed cans, which may be eaten either hot or cold, and will consist of six cans per ration as follows:

3 cans containing a meat and vegetable component.

3 cans containing crackers, sugar, soluble coffee, and candy.

(4) *Field ration D.* This ration will consist of three 4-ounce bars of concentrated chocolate.

(a) In time of war, types C and D field rations are to be issued only upon orders of the commander of the field forces. In time of peace, such of these types as are available may, for training purposes, be utilized when directed by proper authority.

(b) When deemed advisable, a combination of types C and D may constitute the field ration. This will normally consist of 2 cans of the meat and vegetable component, 2 cans of the crackers, sugar, soluble coffee and candy, and 2 each of the 4-ounce bars of concentrated chocolate.

(5) *Field ration K.* This ration will consist of previously cooked or prepared foods, packaged in moistureproof containers, and will comprise three packages per ration as follows:

(a) *Breakfast unit.*

1 package K-1 biscuit.

1 package K-2 biscuit.

1 can veal and pork loaf.

1 package malted milk-dextrose and dextrose tablets, flavored.

5 grams soluble coffee.

3 tablets sugar.

1 stick chewing gum.

2 cigarettes.

(b) *Dinner unit.*

1 package K-1 biscuit.

1 package K-2 biscuit.

1 package cheese, processed American.

1 fruit bar.

3 tablets sugar.

1 package lemon juice powder.

1 stick chewing gum.

2 cigarettes.

(c) *Supper unit.*

1 package K-1 biscuit.

1 package K-2 biscuit.

1 can pork luncheon meat.

1 2-ounce bar field ration D.

1 package bouillon powder.

1 stick chewing gum.

2 cigarettes.

NOTE.—This ration has not been standardized. The components may be changed from time to time as dictated by experiment and test.

(6) Special rations are prescribed by the War Department for expeditionary forces in tropical and frigid climates and for troops operating in mountainous and desert regions.

8. Garrison ration. Composition. The garrison ration is that prescribed in time of peace for all persons entitled to a ration, except under specific conditions for which other rations are prescribed, and consists of the following:

Article	Quantity	Article	Quantity
Meat: ^{1 2}		Beverages:	
Bacon ----- ounces	2	Coffee, roasted or roasted and ground ----- ounces	2
Beef, fresh ³ ----- do.	10	Cocoa ----- do.	.3
Chicken, fresh ----- do.	2	Tea ----- do.	.05
Pork, fresh ----- do.	4	Milk: ⁴	
Eggs, fresh ----- each	1	Milk, evaporated ----- do.	1
Dry vegetables and cereals:		Milk, fresh ----- do.	8
Beans ----- ounces	.5	Lard:	
Rice ----- do.	.6	Lard ----- do.	.64
Rolled oats ----- do.	1.5	Lard substitute ----- do.	.64
Fresh vegetables:		Butter ----- do.	2
Beans, string, canned ----- ounces	3	Flour, wheat ⁵ ----- do.	12
Corn, canned ----- do.	2	Baking powder ----- do.	.09
Onions ----- do.	2	Macaroni ----- do.	.25
Peas, canned ----- do.	2	Cheese ----- do.	.25
Potatoes ----- do.	10	Sugar ----- do.	5
Tomatoes, canned ----- do.	2	Cinnamon ----- do.	.014
Fruit:		Flavoring extract ----- do.	.02
Apples, canned ----- do.	1.5	Pepper, black ----- do.	.04
Jam or preserves ----- do.	.5	Pickles, cucumber ----- do.	.16
Peaches, canned ----- do.	1.2	Salt ----- do.	.5
Pineapple, canned ----- do.	1.2	Syrup ----- do.	.5
Prunes ----- do.	.3	Vinegar ----- do.	.16

¹ In Alaska the beef component will be increased by 10 percent, the bacon component by 33½ percent, and the vegetable component by 20 percent.

² On Thanksgiving Day and on Christmas Day the meat component will be as follows: Turkey, drawn, 25 ounces; turkey, undrawn, 28 ounces.

³ Alternate forequarters and hindquarters.

⁴ In the Philippine Islands and at remote stations where it is impracticable to procure fresh milk, the milk allowance will be 6 ounces of evaporated milk.

⁵ When it is impracticable to bake soft bread, or if for any reason it is more economical to purchase than to bake it, soft bread will be a component in lieu of an equal quantity of flour. In such instances it is prescribed that 8 ounces of bread, soft, and 4 ounces of flour will be the component in lieu of the flour component.

9. Field ration. a. Composition. (1) The components and substitutes of the field ration will be prescribed by the War Department or the commander of the field forces and will correspond as nearly as practicable with the components of the garrison ration. The following table of food equivalents of component articles of the garrison ration is used for establishing the field ration, Type B:

Component articles of garrison ration	Quantities	Substitutive articles for field ration	Quantities
	Ounce		Ounce
Beef, fresh or frozen -----	10	Lamb, fresh or frozen -----	10
		Mutton, fresh or frozen -----	10
		Veal, fresh or frozen -----	10
		Reindeer meat, fresh or frozen -----	10
		Beef hearts, fresh or frozen -----	10
		Liver, beef, fresh or frozen -----	10
		Beef, corned, canned -----	8
		Pork, fresh or frozen -----	10
		Bacon -----	6
		Fish, fresh or frozen -----	10
		Fish, canned -----	8
		Hash, corned beef, canned -----	10
		Turkey, dressed, undrawn -----	16
		Fowl, undrawn, fresh or frozen -----	16
		Ham, smoked -----	9
		Shoulders, picnic, smoked -----	10
		Sausage, fresh or frozen -----	8
		Sausage, canned -----	8
Bacon -----	2	Beef, fresh or frozen -----	4
		Pork, fresh or frozen -----	3
		Fish, pickled (mackerel) -----	4
		Ham, smoked -----	3
		Beef, corned, canned -----	3

Component articles of garrison ration	Quantities	Substitutive articles for field ration	Quantities
Bacon (Continued) -----	Ounce 2	Hash, corned beef, canned -----	Ounce 4
		Sausage, canned -----	3
		Pork, salt -----	3
		Turkey, dressed, undrawn -----	6
Chicken, undrawn, fresh or frozen --	2	Turkey, undrawn, fresh or frozen -----	2
		Ducks, undrawn, fresh or frozen -----	2
		Geese, undrawn, fresh or frozen -----	2
		Fowl, undrawn, fresh or frozen -----	2
		Beef, fresh or frozen -----	2
		Pork, fresh or frozen -----	2
Pork, fresh or frozen -----	4	Beef, fresh or frozen -----	6
		Bacon -----	2
		Ham, smoked -----	3
		Sausage, pork, canned -----	3
		Sausage, pork, fresh -----	3
		Pork, salt -----	3
		Pork, pickled -----	4
		Turkey, dressed, undrawn -----	4
Eggs, fresh -----	Each 1	Eggs, storage -----	Each 1
			Ounce 1
		Eggs, whole, dried -----	.5
		Eggs, whole, frozen -----	1
Beans, dry (any kind) -----	Ounce .5	Beans, baked, canned -----	1.5
		Cereals, prepared -----	1
		Peas, dried -----	.5
		Hominy, lye, canned -----	2
		Hominy grits -----	.5
		Cereals, uncooked -----	.5
		Rice -----	.6
Rice -----	.6	Corn meal -----	1
		Beans, dry -----	.5
		Peas, dried -----	.5
		Hominy, lye, canned -----	2
		Hominy grits -----	.5
		Cereals, prepared -----	1
		Cereals, uncooked -----	1.5
		Cereals, prepared -----	1
		Rice -----	1
		Corn meal -----	1
		Hominy grits -----	1.5
Beans, string, canned -----	3	Spinach, canned -----	3
		Beans, string, fresh -----	6
		Beans, lima, canned -----	3
		Dehydrated vegetables -----	.6
		Other canned vegetables -----	3
		Cabbage, canned -----	3
Corn, canned -----	2	Beets, canned -----	3
		Dehydrated vegetables -----	.4
		Carrots, canned -----	3
		Potatoes, fresh -----	6
Onions -----	2	Dehydrated onions -----	.4
		Onions, green -----	4
		Beans, string, canned -----	2
		Beans, lima, canned -----	2
		Beans, chili, canned -----	2
		Peas, fresh -----	6
		Other canned vegetables -----	2
		Dehydrated vegetables -----	.4
Potatoes, fresh -----	10	Dehydrated potatoes -----	2
		Potatoes canned -----	10
		Potatoes, sweet, canned -----	6
		Other canned vegetables -----	10
		Tomatoes, canned -----	14
Tomatoes, canned -----	2	Tomato juice, canned -----	2
		Sauerkraut, canned -----	2
		Tomatoes, fresh -----	4
		Fruit juice -----	2
Apples, canned -----	1.5	Apples, evaporated -----	.5
		Apples, fresh -----	4
		Apple butter -----	2
		Canned fruits -----	1.5
		Dried fruits -----	.5
		Jelly -----	.5
Jam or preserves -----	.5	Marmalade -----	.5
		Fresh fruit -----	2
		Peaches, evaporated -----	.4
		Apricots, evaporated -----	.4
		Peaches, fresh -----	2.4
		Other canned fruits -----	1.2
Pineapple, canned -----	1.2	Other canned fruits -----	1.2
		Fresh fruit -----	3
		Prunes, evaporated -----	.1
Prunes, canned -----	.2	Other evaporated fruit -----	.1
		Other canned fruit -----	.3
		Raisins -----	.1
		Currants -----	.1

Component articles of garrison ration	Quantities	Substitutive articles for field ration	Quantities
	Ounce		Ounce
Coffee, roasted and ground	2	Coffee, soluble	.6
		Chocolate, plain	1
		Cocoa	3
		Tea	1
		Other beverages	2
Cocoa	.3	Cocoa preparations	.5
		Coffee	1
		Coffee, soluble	.1
		Tea	.2
		Other beverages	1
Tea	.05	Coffee	.1
Milk, evaporated	1	Milk, whole, dry	.25
		Milk, skimmed, dry	.5
		Milk, condensed	1.5
		Milk, fresh	2
Milk, fresh	8	Milk, whole, dry	1
		Milk, skimmed, dry	2
		Milk, evaporated	4
		Tomato juice	8
		Fruit juice	5
Lard	.64	Oil, cooking	.64
Lard substitute	.64	Lard substitute	.64
		Lard	.64
		Oil, cooking	.64
Butter	2	Peanut butter	3
		Fruit butters	3
		Jams	2
		Jellies	2
Flour, wheat	12	Flour, graham or rye	12
		Bread, fresh	12
		Bread, hard	8
		Corn meal	12
		Crackers	8
Baking powder	.09	Yeast, compressed or dried	.08
		Soda, baking	.09
Macaroni	.25	Spaghetti	.25
		Tapioca	.25
		Cornstarch	.25
		Spaghetti, prepared, canned	1
Cheese	.25	Flavoring, food	.25
		Butter	.2
		Peanut butter	.25
Sugar	5		.25
Cinnamon	.014	Allspice	.014
		Cloves	.014
		Mace	.014
		Nutmeg	.014
Flavoring extract	.02		
Pepper, black	.04	Pepper, cayenne or white	.04
		Paprika	.04
Pickles, cucumber	.16	Other pickles (all kinds)	.16
Salt	.5		
Sirup	.5	Honey, strained	.5
		Jam or preserve	.4
Vinegar	.16	Pickles (all kinds)	.16

(2) In the theater of operations, when these articles cannot be obtained otherwise by the troops, the commander of the field forces may authorize the issue of any of the following items as a part of the field ration, not to exceed the allowances per ration as shown:

Articles	Quantities	Substitutive articles	Quantities
	Ounce		Ounce
Candy	1		
Tobacco, smoking	1	Tobacco, chewing	1
	Each		Each
Papers, cigarette, to each 2 ounces of smoking tobacco allowed.	100	Cigarettes	20
	Box		
Matches, safety, for each issue of smoking tobacco or cigarettes.	.5		

b. *Handling field rations.* (1) *Daily use.* Whenever troops are in the field, a daily issue of rations to be consumed daily is contemplated. This is chiefly because the issue of more than one day's ration would overload organic transportation, especially if the troops are on the march. To make this system work well re-

quires loyal and intelligent cooperation by all concerned. A certain amount of "overlap" in the case of a few items is unavoidable. For example, the daily allowance of macaroni is insufficient to provide a separate dish; therefore, unless the macaroni is combined with some other food, it is necessary to save the daily issues until sufficient is accumulated. Consumption of spices and flavoring extracts, etc., fluctuates. Any carry-over of such articles is so small in bulk and weight that it can be accommodated in the transportation of the organization.

(2) *Distribution.* (a) The regimental or unit supply officer has a difficult task in the daily distribution of the field rations he receives from the quartermaster. This is so for a number of unavoidable reasons. Frequently it is impossible to issue to a company the exact allowance due without breaking original packages. Conditions of weather, available shelter, enemy fire, etc., might make it extremely difficult to break packages and issue odd weights of such foods as sugar, coffee, flour, spices, etc. Therefore, the best system often is to issue unbroken packages and keep a debit and credit record, overages and shortages to be adjusted as soon as possible. This probably was the expedient most frequently adopted by regimental supply officers during the World War. It is an expedient which should be, and probably would be, adopted by railhead officers in making their issues. The total allowance for a division or similar unit in the case of several articles of the field ration seldom results in an even number of original containers. The usual practice is to issue more than the allowance in order to avoid breaking containers at the railhead. If a division were entitled to 20 and a fraction cans of pepper, the railhead probably would issue 21 cans, make a record of the overage, and adjust this overage on succeeding issues. It is impossible to prescribe regulations for distribution of rations in the field which will cover every possible contingency which may arise. Many regimental or unit supply officers become, in effect, regimental mess officers in that they ascertain daily the needs of each mess and adjust issues accordingly. One company mess may be short sugar and have an ample supply of coffee, while another company mess may be short coffee and have ample sugar. Company messes should cooperate with the regimental or unit supply officer by saving empty packing cases, cans, etc., which will serve as containers to transport rations.

(b) When troops are serving at posts, camps, or in permanent or semi-permanent locations, issue and handling of field rations are accomplished in a manner somewhat different than that which prevails in the field. At such locations, sufficient field rations for a week or 10 days probably would be issued at one time. When this occurs, company commanders must remember that the rations issued are the total allowance for that ration period; when they are gone, no more will be issued until the expiration of the period; therefore, control must be exercised to see that consumption is intelligently spread over the entire period. Inexperienced mess personnel are prone to the error of feeding heavily the first few days, with the result that the men are on short rations for the remainder of the ration period.

10. Travel ration. The travel ration, being intended for troops traveling without cooking facilities, consists of foods which can be eaten without cooking. The exception to this is coffee which, together with sugar and milk, is issued when it appears probable that the troops can obtain hot water and utensils for making the beverage en route. Control is essential to insure equitable distribution of travel rations at a proper daily rate.

a. Composition.

Article	Quantity	Article	Quantity
	Ounce		Ounce
Bread, soft -----	18	Jam -----	1.4
or -----		Coffee, roasted and ground -----	2
Bread, hard -----	16	Sugar -----	4
Beef, corned, or hash, corned beef -----	12	Milk, evaporated, unsweetened -----	1
Beans, baked -----	4		
Tomatoes, canned -----	8		

Note. When liquid-coffee money is provided it is in lieu of the coffee, sugar, and milk components of the travel ration.

b. Supply. The supply of travel rations is not automatic. Troops departing on a journey present copies of travel orders to the quartermaster designated to supply them, and he issues the necessary number of travel rations. Depending upon circumstances, the travel orders may prescribe that liquid-coffee money be supplied in lieu of the coffee, sugar, and milk components of the ration. In such a case the proper amount of cash is issued by the disbursing officer on presentation of travel orders. Travel rations and liquid-coffee money are drawn by the commander of the troops traveling, or his accredited representative, who may be a subordinate officer. Frequently troops travel without commissioned officers. In such cases the senior enlisted man draws the travel rations, and liquid-coffee money is paid to each individual concerned.

11. Method of supply of rations to troops; accounts. *a. In the field.* (1) Field Service Regulations provide for automatic supply of rations, that is, a constant flow of rations from depots to troops with a minimum of administrative work on the part of troops. This scheme is designed to relieve the fighting forces of all anxiety concerning questions of food supply, and automatically to effect a daily delivery. The only action necessary by company commanders to secure rations is to submit strength reports to regimental headquarters (unless the company is serving alone.) Any unit operating independently is supplied in the same way as a division. The strength reports submitted by organizations are consolidated by the division adjutant who furnishes copies to the division G-4 and the division quartermaster. Based upon these figures, the division quartermaster sends a daily telegram to the army quartermaster. This information may be transmitted by telephone. The army quartermaster then sends a consolidated daily telegram to the regulating officer, giving the needs of the several divisions and of corps and army troops. The regulating officer calls on the designated depot or depots in the communications zone for shipment of the division's requirements in one of two ways:

(a) By directing the supplies to be made up into unit sections at the depot for through shipments to divisions, or

(b) By calling for shipment of supplies for the army in bulk. When the latter method is employed, it is necessary to make up the unit sections for each division at the regulating station. In either case the daily shipment for any particular division is routed by the regulating officer to the proper railhead or other supply point.

(2) Upon arrival of the daily train at the railhead, the railhead officer delivers the supplies to the division quartermaster, who utilizes transportation and personnel of the division quartermaster service to distribute the supplies to organizations of the division. Generally, supplies are delivered to bivouacs of the unit trains, but they may be secured at the railhead by the unit trains. The quartermaster vehicles are loaded at the railhead in groups so as to carry the proper amount of supplies for each unit. Administrative orders may designate specific points for distribution to units of the division and prescribe the time each unit will be served. The responsibility of the division quartermaster ceases when the supplies are turned over to unit supply officers.

(3) In order to issue the rations properly, it is necessary that the railhead officer, the division quartermaster, and the regimental supply officer have copies of those regulations which publish the prescribed ration. This is published in orders issued either by the War Department or by the commander of the field forces. In order that the company commander may check to see whether the company is receiving its authorized quantity of rations, it is necessary for him to know the composition of the ration. It must be remembered by all company commanders that conditions may arise which will make it impossible or impracticable to get the full allowance to the company. Such situations are at times inevitable circumstances of field service, are easily recognized, and are not just grounds for complaint.

(4) Under normal conditions each infantry division carries two rations distributed as follows:

On kitchen truck and trailer	1 field ration
On the division quartermaster train	1 field ration, Types B, C, and D
Total	2 rations

b. *In camp or garrison.* (1) When troops are serving at permanent posts or permanent or semipermanent camps or mobilization points, or at any locality other than in the field, they will be supplied with the garrison ration. The procedure in obtaining and using information pertaining to the messing of an organization is given below:

(a) From the data entered each day on the company morning report, the mess sergeant is informed of the number of rations for which he can take monetary credit on his mess reports and records. Then, knowing the money value of the ration (which is computed by the sales officer or quartermaster at the beginning of each month), he can readily compute the money he can spend for any particular day or period. He buys provisions daily or as needed from the quartermaster sales store which will go to make up the various items appearing on the approved menu.

(b) At the end of each month the organization commander submits a ration return (which is a certificate showing the total number of rations due the organization for the period) to the commanding officer for approval. When approved the ration returns from all units are sent to the sales officer to be used in making up the "Ration and Savings Account." This record or voucher is used to effect a settlement between the sales store and the organization concerned. If any money is due the Government, the organization concerned will pay the proper amount from its mess funds, and if any credit is due an organization, it will be paid by the disbursing officer.

SECTION III

MESS ACCOUNTING

12. General. The importance of rigid and accurate mess accounting cannot be overstressed. It is essential that the mess accounts be kept by a commissioned officer (usually the organization mess officer) and checked at frequent intervals by the organization commander. Although many of the actual entries may be made by the mess sergeant, the mess officer must perform the computations himself. With a rigid system of mess accounting, there is little probability of the mess "going into the hole," or of irregularities by mess personnel. With proper accounting, it will be impossible for so much as a single can of food to be diverted from its intended use.

13. Mess records. Organizations operating under the garrison ration will naturally have more records to keep, and must supervise expenditures of both money and food in a much more thorough manner, than units using the field ration. The following information is based on the use of the garrison ration—units operating with the field ration will be able to get along with much less paperwork. An organization that keeps the following records conscientiously will have little difficulty in having accurate and complete mess accounts:

- a. Q.M.C. Form 469, with 5 columns added.
- b. Bill of Fare.
- c. Stock Record Cards.
- d. Monthly itemized summary of mess standing and worth.
- e. Additional records that may be required by regimental, post, corps area, or army commanders.

14. Mess equipment and supplies. a. Quartermaster supplies are issued to the Army on properly approved requisitions within the limits of allowances prescribed in Tables of Organization, Tables of Basic Allowances, Tables of Allowance (equipment for posts, camps, and stations), Army Regulations, War Department circulars, and other publications.

b. The requisitions (requests for supplies) are submitted by the unit commander concerned to the post, camp, or station quartermaster through his respective battalion, regimental, or similar unit supply officer. Requisition forms pertaining to messing are as follows:

(1) W. D., Q. M. C. Form No. 400 (Requisition for Supplies and Equipment, General, Kitchen Equipment, and Silverware).

(2) W. D., Q. M. C. Form No. 411 (Requisition and Receipt for Brooms, Brushes, Matches, Mops, Toilet Paper, Soap, etc.).

(3) W. D., Q. M. C. Form No. 414 (Requisition and Receipt for China and Glassware)

(4) Local approved forms for subsistence.

15. Fuel, light, and water. In an established post, camp, or station, timely arrangements will be made by the unit commander with the post utility officer for the supplying of water, gas, and electric power and a check of existing installations prior to acceptance and operation. Representatives of the quartermaster must be contacted to arrange for deliveries of all types of fuel, including coal and wood, when gas installations are not available.

16. Refuse and garbage disposal. The post, camp, or station quartermaster's representative, post police, or provost marshal (depending upon local policies in effect) will arrange for the disposal of all mess refuse and garbage.

17. White clothing and laundry. a. White clothing, for organizations entitled thereto, will be requisitioned on W. D., Q. M. C. Form No. 409 (Requisition and receipt for Clothing in Bulk), based on the allowances prescribed in Table of Allowances.

b. Arrangements will be made with the local quartermaster for the laundering of white clothing in accordance with local regulations.

18. Garrison ration in effect. a. At posts, camps, or stations where the garrison ration is authorized, requisitions on local approved forms will be submitted to the quartermaster sales officer. Before submitting his subsistence requisition, the mess officer will familiarize himself with the subsistence price list, the policy in effect pertaining to days of issue of subsistence articles, and the dates prior to issues on which requisitions will be submitted.

b. The requisition will be based on the strength of the organization and a menu covering a period of at least 10 days. For further reference to menu making, see Section IV of this Chapter.

19. Field ration in effect. a. No requisition is required where the field ration is in effect.

b. Issue of the field ration is based on the organization strength and a menu previously prepared and approved by higher authority. The strength of the organization will be submitted on approved form through channels to the field commissary officer, who will make necessary issues to the organization of the components of the field ration menu. The dates of issue will be designated by the commanding officer of the post, camp, or station.

20. Ice issues. Timely arrangements will be made with the post, camp, or station quartermaster for the delivery of ice to the mess. For reference to ice allowance accounts, etc., see AR 30-2280.

21. Determining number of rations due. The daily average strength for rations is based on the number of men for whom the company is entitled to rations, and is found by dividing the total number of meals (breakfast, dinner, and supper) served in the company or similar unit by three, as shown by the figures and "Remarks" on the morning report. (See AR 345-400.)

22. Ration return. A ration return is a requisition on the quartermaster for rations, submitted by the officer under whom persons entitled thereto are serving, and will be submitted in accordance with AR 30-2210.

23. Ration savings. Expenditures of ration savings by organizations will be limited to those authorized by AR 30-2210 and AR 210-50. These funds will be accounted for under the provisions of AR 210-50.

24. Ration certificate. A ration certificate is given to the commanding officer of an organization by the quartermaster upon closing the account as indicated in AR 30-2210.

25. Q. M. C. Form No. 469. Mess accounts for an organization operating on the garrison ration are recorded daily on Q.M.C. Form No. 469. A uniform method of keeping an accurate record of mess accounts on this form, augmented by additional columns 17 to 21 inclusive, is described below.

a. Extension columns should be pasted to the printed form so that alignment is obtained between the printed form and additional columns 17 to 21.

b. Under the heading, "Monthly Mess Account of," should be entered the designation of the organization (Co. C, 501st Inf.). Month and year should be entered (March 1940). "Ration value" as furnished by the quartermaster in this case is

\$0.45. Allowance from company for month, "None" should be written, unless there is an allowance from the company fund. For the day, "None" should be written, unless there is an allowance. Stock at the end of the previous month will be the actual value of all subsistence on hand on the last day of the month as shown by the inventory taken by the mess officer, assisted by the mess sergeant (\$250.00).

c. Columns 2 to 21 should be computed in the following manner:

Column 2: Under "Today" is shown the number of rations due for the day as recorded in the morning report. Under "To date" the total number of rations due to date is computed as follows: Start with the first day of the month with 200 rations due as shown on the morning report. Under "Today" enter 200 and under "To date" 200. On the second day the morning report shows 195 men; enter 195 under "Today"; add 195 to 200 as shown by the previous day, and place 395 under "To date" for the second day of the month. For the third day the morning report shows 197 men; enter 197 under "Today" and add 197 to 395 as shown for the previous day and place 592 under "To date" for the third day. Continue this process of computation throughout the month.

Column 3: "Total value of ration for the day" is the total number under "Today" multiplied by the value of the ration. The ration value as furnished by the quartermaster, $\$0.45 \times 200$, or $\$90.00$, is the ration value for the day and the entry in column 3 for the first day; $195 \times \$0.45$, or $\$87.75$, for the second day; $197 \times \$0.45$, or $\$88.65$, for the third day, and so on.

Column 4: Should be left blank unless there is an allowance from the company fund. Normally this will occur during the months of November and December (Thanksgiving and Christmas).

Column 5: This column must be filled in daily. Amounts for this column are taken from the daily boarders' list which should be kept in every company. Regular boarders usually are charged the ration value and transient boarders \$0.25 per meal. In this case there are 10 regular boarders and one transient boarder for one meal on the first day of the month. $10 \times \$0.45$ equals \$4.50 plus \$0.25 or \$4.75 to be entered in column 5 for the first day. On the second or third day only the regular boarders are present and the entry should be \$4.50 each day.

Column 6: This column is computed by adding the totals of columns 3, 4, and 5. \$90.00 in column 3 plus zero in column 4 plus \$4.75 in column 5 equals \$94.75 to be entered in column 6 for the first day. For the second day add \$87.75 plus zero plus \$4.50 or \$92.25, and for the third day \$88.65 plus \$4.50 equals \$93.15, and so on through the month.

Column 7: "Total credit to date" is obtained as follows: For the first day this entry is the same as that in column 6, \$94.75. For the second day add the total credit of the preceding day as shown in column 7 to \$92.25, which is the total credit for the second day, and enter the total \$187.00 in the column for the second day. For the third day add \$93.15 to \$187.00 and enter the total \$280.15 for the third day, and so on.

Column 8: "Purchases from the commissary." The total amount of the sales slips furnished by the sales officer should be posted in column 8 the same day they are received. Under "To date" in column 8 should be shown daily the total amount of purchases from the commissary to date. In this case on the first day of the month sales slips amounting to \$100.00 are received from the sales officer. \$100.00 is entered under both "Today" and "To date." No more entries are made under "Today" until the next subsistence sales slips are received. On the eleventh day of the month subsistence sales slips amounting to \$350.00 are received. The sum \$350.00 is entered under "Today" for the eleventh and then added to the \$100.00 carried "To date" and the total of \$450.00 entered under "To date."

Column 9: This column is used in the same way as column 8 recording post exchange purchases.

Column 10: "Purchases from other sources" are for all food products purchased which cannot be shown in columns 8 and 9, such as fresh fruits, vegetables, and other local purchases. This column is computed in exactly the same manner as column 8. The first day, \$43.90; second day, \$35.00; and the third day, \$30.50 in which miscellaneous exceptional articles were purchased. The entry for the third day under "To date" is \$109.40.

Column 11: The amounts for this column are obtained by adding together the

amounts under "Today" in columns 8, 9, and 10. Totals for the first day are \$143.90; second day, \$35.00; and third day, \$30.50.

Column 12: "Total purchases to date" are obtained by adding the amounts under "To date" in columns 8, 9, and 10. The figures to be entered are \$143.90, \$178.90, and \$209.40 for the first, second, and third days, respectively.

Column 13: "Savings from the quartermaster for day" is obtained by subtracting the amount under "Today" in column 8 from those in column 3. On the first day the figure under "Today" in column 8 exceeds that in column 3, hence there is no entry in this column for the first day. On the second day there is no entry under "Today" in column 8; therefore, there is zero to subtract from the figure in column 3 and the entry in column 13 is \$87.75. The same condition exists for the third day and the entry for this day is \$88.65.

Column 14: "Deficit due the quartermaster for day" is obtained by subtracting the amount in column 3 from that under "Today" in column 8. This is just the reverse of the method shown for column 13. For the first day the figure in column 3 is \$90.00 and subtracting it from the \$100.00 in column 8, leaves a balance of \$10.00 to be entered in column 14 for the first day. On the second and third days there is nothing under "Today" in column 8; therefore, there can be no entry in column 14 for these dates.

Column 15: "Standing with quartermaster" in column 13 or 14 for the day plus column 15 for previous day. For the first day there is in column 14 a deficit due quartermaster of \$10.00. This figure is entered in column 15 as minus \$10.00. For the second day there is in column 13 a saving from the quartermaster of \$87.75; subtracting the deficit of the previous day there is a balance of \$77.75, which is entered in column 15 as plus \$77.75. For the third day there is a saving of \$88.65 in column 13, which added to the balance of the previous day in column 15 shows the standing with the quartermaster to be plus \$166.40. This process is then continued throughout the month.

Column 16: The word "financial" should be written above the word "Standing" in column 16. "Financial standing for mess to date" is obtained by subtracting the amount in column 12 from that in column 7. For the first day subtract \$143.90 from \$94.75 which leaves a minus balance of \$49.15. This is shown in column 16 as minus \$49.15. For the second day subtract \$178.90 from \$187.00, which leaves a balance of plus \$8.10. Likewise, for the third day enter plus \$70.75.

Column 17: "Value of stock in supply room." For the first day of the month the figure is the same as the value of the stock shown in the upper right corner of the original W. D., Q. M. C. Form No. 469, that is, the value of the inventory as of the last day of the previous month, plus the total purchases for the day (column 11). For succeeding days of the month, this column shows for any day the balance of stock on hand for the previous day (found in column 19) plus the total purchases for the day (column 11), or, in other words, all the stock on hand after dinner yesterday plus all the stock acquired during today. In this case, first day: Inventory, \$250.00, plus column 11, \$143.90, equals \$393.90. Second day: \$303.90 (from column 19 of the preceding day) plus \$35.00 from column 11 equals \$338.90. Third day: \$245.40 plus \$30.50 equals \$275.90.

Column 18: This column shows the "Cost of meals for each day," obtained from the daily menu, commencing with supper the night before. It is of paramount importance that the menu for the day is figured closely, taking painstaking account of all supplies used in the preparation of the meals each day in order to get as close as possible to the actual cost of the meals. In example, first day; cost of meals from menus, \$90.00; second, \$93.50; and third, \$97.00.

Column 19: This column shows the "Balance of stock on hand" and is found by deducting the amount of stock withdrawn (consumed) from the accountable stock. Column 19 equals column 17 minus column 18. This column is very important because it gives the value of the stock on hand at any time and permits the immediate checking of an inventory, regardless of when it is taken. When an inventory is taken, the actual value will be entered in column 19 and used as a basis for determining the entry in column 17 of the next day. The difference between the actual inventory and the estimated inventory should be indicated on the margin of W. D., Q. M. C. Form No. 469. In this case, first day, \$393.90 minus \$90.00 equals \$303.90; second, \$338.90 minus \$93.50 equals \$245.40; third, \$275.90 minus \$97.00 equals \$178.90.

Column 20: This column shows the gain or loss on any given day with relation

to the capital stock with which the month was started. Thus it means the relation (for the day) of the figure in column 19 to the value of stock shown at inventory on the last day of the previous month, as recorded in the upper right corner of the original W. D., Q. M. C. Form No. 469. Therefore, the figure to be placed in column 20 on any day is the difference between the value of stock the last day of the previous month and the balance of stock shown in column 19. It answers the question: Has the mess more or less stock than it started the month with? In example, first day, \$303.90 minus \$250.00 equals plus \$53.90; second day, \$250.00 minus \$245.40 equals minus \$4.60; third day, \$250.00 minus \$178.90 equals minus \$71.10.

Column 21: This column shows the "Actual standing of mess" to date for the current month. It shows whether the mess is gaining or losing during the current month only. There is no connection between the standing given in this column and the status of the mess in the preceding month. By watching this column, the organization commander can exercise financial control of his mess. In example, first day, \$53.90 (column 20) minus \$49.15 (column 16) equals plus \$4.75; second day, \$8.10 minus \$4.60 equals plus \$3.50; third day, minus \$71.10 subtracted from \$70.75 equals minus \$0.35. In column 16 for the first day there is shown minus \$49.15 and in column 20 there is a plus \$53.90. Looking at the figures it is seen that the plus figure exceeds the minus figure and after subtracting we have a plus \$4.75 for entry in column 21. (If both figures were minus, they would be added together, making the entry in column 21, minus \$103.05.) For the second day, there is a plus \$8.10 in column 16 and a minus \$4.60 in column 20. In this case, also, the plus figure exceeds the minus figure by \$3.50, and the entry in column 21 is plus \$3.50. For the third day, there is a plus \$70.75 in column 16 and a minus \$71.10 in column 20. In this case, the minus figure exceeds the plus figure, and, when subtracted, there is a minus \$0.35 for entry in column 21.

d. Note that column 15 shows the standing with the quartermaster for subsistence furnished by him. The amount of the ration savings check or the amount due the quartermaster, as the case may be, is computed in the following manner: The figure under "To date" in column 8 as shown for the last day of the month is subtracted from the total of all entries in column 3. (The figure for the total of column 3 also can be obtained by multiplying the number of "Rations to date" in column 2 as shown for the last day of the month by the value of the ration.) If the total of column 8 exceeds the total ration value for the month, the excess must be paid from ration savings in the company fund.

e. Appropriate entries will be made in all blank spaces, including the signatures of mess sergeant and mess officer on the bottom of W. D., Q. M. C. Form No. 469 after the close of the month's business.

f. On the reverse side of W. D., Q. M. C. Form No. 469 is the subsistence stock record which may be used in lieu of Q.M.C. Form No. 424, Stock Record card. It is recommended that Stock Record cards be used if available. (See par. 30.) The figures for column 3 are obtained from the inventory of the preceding month and will show quantities, not money value. In column 4 will be entered the quantity received during the 10-day period. A separate record will be kept of perishables and other items which are received several times during a 10-day period, and the total amount received during the period will be entered on the 10th day of the period. Column 5 is for the sum of the quantities shown in columns 3 and 4. The figure in column 6 should be obtained from the total amount used in the menus for the 10-day period, and column 7 "Balance on hand," is for recording the inventory taken at the end of the 10-day period. Any serious discrepancy noted in the amounts used in column 6, as taken from the menus, and that noted in the inventory in column 7, indicates a leak and should be investigated. Column 8 is obtained by multiplying the unit price charged by the quartermaster, by the number of items on hand, as shown by the inventory. All other items will be inventoried at cost price as shown on original invoice. For the next 10-day period the amounts shown in column 7 will be carried forward to column 9 and the same procedure continued as described for the first 10-day period.

g. Orderly files of invoices and sales slips should be maintained and filed with completed W. D., Q. M. C. Form No. 469 as soon as each month's business is ended. Invoices and sales slips should be kept in proper order so that any one day's or several day's entries may be checked without losing time searching for them.

Inventories will be taken on the 10th, 20th, and last day of the month, and at

BILL OF FARE

Organization. Date....., 19....

ARTICLES	INGREDIENTS USED																TOTAL COST
	BEEF	LARD	POTATOES	FLOUR	SUGAR	BREAD											
SUPPER																	\$
.....																	
.....																	
.....																	
.....																	
.....																	
.....																	
Supper, total cost....\$																	
BREAKFAST																	
.....																	
.....																	
.....																	
.....																	
.....																	
.....																	
Breakfast, total cost.....\$																	
DINNER																	
.....																	
.....																	
.....																	
.....																	
.....																	
.....																	
.....																	
Dinner, total cost.....\$																	
Total ingredi- ents used																	
Total cost for day.....\$																	

Prepared by.....
Verified by.....
(ONE-FOURTH ACTUAL SIZE)

MONTHLY MESS ACCOUNT OF Company C 501st Infantry March MONTH YEAR 19 40

Value of Ration, \$ 0.4500 Allowance from Company Fund for Month, \$ None, for Day, \$ None Value of Stock at End of Previous Month, \$ 250.00

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
DAYS	NUMBER MEN SERVED	TOTAL VALUE OF ISSUES FROM THE DAY TODAY	DAILY AMOUNT FROM COST OF FEED	DAY'S ISSUES FROM SERVED	TOTAL COST FOR (D+H+I)	TOTAL COST TO DATE	ISSUES FROM CONSUMED		ISSUES FROM SERVED		TOTAL ISSUES (H+I+J)	TOTAL ISSUES TO DATE	TOTAL ISSUES (J+K)	TOTAL ISSUES (K+L)	TOTAL ISSUES (L+M)	TOTAL ISSUES (M+N)	TOTAL ISSUES (N+O)	TOTAL ISSUES (O+P)	TOTAL ISSUES (P+Q)	TOTAL ISSUES (Q+R)
							TODAY	TOTAL	TODAY	TOTAL										
1	200	200	90.00	4.75	94.75	94.75	100.00	100.00	43.90	43.90	143.90	143.90	10.00	10.00	49.15	393.90	303.90	53.90	4.75	
2	195	395	87.75	4.50	92.25	187.00	100.00	100.00	35.00	78.90	35.00	178.90	87.75	87.75	8.10	338.90	93.50	245.40	4.60	3.50
3	197	592	89.65	4.50	93.15	280.15	100.00	100.00	30.50	109.40	30.50	209.40	88.65	88.65	+166.40	275.90	97.00	178.90	71.10	35
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				
18																				
19																				
20																				
21																				
22																				
23																				
24																				
25																				
26																				
27																				
28																				
29																				
30																				
31																				

* The entry made in column No. 19, on the 10th, 20th and last day of the month is the actual physical inventory value. Adjustments are made in the space below.

March 31

I certify that the above is correct.

INVENTORY ADJUSTMENTS

10th	20th	Last Day
Physical Inventory value		
Column 17 minus 18		
Difference GAIN:		
LOSS:		
Standing of Mess per column 21		
Corrected standing		

John Doe

Mess Sergeant,

April 1

Audited:

A. M. Jones, 1st Lt., 501st Inf.

Officer in charge of Mess.

STOCK RECORD

1	2	10th Day							20th Day							Last Day						
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20			
ARTICLES	UNIT	BAL. FOR'D	RAC'D	TOTAL ACCT'S (1-10)	USED	BAL. ON HAND (1-10)	VALUE OF I	BAL. FOR'D	RAC'D	TOTAL ACCT'S (1-20)	USED	BAL. ON HAND (1-20)	VALUE OF I	BAL. FOR'D	RAC'D	TOTAL ACCT'S (1-30)	USED	BAL. ON HAND (1-30)	VALUE OF I			
Apples, evaporated,	Lbs.																					
Baking powder,	Cans																					
Bacon, issue,	Lbs.																					
Beans, issue,	Lbs.																					
Beans, stringless,	Cans.																					
Beans, lima, dry,	Lbs.																					
Beans, lima,	Cans																					
Beef, fresh,	Lbs.																					
Beef, corned,	Cans																					
Bread, soft,	Lbs.																					
Butter,	Lbs.																					
Cabbage,	Lbs.																					
Chocolate, plain,	Pkgs.																					
Cinnamon, ground,	Cans																					
Cloves, ground,	Cans																					
Cocoa, br.,	Cans																					
Coffee, roasted or green,	Lbs.																					
Corn,	Cans																					
Corn Flakes,	Pkgs.																					
Corn meal,	Lbs.																					
Currants,	Pkgs.																					
Eggs,	Doz.																					
Flavoring extract, E.,	Bots.																					
Flavoring, extract, V.,	Bots.																					
Flour, issue,	Lbs.																					
Honiny, lye,	Cans.																					
Jam, assorted,	Cans.																					
Lard, issue,	Lbs.																					
Milk, evaporated,	Cans.																					
Molasses,	Cans.																					
Oats, Rolled,	Cris.																					
Oil, olive,	Bots.																					
Oil, cooking,	Bots.																					
Oleomargarine,	Lbs.																					
Onions, fresh,	Lbs.																					
Peaches, evaporated,	Lbs.																					
Pear,	Cans.																					
Peas, split,	Lbs.																					
Pepper, black,	Cans																					
Pickles, cucumber,	Gals.																					
Pineapple,	Cans.																					
Potatoes, fresh,	Lbs.																					
Prunes,	Lbs.																					
Rice,	Lbs.																					
Rice, Puffed,	Pkgs.																					
Salt, issue,	Lbs.																					
Sauerkraut,	Cans																					
Sirup,	Cans.																					
Sugar, granulated,	Lbs.																					
Sugar, powdered,	Lbs.																					
Tea, black or green,	Lbs.																					
Tomatoes,	Cans.																					
Vinegar,	Gals.																					
Yeast, compressed,	Lbs.																					

ADDITIONAL ARTICLES NOT LISTED ABOVE WILL BE ENTERED BELOW

NOTE.—The officer in charge of the mass will, at the end of each ten-day period, personally make a physical inventory and will verify all entries in each column for that period.

such other times as directed. This inventory value will be entered in column 19 on the date taken and adjustments noted at the foot of Form No. 469, as illustrated on the sample form.

26. Filipino ration. The Filipino ration is accounted for in the same manner as the garrison ration.

27. Travel ration. The travel ration is issued in kind and no accountability is required after issue, except when a monetary allowance is prescribed in lieu of the coffee, milk, and sugar components. This monetary allowance is prescribed and accounted for under the provisions of AR 35-4520.

28. Field ration. When the components of the field ration are delivered to the organization mess, accountability therefor is no longer required. This does not relieve the commander concerned of responsibility for the preservation and proper utilization of these components to the fullest extent. (See AR 30-2210.)

The mess officer will check the amounts of ration components delivered with the menu requirements, as based on the estimated strength of his organization, to determine any probable over or short issues.

Overages or shortages may result from changes in organization strength between the date the estimated strength was submitted and that on which the field ration menu components were delivered.

In the event of overissues resulting from change of strength of the organization, subsequent issues will be decreased to offset the overage. Therefore, care must be exercised to hold these overages for use at a later date.

In case of a serious shortage in the issue of field ration menu components resulting from increased strength between the date of estimate and the date of issue, additional ration components may be drawn from the field commissary and the strength return adjusted accordingly.

b. Forced issues. Commanding officers may order forced issues of subsistence stores to prevent loss through deterioration. Debits and credits will be given on the ration savings account for the increased or decreased cost. For further information, see AR 30-2210.

29. Daily bill of fare. This form lists the ingredients used each day, the recipes for each dish, and the cost of the food consumed. The bill of fare should be used as a source of daily issue of stock to the cooks. This enforces uniformity in the preparation of dishes. The difference between operating a mess on the ration and going in the hole is found in the control of the amounts of food issued. By careful check of the amounts used for each meal, the mess officer can prevent wastage. The savings thus made being placed back in the mess can account for the difference between a poor mess and an excellent one.

30. Stock Record Cards. Stock record cards, Q. M. C. Form No. 424, should be used instead of the back of Form No. 469. This provides a daily record of receipts and issues for each item and permits the making of an accurate spot inventory at any time. At inventory, the amount found on hand and its value are entered in red ink on the Stock Record Card. The total value of the actual inventory as determined from the Stock Record Cards should not differ from the estimated inventory (column 19 of Form No. 469) by an amount exceeding 2 per cent.

SECTION IV

NUTRITION AND MENUS

31. General. Good health depends to a great extent on the kind and amount of food eaten. The right food will provide: heat and energy, material for building and repairing the body, and material for regulating body processes. All foods contain some nutrients (carbohydrates, fats, proteins, minerals, or vitamins) that contribute in different ways to the needs of the body. No single food provides all the essential nutrients. For this reason, a wide variety should be selected so that a balanced diet will be assured. A diet to be satisfactory must first be palatable. Good cooking and pleasing flavor, therefore, are important for good nutrition.

32. Energy foods. The body must have sufficient energy to meet the daily expenditure for work. This energy is supplied by the oxidation or burning of energy-yielding foods. The energy requirement is spoken of in terms of the number of calories needed daily. A calorie is a unit by which heat or energy is measured

(similar to a degree on a thermometer). Muscular activity increases the caloric requirements of the body. An active soldier requires more calories a day than a soldier who is doing office work. Most of the calories come from carbohydrates and fats, but protein also furnishes energy.

a. Carbohydrates. Sugars, starches, and cellulose (bulk) are the most common forms of carbohydrates. Carbohydrates include all starches (breads and cereals, macaroni and other pastes, rice, potatoes, cornstarch, puddings, etc.), and sugars and sweets (jams, jellies, sirups, candy, cakes, pastries, etc.). In some foods, such as sugar, bread, jams, jellies, or cakes, the carbohydrate is highly concentrated. Even in small amounts these foods are rich in energy. Since carbohydrates tend to satisfy the appetite, it might seem that these foods could be taken to supply the necessary energy in a cheap form. If this were done, the body would get enough energy but would lack other essential nutrients.

b. Fats. Fats include all the shortenings, butter, cream, salad oil and dressing, bacon, and other fat meats. Fats require a longer time for digestion than do carbohydrates or proteins and therefore are of special importance in delaying the sensations of hunger. A diet devoid of fat is very likely to create an abnormal feeling of hunger a few hours after meals.

33. Proteins. Proteins must always be supplied in food to provide the material necessary for repairing the wear and tear of the soft tissue and for building new tissue. All proteins are made up of amino acids (building stones), some of which are essential to growth and the maintenance of life. All proteins are not of equal value, for they contain amino acids in different combinations. The proteins that contain all of the essential amino acids are called "complete" proteins. Some proteins containing little or none of some one essential amino acid are called "incomplete" proteins. It is necessary to keep this in mind in selecting the proteins for an adequate diet. It is wise to choose protein from animal sources for the larger part of the protein intake for these are complete proteins. Meat, fish, eggs, and milk products contain proteins of good quality, while legumes, breads, and cereals contain proteins which are less valuable for tissue-building purposes but useful when combined with animal proteins. Gelatin is an incomplete protein which must be supplemented by another to be as useful as a complete protein.

34. Minerals. Minerals are present in the foods we eat. The amounts are so small it is impossible to see them but they are absolutely necessary for good health. They may be classified as both protective and building substances. Calcium is the mineral most likely to be deficient in ordinary meals unless thought and action are taken to see that it is supplied.

a. Calcium and phosphorus are necessary for strong, firm bones and teeth, and to maintain the tone of various tissues. The richest sources of calcium and phosphorus are milk, eggs, cheese, and some green leafy vegetables.

b. Iron and copper help promote growth and prevent anemia. Iron and copper are found in liver, lean meat, egg yolk, apricots, green leafy vegetables, and whole grain cereals.

c. Iodine is needed for the proper functioning of the thyroid gland in the throat. Without it, the disease of common goiter may occur. Iodine is found in sea foods and in the water supply and vegetables grown in nongoiterous regions. In goiterous areas iodized salt may be used to supply the necessary iodine.

d. Several other inorganic mineral elements are also essential. They are present in many of the foods people eat and there is little danger of not obtaining enough of them. If milk, vegetables and fruits, lean meats, fish, eggs, whole grain breads, and cereals are included in the daily diet, all of the mineral requirements can be fulfilled.

35. Vitamins. The vitamins are also minute substances which are essential to life, growth and good health. Without them the body is unable to function properly. They aid in the formation of bone and teeth, the maintenance of the integrity of the tissues, and the utilization of food. Vitamins aid the minerals in body-building and are protective substances.

a. Vitamin A aids in maintaining a healthy condition in the respiratory, digestive, and urinary tracts, and is essential for good eyesight. Foods that are major sources of vitamin A are liver, milk, and other dairy products (especially summer butter), and leafy green and yellow vegetables. It is the coloring matter, carotene, of the latter foods, which is changed by the body into vitamin A. Vitamin A, or carotene, is readily destroyed by exposure to the oxygen of the air and by heat. It is im-

portant, therefore, to utilize fresh leafy green and yellow vegetables as soon as possible.

b. Vitamin B as it was originally discovered is now referred to as the "Vitamin B complex" because it has been found to be made up of several vitamins. Vitamins of the B complex are likely to be lacking in the average diet unless an effort is made to see that they are included. They are water-soluble and may be lost by soaking in water or discarding the liquid in canned goods. Some of them are readily destroyed by heat when food is cooked too long.

(1) Vitamin B₁ (thiamine) aids in the utilization of carbohydrates and stimulates a good appetite.

(2) Vitamin B₂ (riboflavin or G) aids in the utilization of food, and helps to keep the skin, hair, and eyes normal.

(3) Niacin (nicotinic acid) is concerned in the prevention of pellagra. The best sources are meats, while legumes, whole grains, and green vegetables also contribute appreciable amounts.

(4) Other recently discovered factors are also part of the vitamin B complex. They are usually present in foods which are good sources of the other B vitamins.

c. Vitamin C (ascorbic acid) helps form strong bones and teeth and helps keep the gums healthy and teeth firm. It is found chiefly in citrus fruits (oranges, grapefruits, etc.), tomato juice, potatoes, cabbage, and other green leafy vegetables. Vitamin C is water-soluble and is readily destroyed by heat and oxygen. The losses in careful cooking may be as much as 40 percent. By careless cooking, the losses may be so great as to impair the adequacy of an otherwise good diet.

d. Vitamin D aids in building sturdy bones and teeth. The best sources of vitamin D are sunshine, irradiated, evaporated, or whole milk, irradiated cereals, butter, and eggs.

36. **Water.** Water is essential to all vital processes, including circulation, assimilation, excretion, and body regulation.

37. **Balanced diet.** The body performs its functions best when the purpose foods are consumed in definite ratio to each other, the total amount of each varying according to the type of work being performed. A man at heavy physical work needs more food than a man doing sedentary work but, although he eats more total food, the different purpose foods should remain in correct ratio and the increased consumption of food should be proportioned to the kind of labor actually performed. When all foods required by the body are provided in correct proportion, the diet is said to be balanced. On the other hand, if too much energy food is included in the diet and too little building and repairing food, the diet is not balanced. In the same way the diet is not balanced if it contains sufficient energy and building and repairing food but not enough health-protecting food. A balanced diet may be defined as one that supplies all the food required by the body for all purposes without lack or excess of any one kind. Computation of exact quantities of each kind of food required for a certain type of work is beyond the scope of this manual. This problem has been solved for troops in time of war or mobilization, so far as it is possible to solve it, through adoption of the Army field ration, which provides a balanced diet when properly issued, handled, and used.

38. **Balanced menu.** It is evident that to make a balanced menu it is necessary to:

(1) Include each class of food; that is carbohydrates, proteins, vitamins, fats, minerals, and bulk. However, it is not always possible to do this in every meal or in each day's menu, but any lack of balance should be corrected as soon as possible.

(2) Provide sufficient food.

39. **Simple rules for balanced diet.** a. If the following simple rules are observed in the preparation of menus, the meals served during a day or during a period of several days will be fairly well balanced:

(1) Include foods from each class.

(2) Have variety; different meats, different vegetables, salads, desserts, etc.

(3) See that the vitamin and bulk foods, especially vegetables, fruits, and milk, are served daily if possible.

b. In deciding whether a menu provides sufficient food, the first point to consider is the nature of the duties performed by the troops being fed. A soldier in combat or at drill or fatigue expends more energy and requires more food than a soldier performing clerical duties at a desk. There is little danger of not

enough food being included in the menu of an Army mess under normal conditions. Under some conditions, such as combat, there may be danger of insufficient health-protecting foods being served. Frequently this danger is not due to lack of health-protecting foods in the ration but rather to improper methods of handling and cooking which may partially or completely destroy the health-protecting elements naturally present in some foods.

40. Functions of food.

Function	Classification	Foods	
Furnish energy	Carbohydrates	Sugars Sirups Molasses Starches	Flour and flour products Breads Crackers Cereals Potatoes and other starchy vegetables
	Fats	Butter Lard and lard substitutes Meat fats Vegetable oils Cream Nuts Cheese	Meat Glandular meats Fowl Fish Cheese Beans and peas Eggs Cereals Nuts Milk
	Proteins for muscles		
Build and repair the body	Calcium for bones and teeth	Milk Cheese Vegetables (green)	Glandular meats Meat Fowl Fish Milk Cheese Beans and peas Eggs Whole grain cereals
	Phosphorus for bones and teeth		
	Minerals		
	Iron for blood	Glandular meats Meat Fowl Oysters Eggs Vegetables (green) Fruits (dry) Whole grain cereals Whole wheat or enriched flour and bread	Green and yellow vegetables Liver Cream Butter Cheese Eggs Sardines and salmon Milk Fish liver oil
Regulate body processes	A	Pork Glandular meats Meat Potatoes Vegetables (green) Fruits Whole wheat or enriched flour and bread Legumes	Glandular meats Meats Milk Legumes Vegetables (green) Eggs
		Thiamine (B ₁)	
	B	Riboflavin (B ₂)	
		Nicotinic acid	
	C	Citrus fruits Leafy green and yellow vegetables Berries Fruits other than citrus Vegetables other than leafy green and yellow	
		D	Liver Evaporated milk (irradiated) Eggs Butter Fish liver oil
Vitamins	D		

41. Food classification. a. The essential nutrients outlined above are contained in foods in varying amounts, depending on the composition of the foods. Foods are classified, therefore, according to their functions as well as to the essential nutrients they contribute. Such classification aids in planning menus and in

analyzing them for nutritional balance. A classification chart indicating the functions and nutritional contribution of many common foods is here made available for guidance and aid in planning balanced menus.

b. The following tabulation shows the types of foods with their major contributions of the essential nutrients. Adequate amounts of each type should be included every day.

Meat	PROTEIN, IRON, B VITAMINS, phosphorus, energy
Milk and dairy products ..	PROTEIN, CALCIUM, VITAMIN B ₂ , phosphorus, vitamin A
Eggs	Protein, iron, phosphorus, vitamins A and D
Vegetables:	
Leafy green and yellow ..	VITAMINS A and C, iron, calcium
Potatoes	IRON, VITAMIN C, B VITAMINS
Dried peas, beans, etc. ..	PROTEIN, CALCIUM, phosphorus, B vitamins
Fruits	VITAMIN C
Fats (butter, lard)	VITAMIN A, ENERGY
Cereals:	
Whole grain or enriched flour products	VITAMIN B, ENERGY, protein, iron, calcium
Refined flour products	ENERGY, protein
Sugars	ENERGY

(1) Glandular meats such as liver are to be served often for A and B vitamins.

(2) Words in capitals indicate large quantity.

42. Menu. a. A menu is a planned list of foods for a meal, a day, a week, or for a longer period.

b. A balanced menu is one which is planned to furnish all the nutritional elements in sufficient quantities as required by the body for its most efficient function.

43. Menu planning. a. The first requisite in menu planning is the providing of a balanced diet. Any lack of balance in one or more meals should be corrected as early as practicable. The quantity of the foods consumed will depend largely upon the nature of the duty being performed by the troops. Troops in combat, at drill or performing other hard physical labor will require more food than troops performing clerical work.

b. A satisfactory menu is well-balanced, provides variety and pleasing food combination, and is within the authorized ration allowance.

c. There is no danger of insufficient foods being included in the menu of the Army under normal conditions and planning, although under conditions such as combat there may be danger of insufficient health-protecting foods. This same danger may occur with the garrison or field ration when the food is improperly handled and cooked. Careless handling and cooking may cause partial or complete loss of vitamins and minerals naturally present and essential to the maintenance of good health.

d. Eating and food selection habits are formed early in the life of the individual and are all a matter of training, custom, and environment. Individuals responsible for menu planning must consider the nutritional requirements of the troops, the subsistence available, and the fact that the Army is a cosmopolitan group. The individuals responsible for menu planning will not permit their personal eating habits to affect the plan of the menu. The principles of menu planning are the same, regardless of the ration being used. All menus will be made in advance to permit intelligent purchase of future supplies and the utilization of those on hand.

44. How to make a menu. The following instructions will serve as a guide in planning normal diet menus, especially when the garrison ration is in effect:

a. Know the foods essential for good nutrition.

b. Plan menus to include all classes of food.

c. Knowledge of the availability of fresh fruits and vegetables during each month permits menu plans to be made far in advance so that procurement is possible. There may have to be substitutions of one food for another, but these are not difficult and the balance of the meal need not be upset if substitution tables are followed.

d. First consider foods which are perishable—meat, fish, fresh milk, fresh fruits and vegetables, butter, eggs, etc.

e. If there is an insufficient quantity of one food for a meal, it may be combined

with another. Example: beef and pork mixed for meat loaf; carrots and peas served together; carrots and cabbage in salad.

f. If the same kind of meat or vegetable must be served on the same day or on consecutive days, vary the method of cooking or serving.

g. Canned tomatoes are an excellent protective food. Use them often and be sure to include them when fresh vegetables are scarce. One raw vegetable daily is desirable.

h. Serve foods with contrasting qualities: crisp and soft, cold and hot, white and colored. This rule has much to do with making an appetizing menu.

i. Be sure that hot foods are not lukewarm. Nothing is more discouraging to the appetite than lukewarm soup and coffee.

j. Season foods well. Monotony can be avoided by careful seasoning.

45. Sample menu for 1 day.

a. Breakfast.

- | | |
|-----------|--|
| Fruit | (1) Fruit—fresh, evaporated, or canned—is used for appe- |
| Cereal | tizing as well as nutritional reasons. It is a welcome |
| Milk | starter for the day, but should not be reserved for |
| Main dish | breakfast if it would be more useful in improving |
| Bread | other meals. |
| Butter | (2) Cereal is a fuel food and has the advantage of being a |
| Coffee | milk carrier. Serve hot or cold cereal, depending on |
| Sugar | the supply, the climate, food habits of men, or need |
| | for variety. |
| | (3) The main dish may be ham, bacon, eggs, sausage, creamed |
| | dried beef, fried mush, French toast, hot cakes, or |
| | other satisfying breakfast dish. Do not have the same |
| | thing on the same day each week. If fried mush or |
| | French toast is on the menu, syrup or jelly should be |
| | served. |
| | (4) Vary bread as much as possible—toast, rolls, corn bread, |
| | hot cakes, biscuits, coffee cake, doughnuts, and pan |
| | bread are some suggestions. |

b. Dinner.

- | | |
|-------------------|---|
| Soup | (1) Soup may be served at either the noon or evening meal |
| Relish or salad | whichever needs the extra nourishment. When a vege- |
| Meat | table soup is on the dinner menu, the salad may be |
| Potatoes | omitted if desired. Soup is one means of getting men |
| Vegetable (canned | to eat vegetables. |
| or fresh) | (2) A relish may also take the place of salad occasionally— |
| Dessert | raw carrot strips, young onions, radishes, peppers, |
| Bread | sliced cucumbers and onions, and pickled beets are |
| Butter | suggestions. |
| Jam | (3) A leafy, green or yellow vegetable is valuable because |
| Coffee | of flavor, appearance, and vitamin content. <i>Do not</i> |
| | <i>overcook.</i> Season well. |
| | (4) Meat is always popular. The grade of meat purchased |
| | for the Army is excellent. Many good cuts are spoiled |
| | by poor cooking. Do not prepare too long in advance. |
| | Serve hot. |
| | (5) Gravy or sauce is usually served with meat. Good |
| | gravy is smooth and not greasy. Serve hot. |
| | (6) Salads may be made from meat, vegetables, or fruits. |
| | Serve as cold and crisp as possible. |
| | (7) Dessert has a definite place in a menu because it gives |
| | a feeling of physical satisfaction. Many people crave |
| | sweets and are accustomed to having them at the end |
| | of the meal. Dessert adds calories and will round out |
| | a light meal. Serve lighter dessert with a heavy meal. |

c. Supper.

- | | |
|-----------|---|
| Main dish | (1) Meat may or may not be used, according to supplies on |
| Relish or | hand. This is a good time to combine meat and rice, |
| salad | macaroni and cheese, or to serve chili con carne, chop |
| Vegetable | suey, creamed meat, thick chowders, baked beans, |

Bread
Butter or
jam
Dessert
Tea or
coffee

and the like. This meal must be heavy enough to keep the men from being hungry when they go to bed.
(2) Utilize dinner left-overs when possible *in addition* to the regular supper menu. Some foods can be served without change while others may be combined with something else. Example: rice and stewed tomatoes; string beans and other vegetables in salad, etc.

46. Substitution lists. *a. General.* Study lists of available foods when making menus. Select foods that will give variety. Any food may be substituted for another in the following lists. Avoid serving two vegetables of similar flavor at the same meal.

b. Key to menu making (par. 45).

Breakfast—Select from (1), (2), (3), (4), (5), (8), and (9) below.

Dinner—Select from (1), (3), (4), (5), (6), (7), (8), (9), (10), (11), and (12) below.

Supper—Select from (1), (3), (4), (5), (6), (7), (8), (9), (10), (11), and (12) below.

(1) *Fruits.*

Fresh	Dried	Canned
Apples	Soak overnight well-covered with water. Bring fruit and water in which it was soaked slowly to the boiling point. Cook about 30 minutes. Add sugar if necessary.	Fruit juices
Apricots		Berries
Avocados		Figs
Bananas		Peaches
Berries		Prunes
Cantaloupes		Tomatoes
Cherries		
Cranberries		
Grapefruit		
Grapes		
Limes	{ May be used for pie or for sauce. (Stew with sliced lemon. Flavor with cinnamon.)	The less sweet juices are good for breakfast. Canned fruits are better for dinner or supper.
Oranges		
Peaches	{ May be stewed with sliced lemon or oranges.	
Prunes		
Figs	{ May be stewed with whole cloves or cinnamon.	
Peaches		
Pears	{ Use in puddings, sauces, cakes, salads, pies.	
Pineapple		
Plums		
Prunes		
Rhubarb		
Tangerines		
Tomatoes		
Watermelon		

(2) *Cereals.* Serve with fresh milk or with canned milk when fresh is not available. A small amount of salt and vanilla may be added to canned milk if desired.

(a) *Dry cereal.* Assorted ready-to-eat cereals are convenient and offer variety.

(b) *Cooked cereal.*

Corn-meal mush	} Cook thoroughly in boiling, salted water. Serve hot.
Farina	
Hominy grits	
Rice	
Rolled oats	
Whole wheat	

(3) *Eggs and other breakfast dishes.* (a) Eggs.

1. Boiled; soft, medium or hard—with or without bacon.

2. Scrambled; plain or with minced { bacon or ham } or without fried bacon.

3. Fried with { bacon ham } and/or potatoes { fried. hashed brown. creamed. potato cakes.

or { hot hominy grits. fried rice cakes.

4. Omelet.
Spanish.
Ham.
Jelly.

- Bacon.
Cheese.
Chipped beef.
5. Creamed on toast.
6. Poached on toast.

- (b) Fried bacon }
Ham } with or without potatoes {
Sausage } fried.
hashed brown.
creamed.
as potato cakes.

- (c) Hot cakes with syrup with or without {
pork.
fried bacon
fried ham.

- (d) Ham with cream gravy.

- (e) French toast and syrup with frankfurters.
pork sausage.

(4) (a) *Breads.*

- White }
Whole wheat } Serve with butter, jam, jelly or marmalade.
Graham } May be toasted.
Rye }
Brown }

- Corn bread }
Biscuits } Serve hot with butter.
Muffins }
Toast }

French toast—Serve with syrup.

(b) *Doughnuts.*

- Cake dough.
Bread dough.
Sweet rolls.
Other sweet rolls.

(5) *Beverages.*

- (a) Coffee— With canned milk (which is much like cream in coffee) and sugar.

It should be strong and not merely coffee-colored water.
Put sugar and canned milk on table.

- (b) Cocoa— Usually partially *sweetened* in cooking.

Chocolate—Better if made with milk—canned milk will do. Serve once or twice a week.

- (c) Tea— Serve cold with lemon in hot weather.

(6) *Relishes.*

- | | |
|-----------------|----------|
| Beets (pickled) | Pickles: |
| Carrots (raw) | Dill |
| Celery | Mustard |
| Olives | Sour |
| Onions: | Sweet |
| Sliced | |
| Young green | |

(7) *Soups.* (a) *General.* It is well to serve soup once a day in cold weather. Serve occasionally even in hot weather. Twice a day, now and then, is all right. Soups must always be served *boiling hot* and free from grease.

(b) *Varieties.*

- | | | | |
|-------------|-------------|-----------------|-------------------|
| Barley | Mushroom | Pepperpot | Split pea |
| Chicken | Navy bean | Puree of peas | Tomato and rice |
| Kidney bean | Onion | Puree of tomato | Vegetable |
| Lima bean | Oyster stew | Clam chowder | Vegetable chowder |

(8) *Meats or equivalents.* (a) *Beef.*

- | | |
|-------------------------|------------------------------|
| A la mode | Corned (baked, boiled, hash) |
| Braised (pot roast) | Creamed |
| Braised with vegetables | Croquettes |
| Chili con carne | Curried |
| Chop suey | Dried, chipped, creamed |

Fricassee
Goulash
Hamburg
Hash
Liver
Loaf
Oven roast
Patties

Pot pie
Pot Roast
Rolls
Short ribs
Spanish
Steak
Stew
Turkish

- | | | |
|---|-------------|-------------------------|
| (b) <i>Beef heart.</i> | | |
| Baked | Boiled | Stuffed |
| (c) <i>Chicken.</i> | | |
| A la king | Creamed | Pot pie |
| Broiled | Fricassee | Roast |
| Casserole | Fried | Stew |
| Chop suey | Hash | |
| (d) <i>Pork, fresh.</i> | | |
| Breaded | Chop suey | Spare ribs |
| Tenderloin | Pig's hocks | Stuffed shoulder |
| Chops | Roast | |
| (e) <i>Ham.</i> | | |
| Baked | Boiled | Croquettes |
| Baked slices in milk | Broiled | Fried |
| Baked slices with apples | Cold sliced | Loaf |
| | Creamed | Roast |
| | | Scalloped with potatoes |
| (f) <i>Veal.</i> | | |
| Braised | Roast | Stuffed shoulder |
| Cutlets | Steak | Birds |
| Paprika | Stew | |
| (g) <i>Lamb.</i> | | |
| Braised | Curry | Stew |
| Chops | Roast | Stuffed shoulder |
| (h) <i>Miscellaneous dishes.</i> | | |
| Beans baked with bacon or pork (potatoes or other beans are not desirable in meal with baked beans) | | |
| Croquettes | | |
| Frankfurters | | |
| Macaroni with cheese | | |
| Fish—baked, salad, scalloped, fried | | |
| Stuffed peppers | | |
| (9) <i>Irish potatoes. (a) Method of preparation.</i> | | |
| Baked (in jackets or French baked) | | |
| Boiled (with or without jackets) | | |
| Creamed | | |
| Fried: | | |
| French | | |
| Hashed brown | | |
| Lyonnaise | | |
| Plain | | |
| Mashed | | |
| Parsleyed | | |
| Roast browned | | |
| Scalloped | | |
| (b) <i>Substitutes</i> | | |
| Black-eyed peas | | |
| Dried lima beans | | |
| Dried navy beans | | |
| Kidney beans | | |
| Macaroni | | |
| Noodles | | |
| Rice | | |
| Spaghetti | | |
| Sweet potatoes: | | |

Baked
Boiled
Candied

(10) *Vegetables.*

Asparagus—buttered, creamed, salad
Beans—buttered, creamed, salad:
 Green string
 Lima
 Wax
Beets—buttered, Harvard, pickled, salad
Broccoli—buttered, creamed, au gratin
Brussels sprouts—buttered, creamed
Cabbage—boiled, buttered, fried, slaw.
Carrots—buttered, creamed, fried, glazed.
Cauliflower—buttered, creamed, crumbed, raw in salad
Corn—cream, with green peppers or tomatoes, corn pudding
Cucumbers—sliced, raw, salad
Eggplant—baked, fried
Greens (kale, spinach, turnips, etc.)—buttered, creamed, raw in salad
Lettuce—salad and garnish
Okra—fried, with tomatoes, in soup
Onions—boiled, creamed, fried, raw
Parsnips—baked, buttered, fried
Peas—buttered, creamed, with carrots, in salad
Peppers—in salads, with tomatoes or corn
Potatoes (see potato list)
Pumpkin—mashed
Radishes—raw, as relish, or in salad
Rutabaga—buttered, creamed, mashed, raw in salad
Salsify—buttered, creamed
Sauerkraut—baked, boiled
Spinach—buttered, creamed, raw in salad
Squash—baked, mashed
Tomatoes—canned; buttered, scalloped, stewed, with green peppers and onions
 Fresh; fried, salad, sliced
Turnips—buttered, creamed, mashed, mashed with potatoes

(11) *Salads.* (a) *General.* At least one a day at dinner or supper is desirable. Salads are made from raw vegetables or fruit, although they may contain both cooked and raw vegetables and fruit. Do not cut into too small pieces. Make salads look attractive in a vegetable dish or on a platter. Always serve with a good dressing (cheese, French, mayonnaise, Thousand Island, or cooked dressing). It is usually better to *serve dressing separately* and let each man take as much as he wants. Nearly all salads are better with lettuce. If you have none, use sliced cabbage. *Two salads a day*, but not at the same meal, are not too many if they are good and different. Serve cold and crisp.

(b) *Varieties.*

Lettuce or other greens (leaf or head cut in quarters or sixths or separated into whole leaves)
Asparagus.
Beets.
Cabbage.
Carrot and pineapple gelatin.
Cole slaw.
Cauliflower.
Cucumber.
Cucumber, tomatoes.
Fruit salad (two or more fruits, fresh or canned).
Fruit and cream cheese.
Onion.
Green pepper.
Pineapple.
Pineapple and cheese.

String beans and beets.
 Tomato aspic.
 Vegetable (two or more).

(12) *Desserts.*

Cake—chocolate, fruit, jelly roll, plain, spice, sponge, etc.
 Cookies—drop, ginger, molasses, oatmeal, spice.
 Doughnuts and fritters.
 Dumplings—apple, apricot, etc.
 Fruit—baked, canned, fresh or stewed.
 Ice cream.
 Pie—apple, banana, berry, cream, custard, lemon, mince, peach, pumpkin, raisin, etc.
 Puddings—bread, cornstarch, custard, gelatin, plum, rice, tapioca, etc.

CHAPTER 3

KITCHEN MANAGEMENT

SECTION I

GARRISON KITCHENS

1. Personal cleanliness of cooks. a. It is of great importance that the cook keep himself scrupulously clean and in good physical condition at all times. No one desires to eat food prepared by a cook who is not clean. A cook who suffers from any ailment—a cold, or any other sickness—is a possible source of transmission of his ailment to others. If he does not keep himself clean he may transmit disease germs to the food. He must wash his hands frequently, and always after visiting a latrine. He should shave, bathe, and change underwear at least daily, and oftener, if necessary, in warm weather. His outer clothing must be changed as soon as it becomes soiled. Fingernails should be kept trimmed short and free from dirt. Regulation haircuts are comfortable and sanitary and should be procured regularly. Because any illness contracted by a cook or other kitchen personnel may be readily transmitted to the entire command, they should immediately report any symptoms of illness, infection, or contagious disease for medical examination and treatment. The cook must be careful to avoid coughing or sneezing when this might carry germs into the food. All cuts, scalds, or burns, no matter how slight, should be treated immediately to prevent infection.

b. The white caps provided for cooks are not merely for ornament; they are to prevent hair, dandruff, or dust from the cook's hair falling into the food. White caps must be worn at all times when in the kitchen and white caps and coats when serving meals.

2. Cooking—definite plan of work. This plan originates with the menu. The next step is the assembling or the preparation of the foods and other items for cooking. The third step is the cooking or preparation of the food for service. The fourth and final step is the serving of the food. By having a definite plan of work a cook can reduce the number of utensils used in preparation of the food and lessen the dishwashing required. A thoughtless cook often leaves a trail of unnecessarily soiled utensils behind him, thereby justly incurring the resentment of the kitchen police. In order to work rapidly and efficiently, and to spare himself and others unnecessary steps, the cook should first thoroughly understand the recipe upon which he is working. He should read the menu for the day and make definite plans for cooking and serving all the dishes and foods called for. Nothing is gained by starting work without a well-laid plan. The use of a little imagination and anticipation will avoid much unnecessary confusion and last-minute rushing. The cook should think of what he has to do, remember how he did it before, and then try to do it a little better than the last time. He should also observe how others do the same things and be alert to adopt any time or labor-saving methods which he may see others use. Recipes should always be consulted as a guide unless one is sure from long experience that this is not necessary. All ingredients should be accurately weighed and measured in order that uniformity in quantity, volume, and flavor may be assured, and that proper and intelligent corrections or adjustments may be made in preparing better dishes or larger or smaller portions at another time.

3. Cooking—assembling ingredients and utensils. It is important to have a place for each utensil and to keep it there, clean and ready for use. Articles to be used, including the kitchen utensils and the food being prepared, should be assembled within easy reach of the cook's table or range, in order to save time and steps. For example, when preparing cake batter, many steps and much inconvenience will be saved if the articles required are placed conveniently at hand upon the table on which the work is to be done. Also, the fire in the range should be regulated prior to beginning the mixing. After getting one's hands into the batter there is no time to collect articles and regulate the fire, not to mention the inconvenience and messy operations resulting therefrom. This principle applies to all dishes prepared in the kitchen.

4. Cooking stoves, ranges, and appliances; directions for use. a. Cooks should be thoroughly familiar with their ranges, steam kettles, and other cooking ap-

pliances; know how to operate them economically; know which parts thereof produce the greatest heat and under what conditions these appliances may be most efficiently operated. For example, the heat surface of the Army range No. 5 may be best used as follows:

0	0	0	0
5	4	3	1
0	0	0	0
5a	4a	3a	2

The no. 1 eye gives off the greatest amount of heat; the no. 2 next, nos. 3, 3a, 4 and 4a next; and nos. 5 and 5a the least. A food to be boiled should be placed on the no. 1 eye. Should it be desired to have the food simmer the utensil must be removed to eye no. 5 or 5a. Tough meat which requires a long, slow process of cooking may be simmered until tender without fear of burning if placed on the no. 5 or 5a eye. For a moderate heat the no. 3, 3a, 4, and 4a eyes can be used to advantage. Stewing requires a gentle heat applied for a long time.

b. Steam cookers, where available, provide an exceptionally rapid means of cooking fresh vegetables in quantities. These cookers are economical of fuel and labor. They produce food of excellent quality, with a natural tasty flavor, and with very small loss of the nourishing properties contained therein, and, in addition, require little or no attention and do not allow foods to scorch or burn. Pressure steam cookers should have an automatic steam cut-off which is controlled by the opening and shutting of the doors, to avoid accidental scalding of personnel. In using electric ranges or electrical appliances of any kind for cooking, care must be taken to prevent damaging the heating elements by rough handling or spilled foods. Any food spilled on this equipment, particularly on the heating elements, should be cleaned up immediately. Mixing machines, chopping and slicing machines, grinders, etc., should be well cleaned immediately after using. All cutting edges should be kept sharp, and all machinery well oiled and free from rust, dirt, and grease.

5. Care of ranges and cooking utensils. *a. Responsibility of the cook.* It is part of the duty of cooking to give the proper care to ranges, cooking utensils, and kitchen equipment. To do the best cooking it is essential that this equipment be kept in good condition. Careful observation of the following instructions will insure kitchen equipment being in good condition at all times.

b. Ranges, care of. (1) *Army range no. 5.* The Army range no. 5 is the type installed in many company kitchens in permanent barracks.

(a) Frequent firing should be made with small amounts of coal instead of using large amounts with longer intervals between firings. This will provide an even heat and will result in a smaller consumption of fuel.

(b) Ashes under the firebox should be cleaned out frequently, several times a day if necessary. Grate bars will burn out quickly, that is, become warped and twisted, if ashes under the firebox are allowed to pile high enough to touch the grate bars.

(c) The oven should be swept out and the top and outer surfaces of the range and stovepipe rubbed with greasy cloth daily. A greasy cloth applied daily over the entire range keeps it in better condition than stove polish applied once a week.

(d) Not less than once each week the range should be thoroughly cleaned out. To do this remove the top and sweep the top of the oven, protecting the casing plates. Remove the soot with a scraper through the flue doors. The mantel should be wiped often with a damp cloth and, when necessary, washed with soap and water. This prevents dishes picking up dirt and grease and thus soiling the tables.

(e) An intensely hot fire should never be maintained. Such a fire is not necessary for good cooking; on the contrary, it often causes poor cooking, as foods being cooked on top of the range may become scorched and those in the oven scorched or overcooked. An intensely hot fire tends to damage hot water piping and warp the top sections of the range.

(2) *Ranges, electric, care and operation.* The chief point to consider in using electric ranges is to avoid damage to the heating elements through rough handling and spilling of food on the range or heating elements. Any food spilled should be cleaned off immediately.

(3) *Ranges, gas, care and operation.* If foods are spilled on the burners of gas ranges, the holes will close up, thus cutting off heat. The burners should be kept clean. If the gas range does not appear to be heating well, the matter should be reported for the attention of a plumber who may be able to effect improvement by adjusting the air supply to the burners.

c. *Deep-fat fryers, care and use of.* The fryers which have been installed in some mess kitchens are constructed on a scientific principle which practically assures good products. Heat is applied above the bottom of the cooking vessel. This results in having hot fat above and cold fat below. All sediment and particles drop into the cold fat, thus preventing burning which would help to "break down" fat. The thermostat should keep the fat at a constant temperature. (Do not overload the fryer because this results in lowering the temperature too much.)

(1) *Before using fryer.* Fill kettle with cleaning solution such as is used in dishwashers. Set the thermostat to 250° F. Boil for 10 minutes. Rinse with clean hot water and dry thoroughly.

(2) *How much fat to use.* Fill with fat to a level just enough to cover food being fried. Heat slowly so that fat will not be scorched. Fat which is held at smoking point will become scorched.

(3) *Directions for frying.* When fat has reached the temperature indicated for the recipe being used, put food in the basket and lower into fat. When browned, lift up basket, allow food to drain to remove free melted fat, and then turn food onto brown wrapping or other paper which will absorb excess fat.

(4) *Fried foods in menus.* Fried foods are desirable only when they are well cooked. Greasy, overcooked products are unappetizing and slow to digest. Food fried in deep fat should be a good color, crisp, and palatable. Use temperatures and times given in the table below.

Other foods which may be french fried are onions, french toast, croutons, boiled sliced sweet potatoes, eggplant, cucumbers, and squash which have been sliced and dipped in batter.

(5) *How to clean fryer.* (a) The fat should be drained off into kettle, strained through cheesecloth, or put to one side and allowed to settle.

(b) Fill the frying pot with water, heat to boiling, and add from 3 ounces to 1 pound of good cleaning compound (depending on size of fryer).

(c) After boiling for about 25 minutes, shut the burner off and allow to stand overnight, if possible.

(d) Drain and refill with water. Boil and drain.

(e) Refill with water, heat, and add from 2 tablespoonfuls to a cup of vinegar, depending on the size of the fryer. Stir and allow to stand a few minutes before draining. Refill with water and drain.

(6) *Reuse of fat.* Put strained fat in kettle and add fresh fat to proper level. There should always be enough fat to allow the temperature to remain reasonably constant.

Good care and intelligent use of a fryer insure its longer life and better fried products.

(7) *Table of time and temperatures for frying.*

	Temperature (° F.)	Time (minutes)
Saratoga chips	325	5 to 8
French fried, blanching	365 to 370	5 to 12
French fried, browning	395 to 400	2
Shoestring or julienne potatoes	325 to 350	3 to 10
Latticed potatoes	350 to 375	3 to 10
Perch and smelts	370	3 to 5
Fish fillets	370	4 to 6
Fish cakes, croquettes, etc.	390	1
Oysters, dredged	390	1
Chicken, in batter	375	5 to 8
Cutlets and breaded chops	360 to 400	5 to 8
Doughnuts	385 to 390	3 to 5
Fritters	370 to 380	2 to 5

d. Utensils, cleaning and care of. (1) *General.* Tinned utensils, such as boilers, dippers, meat forks, ladles, skimmers, measures, basting spoons, etc., should be cleaned with soap and water, or scoured, if necessary, with fine scouring soap or wood ashes each time after using. They should then be scalded and air-dried (sunned if possible) and hung in a dry place. When tinned utensils become rusted they are unsanitary and should be reported to the mess sergeant. Towels should not be used to dry utensils or dishes if they can be air-dried. Usually the heat of scalding is sufficient to dry dishes but is not always sufficient to dry metal utensils, especially such utensils as egg beaters. If these utensils are placed on a clean stove mantel the heat will dry them.

(2) *Small utensils, care of.* It should be remembered that unclean utensils, knives, forks, spoons, egg beaters, etc., may impart an unpleasant flavor to any dish in which they are used; also, that germs are in the air everywhere, even in the cleanest kitchen. Therefore, every utensil should be cleaned immediately after use by washing in warm water and then rinsing in scalding water. This rinsing in scalding water will kill germs. It is not necessary to clean (wash) the utensils in scalding water; frequently this is bad practice, as scalding tends to cook the food on the utensils and make it more difficult to remove. Even though utensils have been cleaned before being hung up or put away they should be rinsed or dipped in scalding water before being used to kill germs or remove dust which may be settled on them. Large utensils, as tinned boilers, should be wiped before using.

(3) *Black iron bake pans, care of.* (a) *When received.* The black iron roasting and baking pans supplied to Army messes should be washed when first received in the mess in warm soapy water to which a little washing soda has been added. In the case of new and unused pans, this is to remove the protective paraffin coating put on by the manufacturer.

(b) *"Burning in" newly received pans.* It should be a routine practice to "burn in" black iron pans when first received by the mess. After being washed and dried, the pans should be thinly and evenly coated with lard or lard substitute. Lard is better, but lard substitute will do. Then the pans are placed in a medium oven (325-400° F.—12 to 16 counts) for 1 hour. This burns in the coating of lard and gives a smooth glazed surface, closing up the tiny pores in the metal and preventing rust. This process is often called "bluing" or "rebluing."

(c) *Periodical rebluing.* Daily use in the mess causes the burned-in coating on these pans to wear off, this being indicated by shiny, light-colored areas. When this occurs the pans should be washed, dried, and reblued by the method shown in (b) above.

(d) *Cleaning.* Black iron pans must be kept thoroughly clean inside and out. If particles of cooked food or dirt are left on the outside, they may be transferred to other pans when the pans are nested. Particles of cooked food or dirt on the inside of a pan will discolor and impart an unpleasant flavor to any food subsequently cooked or baked in such a pan. Black iron pans should only be scoured when necessary to remove dirt as scouring tends to remove the bluing. Soaking will soften most dirt so that it can be removed by washing in warm soapy water. After washing, scald, air-dry (by heat if possible), and hang separately (not nested).

6. Service of meals. *a. General.* Under the direction of the mess sergeant the senior cook on duty is responsible for the service of meals; that is, that foods are ready at the proper time and placed on serving dishes in an attractive manner. It is of little use to exercise great care in cooking a food if it is to be sent to the mess table presenting an unattractive appearance. On the other hand, the plainest foods become appealing when served in an attractive manner. Many men will eat an attractively served plain food which they would not eat if served in an ordinary manner. Therefore, every cook should know how to serve attractively.

b. Placing foods on dishes. (1) Roast meats, as beef, veal, pork, and lamb, should be of uniform thickness and the slices laid evenly and neatly on the platter. If gravy is spilled on the edges of the platter it should be wiped away.

(2) Soft foods, as mush, mashed potatoes, turnips, etc., should be neatly rounded off, not merely thrown into the dish.

(3) Foods intended to be served hot, as soups, meats, vegetables, beverages, etc., should be actually hot. Nothing is so disappointing as lukewarm soup or coffee. Serving dishes should be kept warm, either by being placed on the range

mantel or by other means. Cold foods should be actually cold, and the cook must use foresight to chill them sufficiently in advance of serving to accomplish this. Hot or cold foods should not be placed on the tables until just before the men are seated; other foods may be placed earlier.

(4) Pies and cakes should be neatly cut. Pieces of cake should be neatly arranged on the serving dish without excess loose crumbs.

(5) A little cracked ice added to butter, olives, etc., and to fresh raw vegetables as radishes, green onions, lettuce, celery, sliced tomatoes, etc., before they are sent to the tables makes these foods much more appetizing.

(6) Fresh fruits, as apples, oranges, pears grapes, bananas, etc., are much more palatable when served chilled, and therefore should be thoroughly chilled before serving. It is economical and good mess practice to halve oranges, apples, and pears before serving, to prevent their being carried from the mess hall, and to encourage the consumption of fresh fruits at the table. A saving can be made in this way, as some men will not eat a whole apple or other fruit; also the freshly cut fruit seems to have a greater appeal to the men. Large bunches of grapes should be cut into smaller bunches.

c. *Garnishing.* (1) *General.* One of the best ways to make food attractive is by garnishing. The effect of color contrast is very pleasing. For example, a cabbage salad is much more attractive if a few strips of pimento and green pepper are spread over the top of the salad. A little paprika sprinkled over mashed potatoes or potato salad makes them more appetizing and appealing.

(2) Following are some methods of garnishing:

(a) Many materials may be used to garnish roast meats. Sprinkle parsley over the meat and arrange a little around the edge of the platter. Add a few slices of fresh tomato, or a few french fried potatoes, or small quantities of green lima beans, diced celery, small whole boiled onions, green peas, sliced green pepper, or cooked carrots and turnips to the serving platter.

(b) When liver and bacon are served, instead of placing all the bacon in a separate dish, lay a few strips over the liver.

(c) Baked fish, salmon hash, fried oysters, etc., may be garnished with a few crescent-shaped slices of lemon and may also be garnished with a little parsley and a few pieces of french fried potatoes.

(d) Soups, stews, and gravies are improved in appearance by sprinkling a little chopped parsley over the surface just before serving.

(e) Macaroni and cheese should be sprinkled with paprika.

(f) Garnish spinach with sliced hard-boiled eggs.

(g) Small slices of cheddar cheese with apple pie are much appreciated.

(h) A small quantity of sliced green peppers greatly improves the flavor of stewed tomatoes, especially if cooked with the tomatoes during the last few minutes of cooking.

(i) Many types of pudding can be greatly improved in taste and appearance by topping with shredded coconut and canned sour red cherries. Diced pineapple spread over cornstarch or tapioca pudding and then topped with thinly spread coconut improves appearance and adds to flavor.

(3) Following is a list of some of the materials which can be used for garnishing. The quantity required and the cost are small:

Asparagus, in whole spears.

Bacon, fried.

Beans, lima, green, canned or cooked.

Beets, canned or cooked, sliced, diced, or cut into fancy shapes.

Cabbage, shredded.

Cantaloupe and other melons, cut into small balls.

Carrots, cooked, whole, halved, sliced, or cut into fancy shapes.

Cauliflower, small cooked pieces.

Celery, in stalks, sliced, or diced.

Celery leaves.

Cheese, cut or grated, or cream cheese.

Cherries, red or green.

Coconut, shredded.

Cucumbers, sliced or cut into fancy shapes.

Eggs, hard-boiled, sliced.

Endive.

Fruits of all kinds.
Lettuce, leaves or pieces.
Olives.
Onions, mature, small, boiled whole or pickled.
Onions, mature, sliced raw.
Onions, young, green.
Paprika.
Parsley.
Peas, green, canned or cooked.
Peppers, green, sliced thin.
Pickles, any kind, whole, halved, sliced, or cut into fancy shapes.
Pimientos, cut into strips.
Potatoes, french fried, or mashed and shaped into small balls, or put on serving dishes or individual plates with a pastry bag.
Radishes, whole, cut, or sliced.
Spinach, cooked.
Turnips, cooked, sliced, diced, or in fancy shapes.

SECTION II

FIELD KITCHENS

7. Arrangement of field kitchen. *a.* The tactical situation will control the location of the field mess. The first requisite in the selection of the site for the field kitchen is the taking of natural cover to prevent observation of troop concentrations by the enemy. A well-drained area is desired.

b. The necessary essentials for field messing are the army field range with its equipment, tentage, and such other improvised expedients as the available resources and the initiative of the mess personnel will permit.

c. The arrangement of the mess tent, fly, or open area, will depend upon local conditions, but should provide for the highest efficiency of operation by eliminating unnecessary steps and effort for the cooks. Improvised work benches should be located adjacent to the range, so they can be used for serving tables. Stores should be located near the kitchen, protected from dust, insects, sunlight, and inclement weather. The cook will familiarize himself with the location of the stores to enable him to find any article during blackouts. He will learn to taste the various items used to enable him to cook during blackouts.

d. All possible precautions will be taken to prevent the exposure of cooking fires, lights, smoke and polished surface equipment to enemy observation. Such exposure may reveal the location of troop concentrations and supply dumps to the enemy.

e. The mess sergeant will acquaint himself with the location of the regimental, battalion, or similar unit ration dump to enable him to direct the ration detail over the route to and from the dump during blackouts. Teams of two men should carry the rations from the dump to the mess by using shelter halves, blankets, or other means. The team will inform the cook as to the contents of their individual load in order to enable the cook to store the items properly as received.

8. Field cooking compared with garrison. *a.* The fundamentals of cooking are the same in field as in garrison. The chief difference is the equipment used. The cook must be familiar with the handling of wood fires and the gasoline burner. Usually too much heat is used with the gasoline burner and difficulty is experienced with the wood fire when not accustomed to it. As the field range M1937 can be operated with wood in case of necessity, the cook should be trained in the handling of both types of fuel.

b. The menu must be adjusted to accommodate the range to be used in the field. Part of the meal should be prepared on the top of the range and part in the oven. This is especially true when either field range No. 1 or No. 2 is used. The menu should also be planned to accommodate the mess kit. Dishes that require long cooking should be avoided when the cooking time is limited. Hot cakes should not be served unless they can be served direct from the griddle to the man. This requires time. Hot biscuits can be prepared in much less time and can be served hot from the oven without difficulty.

9. Field ranges, installing and handling. *a.* When used. Army field ranges are

used by troops in the field when not equipped with rolling kitchens or other cooking equipment.

When signing for field ranges, be certain that all the parts and utensils are present and in good condition. It is important to remember that "field range, complete," includes utensils as well as parts.

b. *Classification.* There are three types of field ranges—Army field range No. 1, Army Field Range No. 2, and Army gasoline field range M1937 (par. 10).

(1) *Description, installation, and operation of field range no. 1.* (a) Army field range no. 1, complete, weighs approximately 264 pounds with utensils, and with the addition of the Alamo attachment is designed to cook for 150 men. It consists essentially of two parts—the oven no. 41 and the boiling plate. The boiling plate has three sections, no. 42, and the Alamo attachments, nos. 42-A and 42-B.

(b) On the march, field range no. 1 is ordinarily set up by leveling the ground selected and placing the oven no. 41 and boiling plate no. 42 side by side, so that the oven door and the fire-box door will be at the same end. Draw together 42-A and 42-B and secure bar lock. Insert 42 (boiling plate) into 42-A and rest 42-B snugly on the angle iron on the rear of the oven. The oven should not be banked as this would cause the sheet iron along the sides to warp and finally burn through. Sufficient earth, however, should be tamped along the sides and closed end to prevent the passage of gasses beneath, but should not extend above the straps along the sides and under the oven door. (See Plate 1.) If heavy weights, such as large cans of water, are placed on the boiling plate, lay angle irons across the plate so that the weight will come on the walls and not on the center of the plate. This will prevent breaking down the center of the plate and warping.

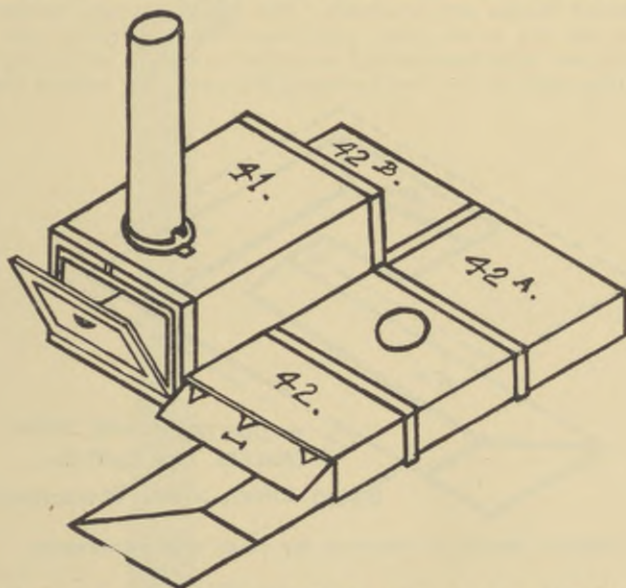


Plate 1. Sketch of Army field range no. 1, with Alamo attachments, assembled for use in the field.

(c) When used for one day only, a few shovelfuls of earth should be removed from the place to be covered by the boiling plate to facilitate firing. The best results are obtained by using short wood, keeping the fire well toward the firing end of the boiling plate; or, if using long sticks and branches, pushing them under the boiling plate as they are consumed.

(d) If the range is to remain in place for several days, it is best to dig a trench, except in sandy soil, about 18 inches wide by 6 inches deep at the front and the length of the boiling plate, say 6 feet, sloping upward to about 5 inches in depth at the back end. (See Plate 2.)

When installed, the trench should extend under the boiling plate and about 1 foot under the Alamo attachment—just enough to facilitate the draft—and about 6 inches under the oven. When the range is set up on different ground daily, no

difficulty will be experienced in obtaining the proper temperature in the oven, both for top and bottom heat. Whenever it remains for a longer time than 1 day in the same spot the ground will become dried out and hot, and it may be necessary to raise the bake pans about 2 inches off the floor of the oven. This can be done easily by the use of angle irons or other means, thereby causing an air space under the bake pans. Never use earth or sand for this purpose as it would cause a hole to burn in the bottom plate of the oven.

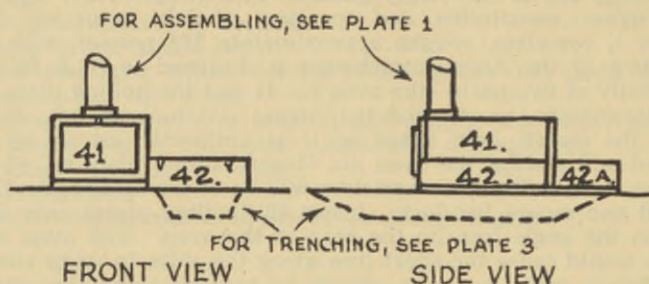


Plate 2. Sketch of range with or without trench.

(e) If the range is to be used for a considerable length of time in one location it should be elevated on a base of bricks or of stones and clay. In this case no trenches are dug under the range. The ground is leveled, and a brick floor may be laid if sufficient bricks are available. Set up the range, temporarily, on the level ground or on the brick floor, and mark the outline of the range. Then remove the range and attachments and construct a wall, 3 bricks high and 8 inches wide on the outline and on the line between the oven and boiling plate. Assemble

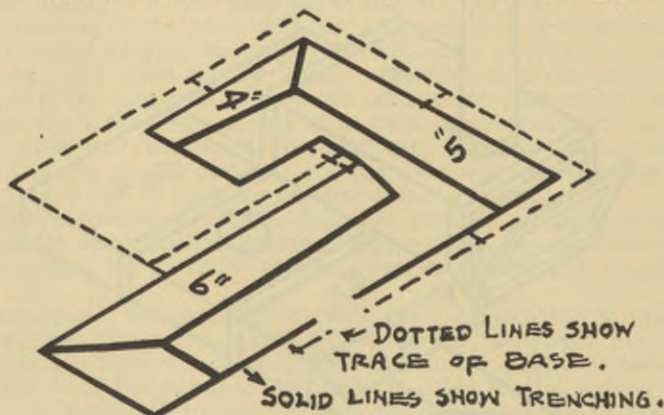


Plate 3. Sketch of trenching for range with attachments.

the range on top of the brick walls. Under the oven place a number of bricks on edge, spaced $\frac{3}{4}$ -inch apart. These hold the heat and improve baking. The spaces (fire channel) inside the brick walls under boiling plate no. 42 and gas chamber under Alamo attachments nos. 42-A and 42-B, and under oven are about the same as if a trench had been dug as in Plate 3. Bank outside of brick walls at sides and back of range with clean earth.

(f) At times it may be necessary to install this range for cooking on a railroad car or on a wooden floor of a house, shed, etc. To install, erect a frame 12 inches high, 6 feet long, and 4 feet 6 inches wide; fill with sand and set the oven and boiling plate on top of the sand, anchoring firmly in place. If clay is available, remove all stones, pebbles, etc.; add salt water, and sand. This foundation will become hard and solid and will prevent the burning of the floor.

(2) *Description, installation, and operation of field range no. 2.* (a) The Army field range no. 2, complete, weighs about 150 pounds with utensils, and is designed

to cook for 55 men. This range does not have the Alamo attachments. It consists essentially of two parts—the oven no. 61 and boiling plate no. 62.

(b) Field range no. 2 is set up practically the same as no. 1, the boiling plate being placed in position and the projecting collar being slipped into the space cut from one end of the oven for that purpose. The fire is maintained in the same manner as when using the no. 1 range.

(c) If the range is to remain in place for several days, it is best to dig a

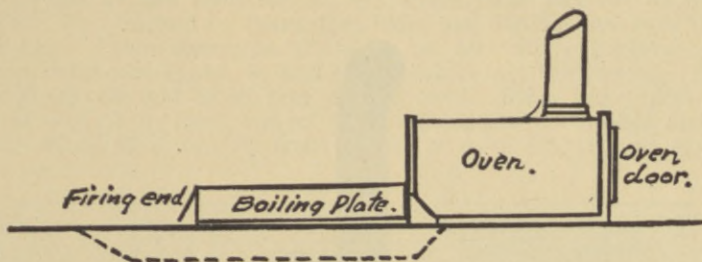


Plate 4.

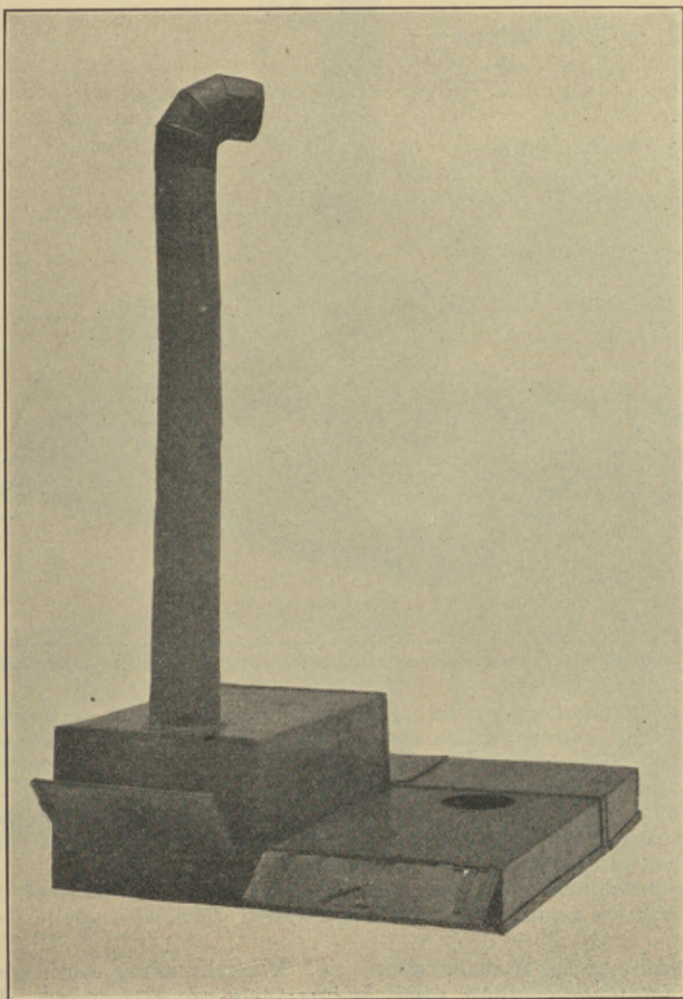


Plate 5. Field range no. 1, set up, front and right side, with boiling plate and Alamo attachments.

trench, except in sandy soil, about 16 inches wide by 6 inches deep, and of sufficient length for free fueling, say 5 feet. (See Plate 4.)

When installed, the trench should extend under the boiling plate and about 3 inches under the oven—just enough to prevent choking of the draft. If the flame is allowed to play freely on the bottom of the oven chamber, it will become too hot for baking and the bottom of the oven will soon burn out.



Plate 6. Field range no. 1, set up, rear and right side, with boiling plate and Alamo attachments.

c. *Remarks on handling ranges.* (1) *Care of ranges.* (a) A tin will be found inside the baking chamber which may be used if for any reason the bottom of the oven is too hot. Should the bottom be too cold for efficient baking the tin should be removed.

(b) Coal should never be used when wood is obtainable. If possible, even when coal is used, part of the fuel should be wood, for the use of coal alone will quickly destroy the range.

(c) In permanent camp the space above and on the sides of the oven and stovepipe should be cleaned at least once a week. This also applies to the boiling plates.

(2) *Assemblage for transportation.* (a) When breaking camp and assembling range no. 1 for transportation, draw boiling plate no. 42 forward. Unfasten the bar lock, pull apart, and remove nos. 42-A and 42-B and proceed as indicated below.

(b) To pack the utensils and range no. 1 for transportation, place the bake pan no. 52 on the ground. Set boiler no. 50 inside of bake pan no. 52 and boiler no. 51 inside of boiler no. 50. Place tent guards inside of boiler no. 51 on bottom. Telescope the four joints of pipe. Inside of the pipe place 2 forks, 3 knives, 1 steel, 1 cleaver, and 2 folding lanterns. Place joints of pipe containing utensils inside of boiler no. 51. Place meat chopper in boiler no. 51 alongside of joints of pipe. Place 2 basting spoons, 1 meat saw, and 1 skimmer in boiler no. 51, on top of pipe. Cover with lid no. 51 and then lid no. 50. Place bake pan no. 52 upside down over lid no. 50. Care should be taken that bake pan handles are well down to the sides of the pan. Place stovepipe elbow in no. 54. Place dippers alongside of elbow. Place covers nos. 54, 53, 49, and 48 on boilers in order named. Place nested boilers nos. 48, 49, 53, and 54 in rear end of oven. Place bake pans and nested boilers nos. 50 and 51 in front end of oven. Close the oven door and lock with damper lock. Place 42-A on left front corner of oven no. 41, and 42-B on right

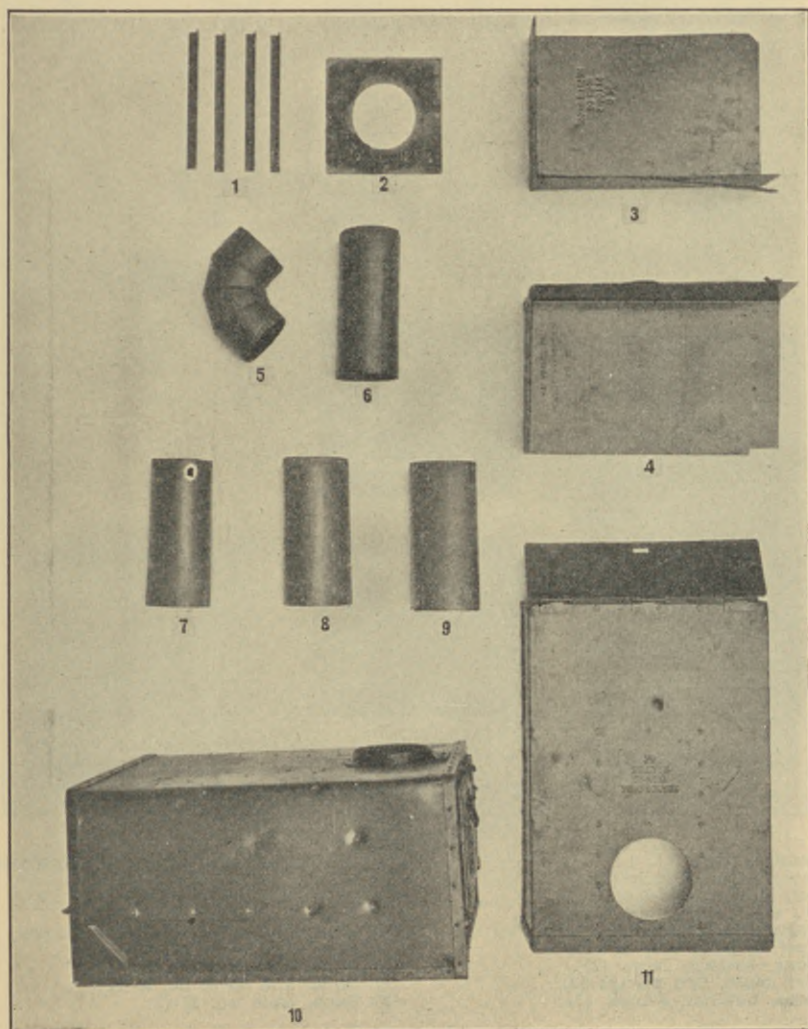


Plate 7. Parts for field range no. 1.

- | | |
|-------------------------------------|-----------------------------------|
| 1. Rests, pan, no. 57 (4). | 7. Pipe, stove, no. 45 (1). |
| 2. Guard, tent, 6½ inches (1). | 8. Pipe, stove, no. 44 (1). |
| 3. Attachment, Alamo, no. 42 B (1). | 9. Pipe, stove, no. 43 (1). |
| 4. Attachment, Alamo, no. 42 A (1). | 10. Body, field range, no 41 (1). |
| 5. Elbow, 6-inch, no. 47 (1). | 11. Plate, boiling, no. 42 (1). |
| 6. Pipe, stove, no. 46 (1). | |

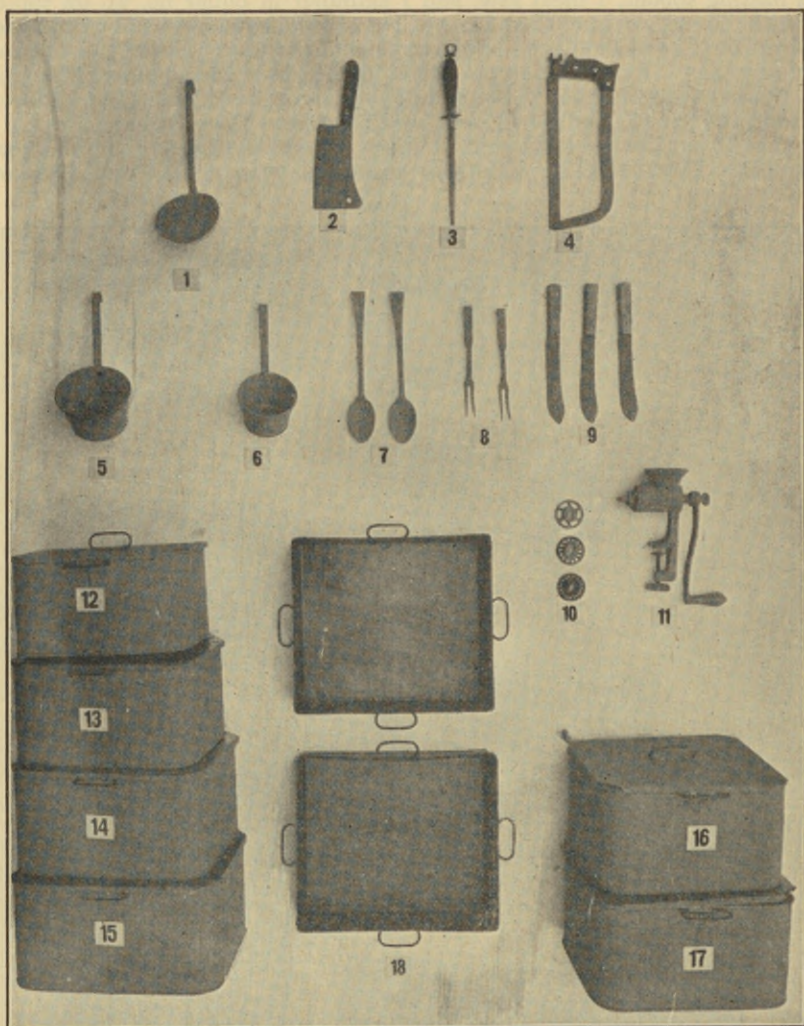


Plate 8. Utensils for field range No. 1.

- | | |
|-----------------------------------|--|
| 1. Skimmer, large (1). | 10. Cutters for meat grinders, assorted sizes (3). |
| 2. Cleaver, meat, 8-inch (1). | 11. Grinders, meat, small (1). |
| 3. Steel, butcher, 10-inch (1). | 12. Boiler and cover no. 54 (1). |
| 4. Saw, meat, 14½-inch blade (1). | 13. Boiler and cover no. 53 (1). |
| 5. Dipper, 2-quart, no. 55 (1). | 14. Boiler and cover no. 49 (1). |
| 6. Dipper, 1-quart, no. 56 (1). | 15. Boiler and cover no. 48 (1). |
| 7. Spoons, basting, large (2). | 16. Boiler and cover no. 51 (1). |
| 8. Forks, meat, two prongs (2). | 17. Boiler and cover no. 50 (1). |
| 9. Knives, butcher, 8-inch (3). | 18. Pans, bake no. 52 (2). |

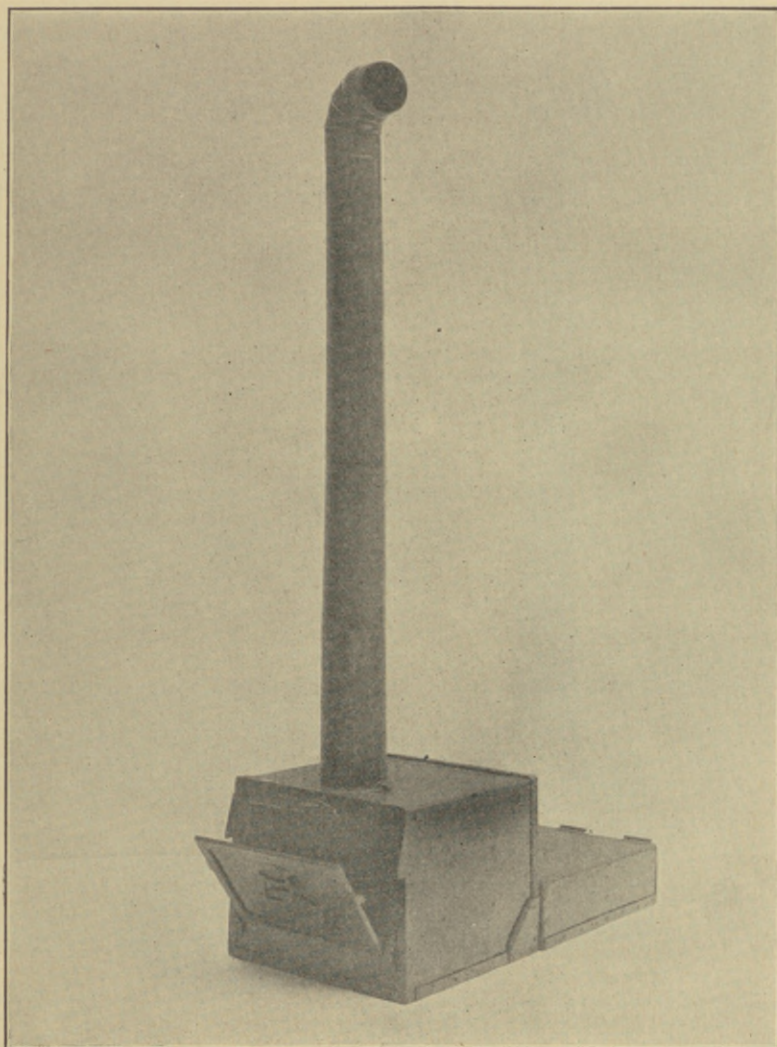


Plate 9. Field range no. 2, set up, front and right side, with boiling plate.

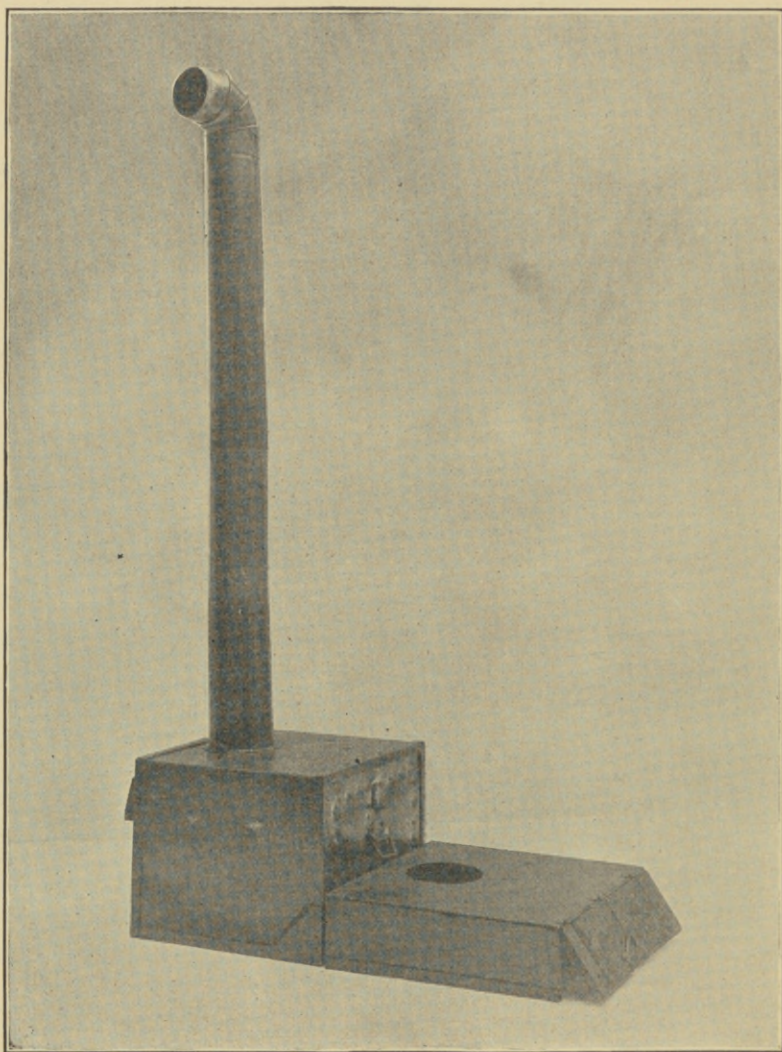


Plate 10. Field range no. 2, set up, rear and right side, with boiling plate.

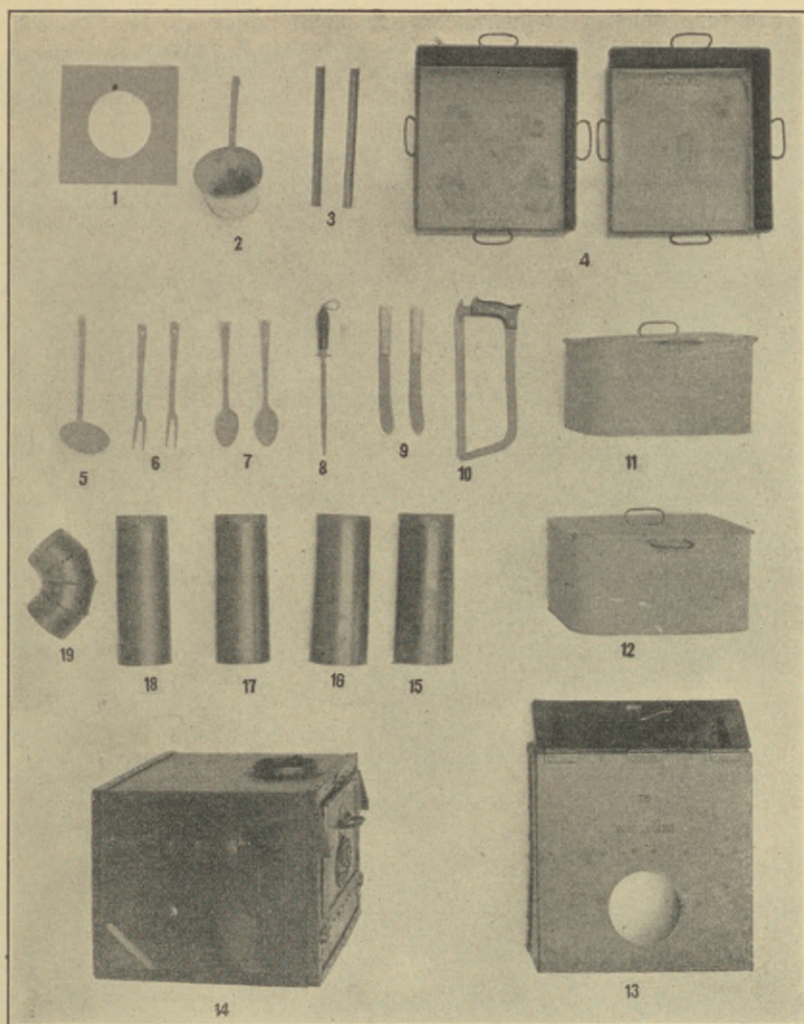


Plate 11. Parts and utensils for field range no. 2.

1. Guard, tent (1 pair).
2. Dipper, 2-quart no. 55 (1).
3. Rests, pan no. 57 (2).
4. Pans, bake no. 52 (2).
5. Skimmer, small (1).
6. Forks, meat, two prongs (2).
7. Spoons, basting, small (2).
8. Steel, butcher, 10-inch (1).
9. Knives, butcher, 8-inch (2).
10. Saw, meat, 14½-inch blade (1).

11. Boiler and cover no. 51 (1).
12. Boiler and cover no. 50 (1).
13. Plate, boiling no. 62 (1).
14. Body, field range no. 61 (1).
15. Pipe, stove, no. 63 (1).
16. Pipe, stove, no. 64 (1).
17. Pipe, stove, no. 65 (1).
18. Pipe, stove, no. 66 (1).
19. Elbow, no. 67 (1).

front corner, inserting bar in crimp. This bar now rests against the pipe collar and prevents sliding. Place boiling plate no. 42 on top of range, eye fitting over stovepipe flange and engaging under the flat hook. Make secure by fastening hook on front of boiling plate to the lug on back of range. The range is now secure for transportation.

(c) To pack utensils and range no. 2 for transportation, place bake pan no. 52 on the ground. Set boiler no. 50 inside of bake pan no. 52 and boiler no. 51 inside of no. 50. Place tent guards on bottom of boiler no. 51. Telescope the 4 joints of stovepipe. Inside of pipe place 2 forks, 2 knives, 1 steel, 2 spoons, 1 lantern (folding), and 1 skimmer. Place dipper and elbow alongside the pipe. Place meat saw in bake pan no. 52 alongside of boilers. Cover boilers with lids

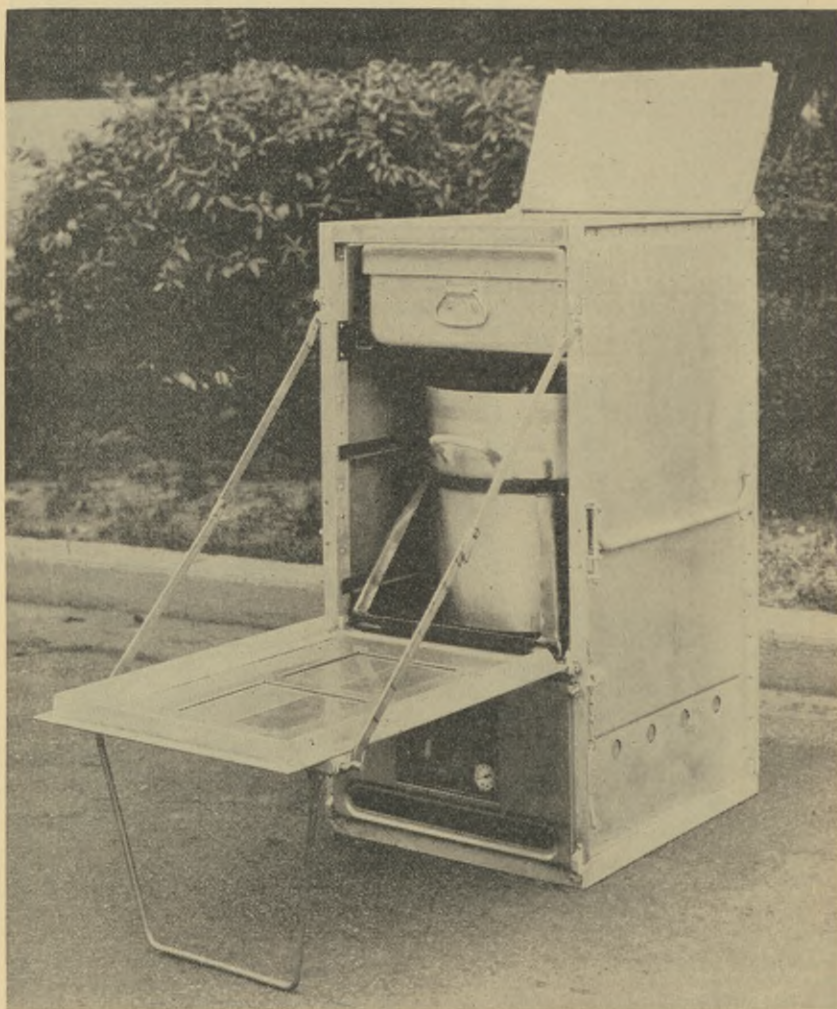


Plate 12. One unit of range with cooking equipment in place.

no. 51 and no. 50. Place bake pan no. 52 upside down over lid no. 50. Place pans in range oven. Place the boiling plate at the door end of the oven. Engage the flanges on the inner side of boiling plate with the lugs on the door end of the oven. Fasten the hook on boiling plate (firing end) to lug above the handle on the closed end of oven. The range is now secure for transportation.

10. Army gasoline field range M1937. a. Description of range. The range has been

designed to perform a variety of cooking operations using gasoline as fuel. Either white or ethyl gasoline may be used. In emergencies it may be operated with wood as fuel, a collapsible grate being provided for this purpose. The construction of the range in small units makes it suitable for any size organization (Plates 12, 13, and 14). One, two, or three units may be installed across the front end of the 1½-ton truck, opening toward the rear of the truck. The fire unit is separate from the cabinet and may be used in three different positions in the cabinet. The fire unit may also be operated outside of the cabinet.



Plate 13. One unit of range with cooking vessels uncovered, and in position for serving food.

b. To operate fire unit. Plate 15. (1) Close all valves tight.

(2) Fill fuel tank and replace cap tight.

(3) Remove filter cap; remove dirty filter disk; wipe filter cap and body clean; insert new filter disk.

(4) Be certain ground joint is clean.

(5) Tighten filter cap screw firmly.

(6) Pump pressure to about 40 pounds.

(7) Pull out burner control rod.

(8) Open air shutter wide.

(9) Open air valve one-half turn.

(10) Open fuel valve one-half turn.

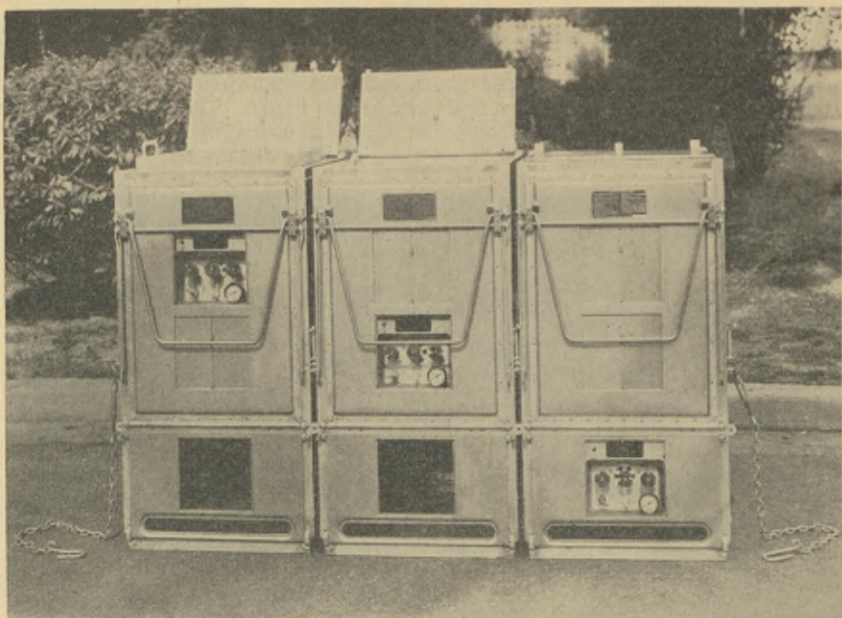


Plate 14. Three units of range latched together for cooking in transport, showing tie-in chains for anchoring range in truck or railway car. (Right-hand unit is set up for boiling and roasting, middle unit for frying, and left-hand unit for griddle cooking).

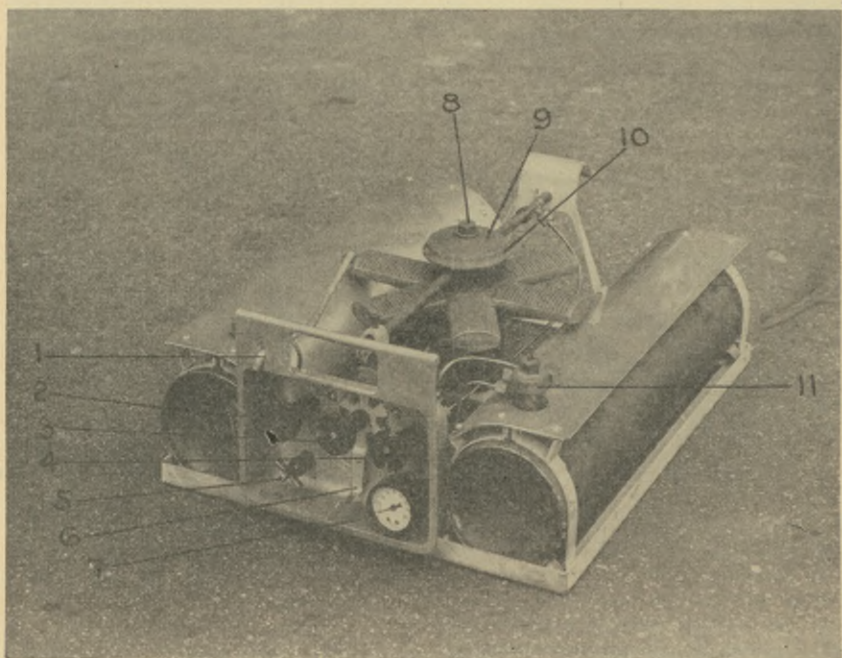


Plate 15. Gasoline fire unit.

1. Rod, burner control.
2. Valve, air.
3. Valve, flame.
4. Valve, fuel.

5. Valve, air input.
6. Shutter, air.
7. Gage, air pressure.
8. Screw, filter case cap.

9. Cap, filter case.
10. Body, filter case.
11. Cap, fuel tank.

- (11) Hold lighted match over end of burner arm and open flame valve one-half turn.
- (12) After flame starts keep color *green* by adjusting air valve.
- (13) When air valve can be *closed* generator is hot.
- (14) Push in burner control rod.
- (15) Regulate size of flame with flame valve.
- (16) Keep flame green with air shutter.
- (17) To stop flame, close *fuel valve*.
- (18) Do not leave flame valve *closed* when hot.
- (19) In case of accidental fire, close fuel valve first and remove fire unit from cabinet.

c. *Refueling fire unit.* Fill the fuel tank *before* each meal. The tank full of fuel will operate the range for about 4 hours. If refilling is necessary, be certain the flame is *out* and that the burner is *not hot*. Remember at all times that *gasoline is treacherous if not kept strictly in its place*.

d. *To clean fire unit.* (1) Clean the shields with steel wool and gasoline or cleaning fluid.

(2) Remove dirt from the burner surface with the steel brush. Clean the slots with the burner slot cleaner.

(3) Clean the mirror surface with water or gasoline. Do not use steel wool on the mirror. Keep the mirror clean at all times.

(4) Remove the generator caps and take the filter case apart. Remove the generator yoke and lift out the generator. Clean all passages thoroughly with the generator cleaner wire. *Do not remove the generator tubes from the filter case body.*

(5) The fuel jet should be cleaned once a day. To clean the fuel jet, open the flame valve stem about one turn. Loosen the generator yoke screw and remove the flame valve from the front panel. Remove the flame valve nut, using the two open end wrenches. Clean the jet with the jet reamer, being sure that the reamer enters the jet up to the shoulder on the reamer. Replace the jet and pull the flame valve nut down *moderately tight*.

(6) The flame valve stem should be cleaned frequently. To clean the flame valve stem, unscrew the packing gland and remove the stem from the valve body. The packing gland must come out with the stem. Clean the socket on the side of the flame valve body and be certain that the end of the small generator tube fits properly in the socket before the generator yoke screw is tightened. Only moderate pressure should be used on this screw. Excessive tightening may distort or rupture the front panel. If a leak occurs at the flame valve socket, these parts should be resealed with valve grinding compound.

(7) Clean the filter and insert a new filter disk * each time the jet is cleaned. After inserting a new filter disk in the filter cap be certain that all dirt particles are removed from the ground joint before the cap is put in place on the filter body.

(8) Apply graphite grease to the threads of the filter case cap screw and to the under side of the filter case cap screw gasket. Pull the cap screw down firmly with the wrench. Avoid excessive tightening of this screw.

e. *Cooking operations.* Suitable temperatures for boiling in the cook pot and for roasting or baking in the roasting pan at the same time are produced when the fire unit is operated in the bottom position in the cabinet. Pies may be baked in the roasting pan. All other baking should be done in the baking pan placed inside of the roasting pan. Always put the cover on the roasting pan when roasting or baking and keep the top door of the range closed. Frying in deep fat is done in the roasting pan without the cover, the fire unit being used in the middle position. For griddle cooking the cover of the roasting pan is turned over and placed on the brackets in the top corners of the cabinet, the fire unit being in the top position.

f. *Wood burning grate.* The wood burning grate (Plate 16) is provided with

* Use of steel wool filter disk in fire unit of field range. 1. It has come to the attention of the War Department that various organizations have been experimenting with the use of steel wool filter disks to replace the present asbestos filter disks used in the fire unit of the field range.

2. The function of the filter disk is to prevent accumulation of lead in the generator tubes and flame valves and to absorb lead which would otherwise remain in the products of combustion. Numerous tests conducted with filter disks made of steel wool in lieu of asbestos have definitely shown that steel wool does not fill either of these functions.

3. In view of the serious health hazard involved, the use of these improvised steel wool filter disks will be discontinued immediately.

each unit of the range. It is carried, folded, in the bottom of the cabinet when not in use. It is used in the bottom fire unit position when the range is set up on the ground.

g. General care of range. (1) Handle the range cabinet and burner carefully.

(2) Spilled food and grease should be removed promptly. Cleaning may be done with a scouring powder and rag or with steel wool and gasoline.

(3) Do not allow water to enter fuel tank. Invert the fire unit to remove water from the fuel tank.

(4) Remove rust from the burner slots by pickling for a few minutes in 50 percent solution of hot muriatic acid.

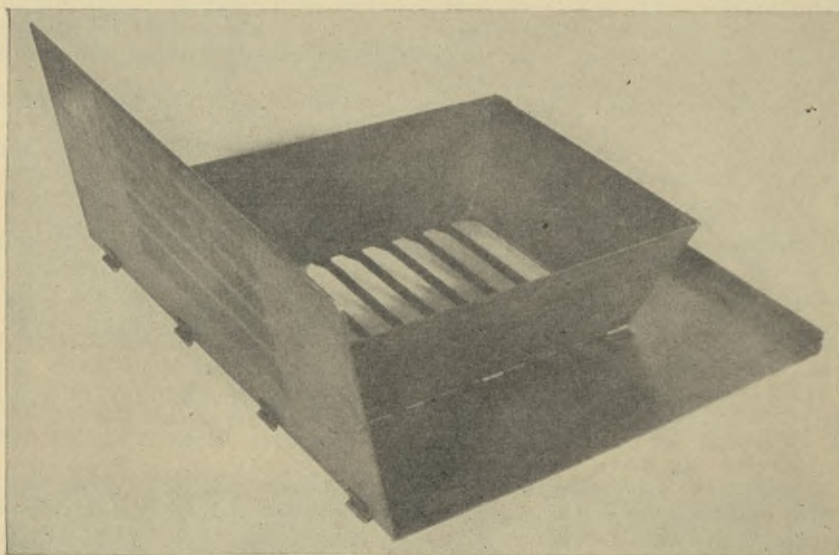


Plate 16. Wood burning grate set up for use.

(5) Apply graphite grease to the cook pot cradle rails occasionally.

(6) Keep water in the cook pot whenever it is over the fire.

(7) Protect the filter case ground joint. Avoid dropping objects on the copper tubing.

(8) Use only the wrenches supplied with the range. Do not use pliers on any of the nuts.

h. Troubles and their treatment. (1) A leak at the filter case ground joint, indicated by a yellow flame at the point of leakage, may be caused by an injured ground joint surface or by a loose cap screw.

(2) Tighten a loose screw, though not excessively. Tapping the filter case cap right over a leak may stop a small leak. Regrinding will be necessary when the ground joint surfaces have been injured. Grind as little as possible.

(3) Much trouble is caused by tightening filter case cap screw too tight. If the ground joint surfaces are clean, moderate tightening is sufficient.

(4) A leak at the flame valve socket may be caused by dirt in the socket, or by improper placing of the flame valve when the generator yoke is tightened. Be very careful to put the generator tube into this socket just right before the yoke screw is tightened. An injured socket joint may be repaired by grinding in with valve grinding compound.

(5) Excessive tightening of the generator yoke screw may fracture the front panel. Very moderate pressure will make this joint tight.

(6) Unions on the tubing fittings should be set up moderately tight.

(7) A yellow flame may be caused by dirt at the point of the flame valve stem. This may be removed by turning the valve stem back and forth while the flame is in operation.

(8) If the flame valve jet is not cleaned frequently the opening will be re-

duced by dirt. This condition may be remedied by closing the flame valve tight and reopening. Ream a dirty jet at the first chance.

(9) A dirty filter disk reduces the passage of fuel through the disk, and is indicated by a weak flame. Replace the dirty filter disk.

(10) If the passages in the filter case body and in the generator tubes are allowed to go too long without cleaning they will choke and stop the flame.

(11) These passages are very difficult to clean if they are allowed to choke tight. Cleaning of these passages about twice a week will prevent trouble.

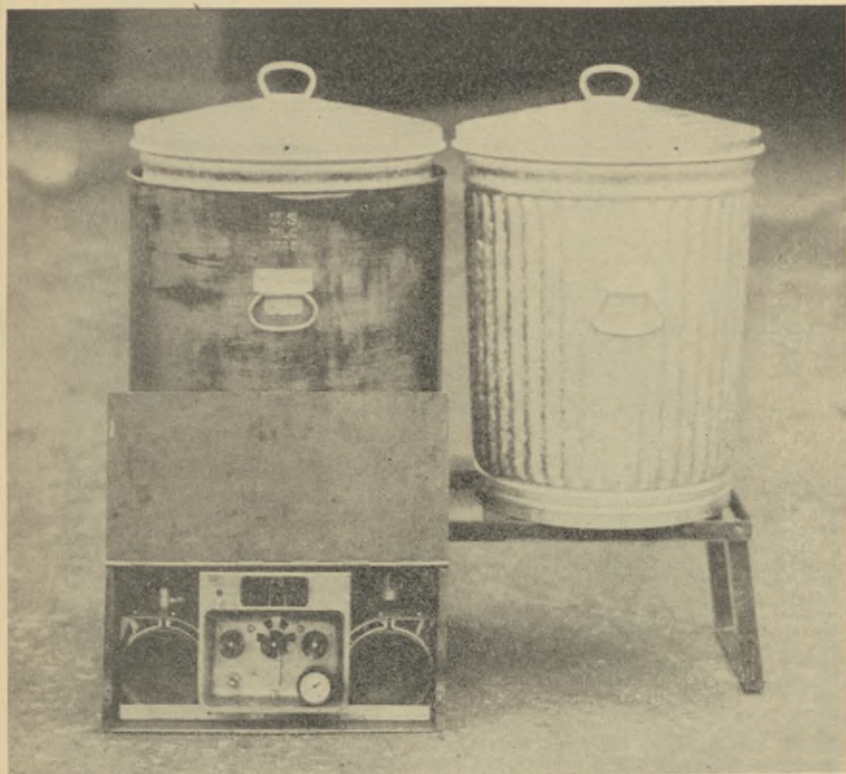


Plate 17. Water heater set up for use (case, can, can cover, and can shield).

i. *Water heater.* The carrying case for the spare fire unit with each set of range units is designed to be used as a water heater (Plate 17). Two 24-gallon cans may be placed on this heater. The shield, for use on the can being heated, is carried inside of one of the cans. It is placed around the can being heated to hold the heat to the wall of the can.

j. *List of replacement parts* (Plates 18, 19, and 20).

11. Installation of Army field range No. 1 in baggage car. a. To install the field range No. 1 in a baggage car as part of an emergency kitchen equipment when kitchen cars are not available, construct a box 6 feet 8 inches long by 5 feet 6 inches wide and about 12 inches deep (inside measurements), with bottom, using 1½- or 2-inch material as available. Line the sides, ends, bottom, and top edge of the box with galvanized iron or zinc. Place box in car on 2 by 4's running lengthwise on one side of the car about 2 feet from the side, giving a 4-inch air space between bottom of box and floor of car. Fill box with dirt to about 2 inches of the top. Place a brick flush with top of dirt at each of the four corners where the range will set. Place range in box, front and oven end close against end of box, and deep enough in the box so that when oven door is opened it will lie flat on the edge of box. Place boiling plate in box, the end resting on top of angle iron on rear of range. Place brick under each front corner of boiling

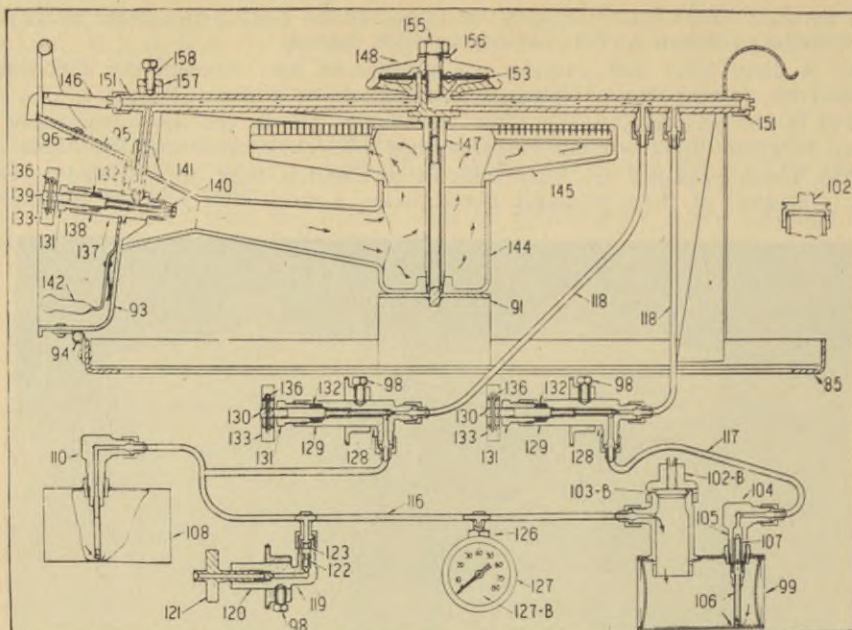


Plate 18. Sectional view of gasoline fire unit.

Number	Name	Number	Name
1.	Cabinet assembly.	141.	Nut, flame valve.
84.	Fire unit assembly.	142.	Shutter, air.
85.	Frame, fire unit assembly.	144.	Chamber, mixing.
88.	Strap, anchor, outer, fire unit tank.	144-B.	Screw mixing chamber.
88-B.	Rivet, outer anchor strap.	145.	Burner.
89.	Strap, anchor, inner, fire unit tank.	146.	Rod, burner control.
89-B.	Rivet, inner anchor strap.	147.	Nut, burner.
90.	Screw, fire unit tank anchor strap.	148.	Generator assembly.
93.	Panel, front.	151.	Cap, generator tube.
93-B.	Rivet, front panel hinge.	153.	Disks, filter, in can.
95.	Mirror, front panel.	155.	Screw, filter case cap.
96.	Screw, front panel mirror.	156.	Gasket, filter case cap screw.
98.	Screw, set, front panel, $\frac{1}{8}$ by $\frac{5}{8}$ inch.	157.	Yoke, generator.
99.	Tank, fuel.	157-B.	Pin, cotter, generator yoke.
100.	Shield, fuel tank.	158.	Screw, generator yoke.
101.	Screw, fuel and air tank shields.	159.	Cradle, cook pot.
102.	Cap, fuel tank filler tube, old type.	181.	Box, tool assembly.
102-B.	Cap, fuel tank filler tube, new type.	187.	Cover, manifold compartment.
103-B.	Valve, fuel tank filler tube cap.	190.	Pump, air, assembly.
104.	Valve, fuel output, assembly.	197.	Cup, leather, air pump.
105.	Body, fuel output valve.	202.	Hose, air pump, with thumb lock and fitting.
106.	Tube, uptake, fuel output valve.	205.	Wrench, filter case cap screw.
107.	Check, safety, fuel output valve.	206.	Wrench, engineers', single head, $\frac{5}{8}$ -inch opening.
108.	Tank, air.	207.	Wrench, engineers', single head, $\frac{1}{2}$ -inch opening.
109.	Shield, air tank.	208.	Wrench, setscrew, $\frac{1}{8}$ -inch opening.
110.	Elbow, air output.	209.	Screw driver.
116.	Manifold assembly.	210.	Reamer, fuel jet.
117.	Tube, fuel, short.	211.	Cleaner, burner slot.
118.	Tube, fuel and air, long.	212.	Cleaner, wire, generator.
119.	Valve, air input assembly.	213.	Brush, steel wire.
120.	Body, air input valve.	214.	Funnel.
121.	Stem, air input valve.	215.	Chain, tie-in, right.
122.	Check, air input valve.	216.	Chain, tie-in, left.
123.	Retainer, check, air input valve.	218.	Container with graphite grease.
126.	Elbow, gage fitting.	219.	Container for small parts.
127.	Gage, air pressure.	220.	Protector, arm, long.
127-B.	Glass, air pressure gage.	221.	Protector, arm, short.
128.	Valve, air and fuel assembly.	222.	Pot, cook.
129.	Body, air and fuel valve.	223.	Cover, heavy, cook pot.
130.	Stem, air and fuel valve.	224.	Plate, splash.
131.	Gland, packing, air, fuel and flame valve.	225.	Insert.
132.	Packing, air, fuel and flame valve.	226.	Cover, light, cook pot.
133.	Knob, air, fuel and flame valve.	227.	Pan, roasting.
136.	Pin, cotter, air, fuel and flame valve knob.	230.	Cover, roasting pan.
137.	Valve, flame assembly.	231.	Pan, cake.
138.	Body, flame valve.	232.	Can, gasoline.
139.	Stem, flame valve.	233.	Hook, hay.
140.	Jet, fuel, flame valve.		

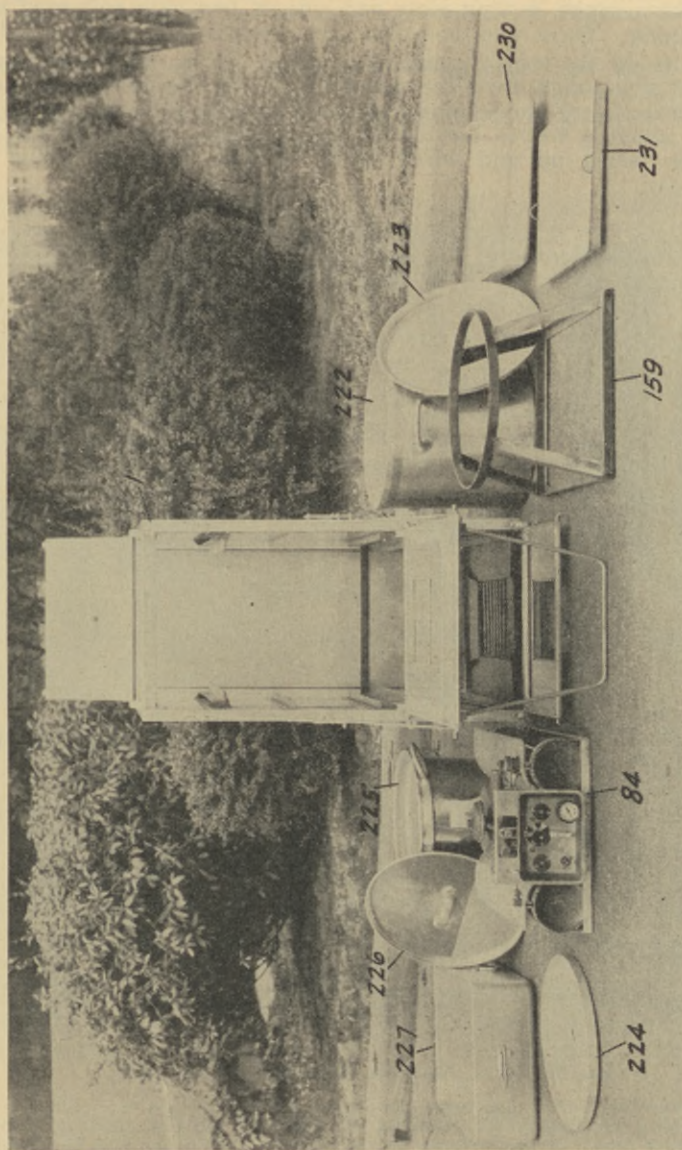


Plate 19. One unit of range, showing cabinet, fire unit, wood burning grate in carrying position, cook pot cradle, and cooking vessels and covers.

NOTE.—In addition to the numbered parts the following items are available as replacements.

- Grate, wood burning.
- Case, water heater assembly.
- Can, water heater.
- Cover, water heater can.
- Shield, water heater can.

The gasoline filler tube cap 102, shown on sectional view of gasoline fire unit, is to be ordered for the old type fire unit only. Numbers 102 and 102-B are not interchangeable.

plate flush with top of the dirt. The Alamo attachments are not used when range No. 1 is installed in the above manner.

b. Fasten range and boiling plate firmly to box by means of strap iron, or two or three strands of telephone or telegraph wires at points shown in Plate 21. Fill space between range, boiling plate and side of box with soft mud to prevent heat from escaping. Three and even four field ranges may be installed in a car.

c. Remove one of the top ventilating windows from car; tack tent guards, furnished with each range, over the opening, one on the outside of the car and one on the inside. Carry stovepipe up and out through the opening. End of pipe should extend about 6 inches outside of the opening. Elbow should be placed on end of pipe facing up and wired firmly to car. Wire stovepipe firmly to both sides of car.

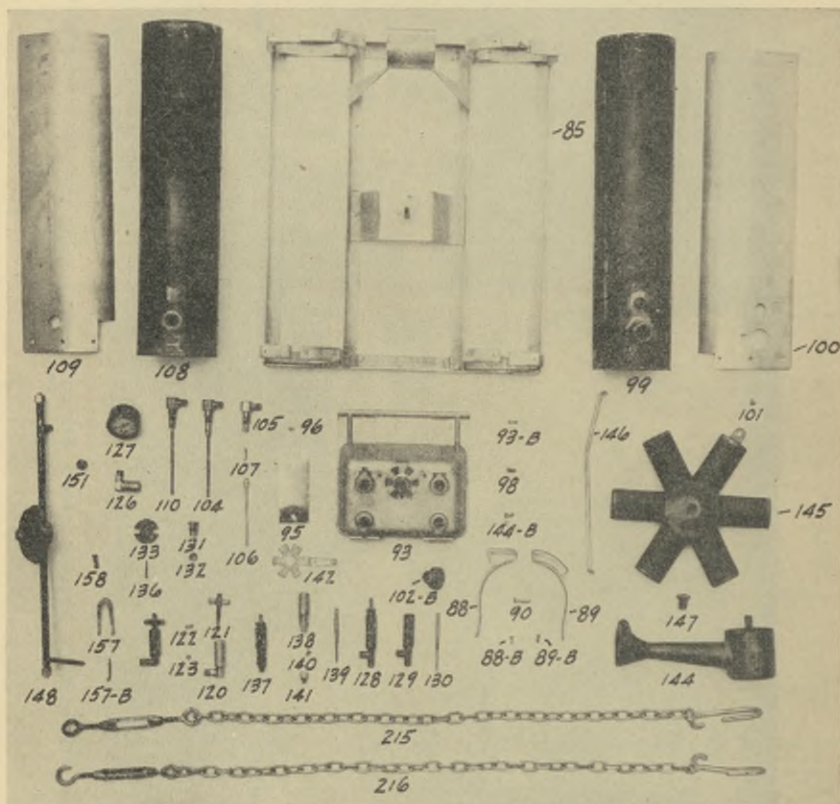


Plate 20. Fig. 1. Gasoline fire unit parts and tools.

d. Box can be held firmly in position on floor of car by nailing 2 by 4 strips around sides and ends of box. This is important and must not be neglected.

e. The following additional equipment to that supplied with each range is necessary: two galvanized iron water cans, two galvanized iron buckets, one stovepipe elbow, and 100 feet of wire.

f. Water cans should be filled on every possible occasion when stops are made.

g. If the equipment is to be set up in a freight car, a hole would have to be cut in the top of the car for the stovepipe, using tent guards as explained in c above, to cover this opening.

h. The commanding officer of troops on a train carrying a kitchen car in which a field range has been installed, will issue such orders as may be necessary to insure watchful attention being given the range and the fire in the range, continuously by day or night.

i. Six bricks, placed three to the side, as shown in Plate 21(a) will serve to hold the range securely in position while the car is in motion.

j. A freight car should not be used unless absolutely necessary as the Government will be compelled to pay for repairs necessary to replace the car in proper condition.

12. Installation and use of Army field range M1937 on troop trains. a. The Association of American Railroads considers that the Army field range M1937 can be safely used for cooking on troop trains when installed and operated in accordance with the instructions below.

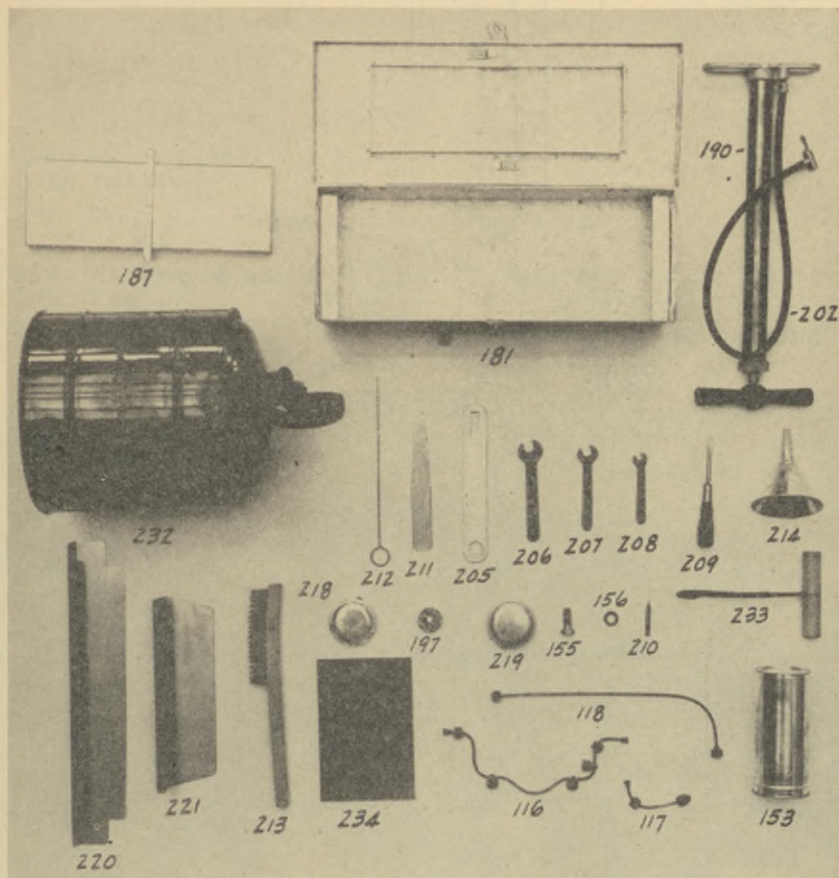


Plate 20. Fig. 2. Gasoline fire unit parts and tools—Continued.

b. All range cabinets, securely latched together as a battery, will be placed against the side wall of a baggage car, and secured by stay chains and wooden blocks as indicated in Plate 21(b). The wooden blocks will be secured with 16-penny nails or with lag screws, whichever will result in the least damage to the car floor. The large hook on the outer end of the chain will be run through a link of the chain and will serve as a pull bar against the outer ends of the wooden blocks. In event the car furnished has a wooden interior, the range set will be placed 2 inches from the side of the car.

c. The installation of the range will be made under the supervision of a commissioned officer.

d. One 5-gallon gasoline safety-filling can is furnished as standard equipment with each range set. Only one such can of gasoline will be carried in a car, except where the number of range cabinets installed exceeds three, in which event two such

cans of gasoline may be carried. Gasoline cans will be placed in individual wood containers secured to the car floor as indicated in Plate 22. The wooden containers will be as far removed from the ranges as is practically possible.

e. One 1-quart carbon tetrachloride fire extinguisher and one bucket of sand will be provided in the car for each range set of three cabinets.

f. Since the carrying in the car of gasoline in excess of the quantity authorized in paragraph *d* above is prohibited, arrangements will be made for replenishing the safety cans en route.

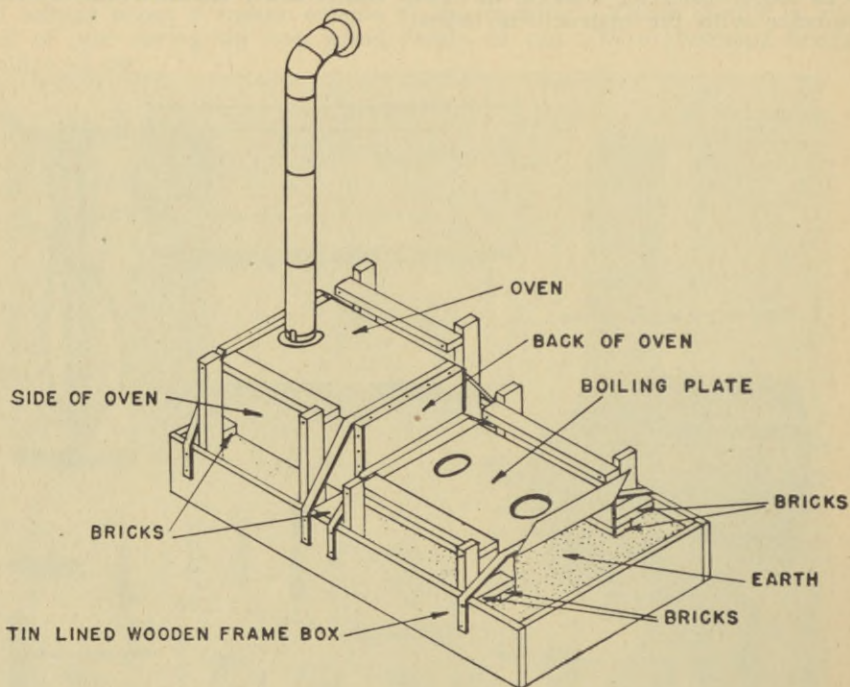


Plate 21 (a). Field range No. 1 installed in baggage car.

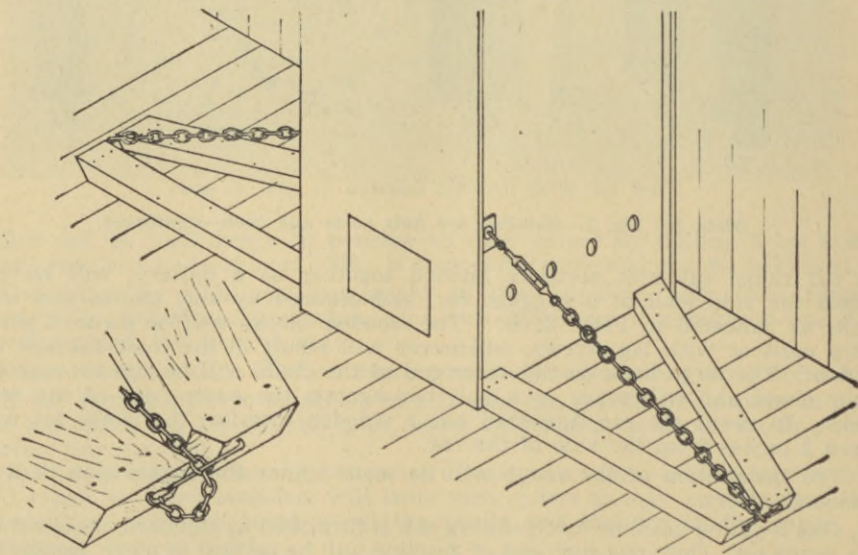


Plate 21 (b). Range cabinet secured to side wall of baggage car.

g. Fire units will be removed to the other end of the car or outside of the car, if practicable, for refueling. *In no event will units be refueled while there is any fire in the car or while the car is in motion.* The work of refueling fire units will be supervised by a commissioned officer.

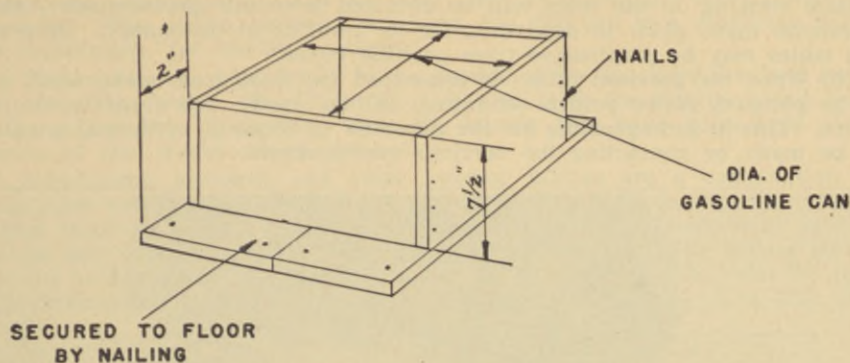


Plate 22. Container for gasoline can.

h. The installation and use of equipment normally provided for heating water in the field is prohibited on troop trains. The fire unit normally used for heating water may be carried on troop trains as a spare, provided it is securely fastened to the floor of the car.

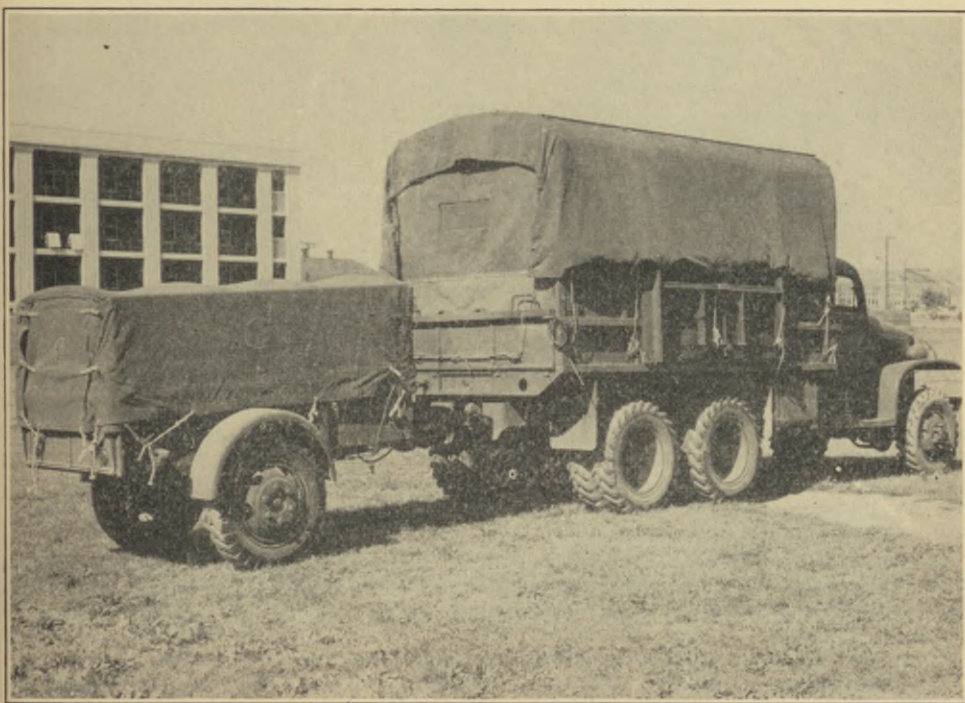


Plate 23. Kitchen truck with trailer.

Army Motors.

i. In order to decrease the fire hazard when ranges are installed in railroad cars with wooden floors, a metal sheet will be placed under the cabinets. This sheet will cover the entire floor area occupied by the range and should extend at least 4 inches beyond the front edge of the cabinets. Twenty-gage metal or heavier is suitable for the purpose.

13. Messing on troop trains. *a. General.* Orders directing travel will prescribe the ration to be used. Under certain conditions the use of meal tickets or a monetary allowance in lieu of rations may be authorized.

b. Kitchen cars. Such equipment in addition to field ranges as is necessary to facilitate messing on the train will be obtained from the quartermaster, and arrangements made prior to departure for its transfer at destination. Improvised work tables may be constructed from packing boxes.

(2) When the garrison ration is prescribed for troop train movements, menus will be planned, ration return submitted, rations drawn and stored prior to departure. Timely arrangements for the purchase en route of additional perishables will be made by contacting the carrier's representative.



Plate 24. A field setup.

Army Motors.

(3) When cooking facilities are not provided and the garrison or travel ration is authorized, all "dry" subsistence except coffee can be stored in the smaller of the two washrooms of the sleeping car. Timely arrangements can be made with the dining car steward for the purchase of hot coffee. In the absence of a dining car on the train, arrangements can be made through the conductor for the purchase of hot coffee from commercial firms at stations or division points along the route.

14. Serving on troop trains. The food must be carried and served to the troops, who remain seated in their respective sections of the cars. No attempt should be made to form a "cafeteria line," as the limited space and motion of the train will cause the spilling of food and general unsatisfactory condition. The troops in the car or cars farthest from the food source should be served first.

15. Installation of kitchen trucks. *a.* Although at this time there are no officially approved installation procedures for kitchen trucks, certain organizations have used their ingenuity in preparing vehicles as mess trucks to assist mess personnel in the problem of feeding men in a moving situation. The following sub-paragraphs are offered as suggestions only.

b. Many units build their kitchen truck around a 2½ ton, 6x6 truck. The first step is to raise the bows, to give the cook plenty of head room. A chock of wood in the body slots that hold the bows is one solution. (See Plate 24). Screening completely incloses the entire body. Note the screen door. The five-foot step-

ladder has two hooks on top which cling firmly to a pair of brackets welded to the tail gate. On the right of truck is a tarpaulin rigged as a fly, sewed to the truck tarpaulin. Two poles support the other end of the tarpaulin.

c. A view of the inside of the truck (Plate 26) show the arrangement of the field ranges, the lighting setup, and the slats fastened across the bows to support the screening. The screen between the body and the cab is a necessary feature of the installation, for obvious reasons.

d. Field tables are held firmly to the outside of the truck by brackets welded to the side of the body. (See Plate 27). A wire from the interior lights leads out to the socket box illustrated. Note the boards that have been fixed along the insides of the trucks above the rail.

e. Breadboxes, iceboxes, and other interior fittings are a combination of the scrap piles and the ingenuity of the builders. It is well to remember that these fittings must be braced firmly against the sides of the truck with brackets to obviate any possibility of movement while on the road. The icebox must have a drain hole, extending through the bed of the truck. Lids must be provided with screen-door hooks or like devices to hold them open when desired.

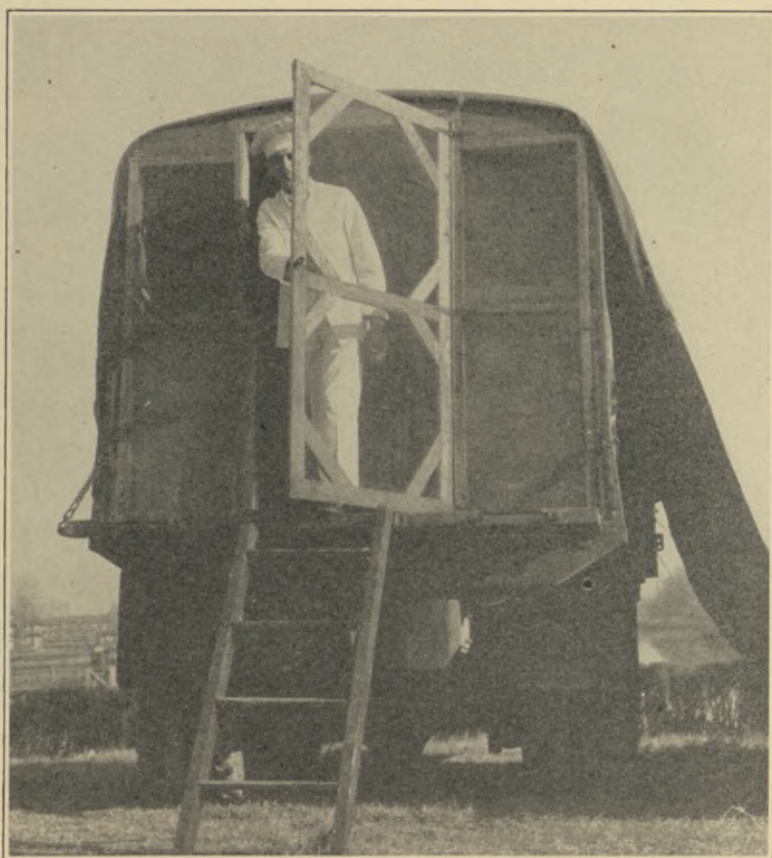
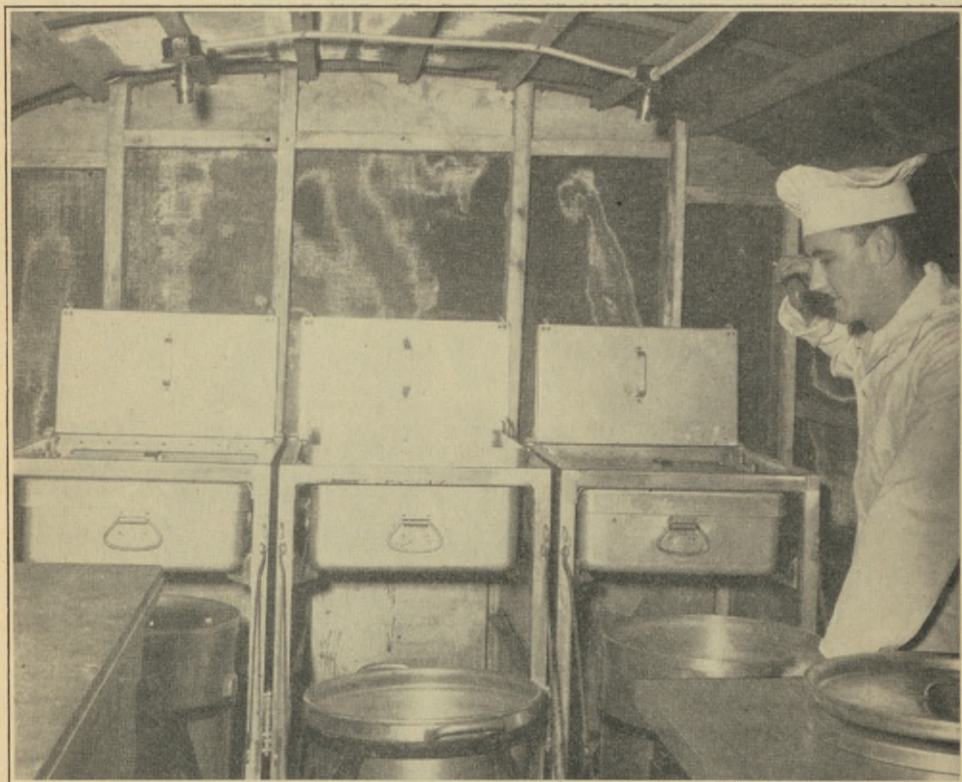


Plate 25. Rear view, showing screen door.

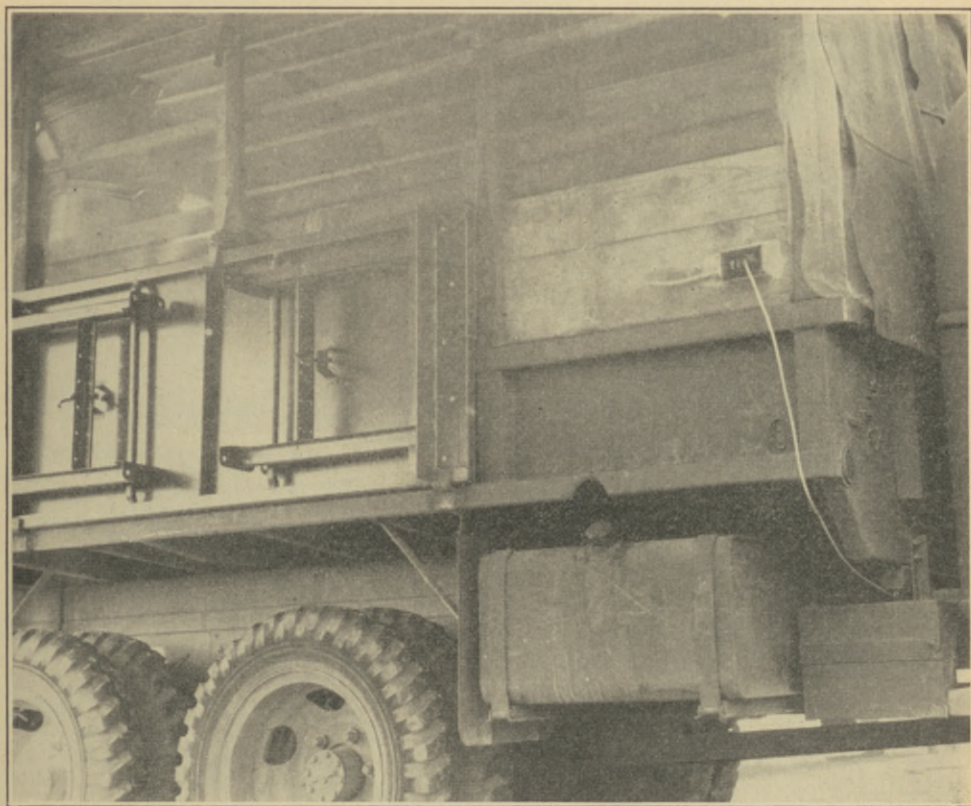
Army Motors.

16. Fireless cookers, instructions for using. *a.* A fireless cooker is an airtight receptacle in which food which has been partly cooked is placed. The heat which has been stored in the food by the partial cooking is retained by the airtight fireless cooker, and this retained heat completes the cooking. It is also used to preserve the temperature of food cooked or uncooked. It is generally a boxlike arrangement lined with a nonconducting material inside of which is the well or reservoir into which the vessel containing the food is placed.



Army Motors.

Plate 26. Illustrating the arrangement of the field ranges, the lighting setup and the slats fastened across the bows to support the screening.



Army Motors.

Plate 27. The field tables are held firmly by a couple of brackets welded to the side of the body. A wire from the interior lights leads out here to the socket box so the lights can be plugged into the battery or into any other electrical connection. Notice the boards that have been fixed along the insides of the truck above the rail.

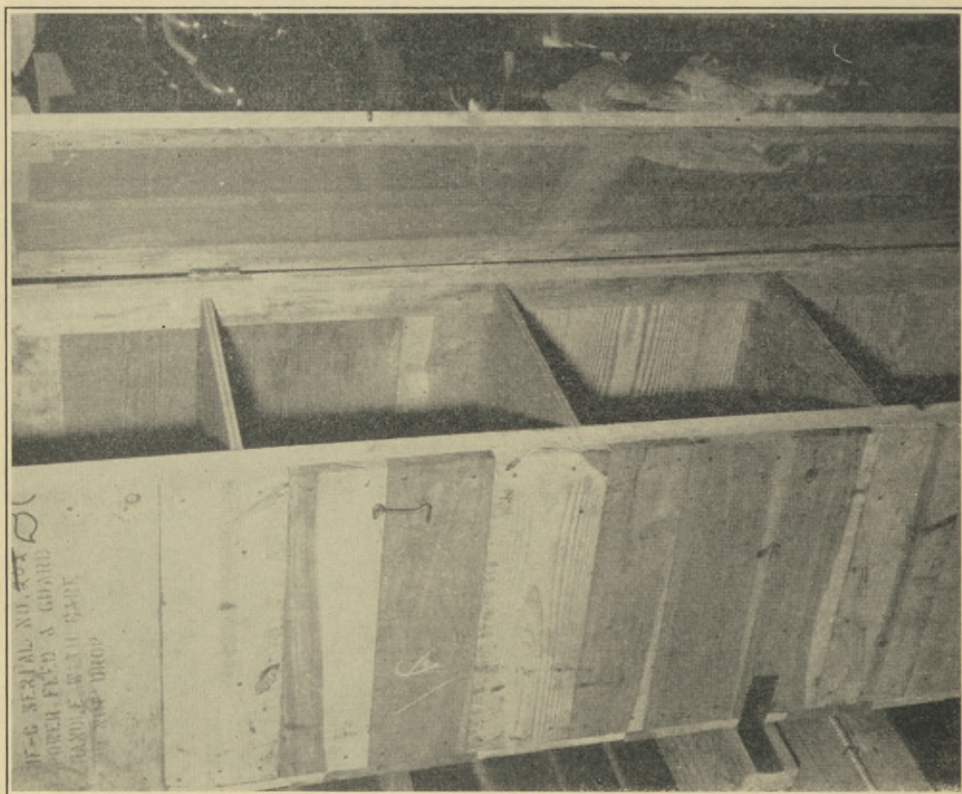
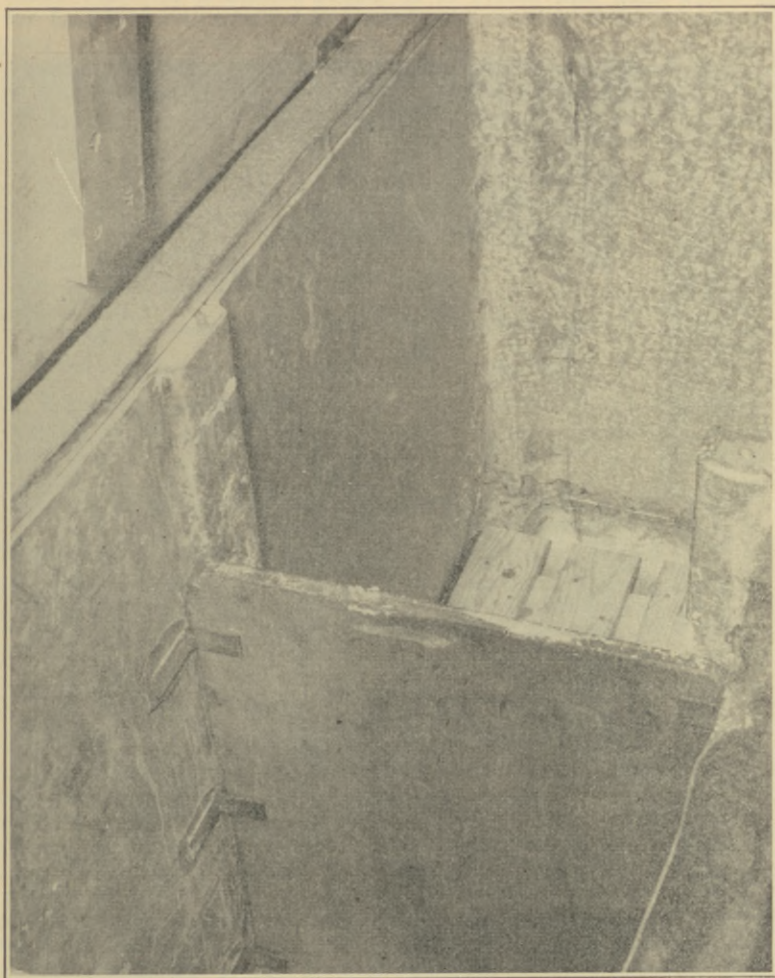


Plate 28. A home-made bread box. The screen door keeps the flies out—or in. The box is bracketed to the side of the truck.

Army Motors.



Army Motors.

Plate 29. A close up of an icebox. This one is 6½ feet long, 38 inches high and 23 inches wide. It is lined with galvanized metal and is divided into three compartments. One in the middle holds the ice, two on either side hold the food. A hole punched through the bottom of the box and through the floor of the truck drains the water from the melting ice. Note the strip of insulation along the top edges,

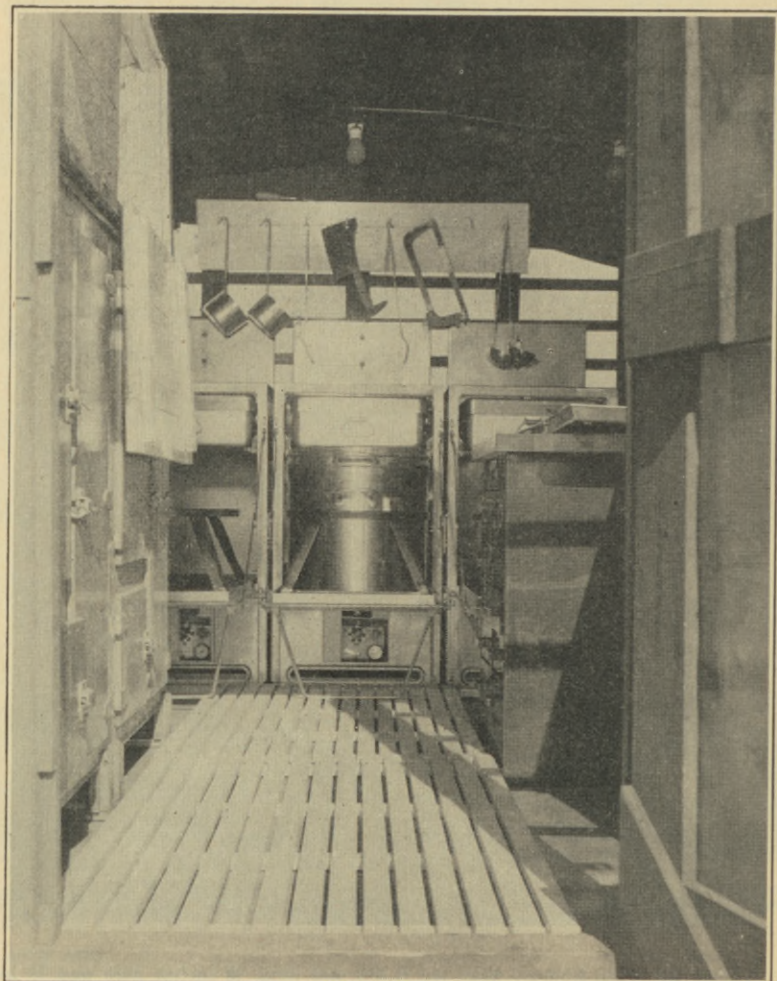


Plate 30. Another interior arrangement.

Army Motors.

b. Many different makes and types of fireless cookers are found on the market. Various materials, such as asbestos, paper, felt, hay, fiber, etc., are used as non-conductors. In some types heated stones are placed in the well under and around the food container to keep the food at a cooking temperature or to supply the heat if it has not been heated over a fire.

c. The advantages of fireless cookers are: The food may be served on the march or upon arrival in camp; they save fuel; being a slow process, they render such foods as less tender meats, tender and palatable; and the food, after being placed in the cooker, requires no further attention.

d. The chief object of a fireless cooker is to retain that heat which has been stored in the food by being previously heated on a cooking range or rolling kitchen. This retained heat completes the cooking of the food, provided the temperature is at 130° F. or higher. Therefore, it is necessary to heat the food, before placing it in the fireless cooker, to a degree of heat which will insure that it will retain 130° F. or higher in the cooker sufficiently long to complete cooking. By experience it has been found that heating the food before placing it in the fireless cooker and leaving it undisturbed in that cooker for the times shown by the following table will insure that cooking will be completed. As soon as the food has been heated on the range according to the table it is transferred to the fireless cooker, which is then closed. It should not be opened until the proper time has elapsed as opening causes loss of heat.

	Number of minutes at simmering point before putting in cooker	Number of hours in the fireless cooker		Number of minutes at simmering point before putting in cooker	Number of hours in the fireless cooker
Beef, stew	45	6	Chicken, curry of	45	4
Beef a la mode	45	3	Chili con carne	30	3
Beef, corned	45	3	Codfish, creamed	15	2
Beef, curry of	45	3	Ham, boiled	45	4
Beef, roast, soft	45	3	Mutton, stew	20	4
Beef, Turkish	45	3	Parsnips	30	3
Beans, Boston, baked	60	12	Pork, fresh, boiled	60	4
Beans, lima	45	3	Potatoes, Irish	15	2
Beans, kidney	90	6	Potatoes, sweet	20	2
Beans, string, green	30	2	Sauerkraut, with bacon or salt pork	45	3
Cabbage, with bacon	20	3	Succotash	20	3
Cabbage, Bavarian	15	3	Tomatoes, stewed	20	1
Cabbage, with fresh pork	45	3	Turnips, boiled	60	3
Carrots, boiled	20	3			
Chicken, stew	45	6			

Note. Meat should not be cooked in pieces weighing more than from 3 to 5 pounds.

e. Whether or not the cooking water or liquid portion of foods which have been heated on the range should be drained off before transfer to the fireless cooker depends on the nature of the foods. Potatoes, parsnips, carrots, onions, cabbage, and turnips are cooked in large quantities of water. If all of this cooking water were transferred with the food to the fireless cooker the result would be a soup; therefore, all of the cooking water must be drained from starchy vegetables, as potatoes, parsnips, carrots, and turnips, and about half the cooking water should be drained from leafy vegetables, as cabbage, and from watery vegetables, as onions. On the other hand, all of the cooking liquid of meats should go in the fireless cooker with the meats as the quantity of liquid will be about correct for the purpose; that is, in stew all the cooking liquid is needed, and in soft roast of beef it also is needed for gravy.

f. Tomatoes, sauerkraut, applesauce made from fresh tart apples, or any other food containing acid should not be permitted to remain in a fireless cooker or other tinned receptacle longer than 4 or 5 hours, whether being cooked or after cooking, as the acid attacks the tin and some of the tin may be dissolved into the food. Coffee to be kept hot in a fireless cooker should be prepared in the usual way and the grounds removed.

CHAPTER 4

COOKING

SECTION I

PRINCIPLES

1. Cooking, general. *a.* When cooking was first discovered, the primary object was to make food more appetizing than when in the raw state. It is now known that proper cooking, in addition to making food more appetizing and easier to chew, makes it more digestible, and also destroys any disease germs or parasites which may be present in the food.

b. Skillful cooking is an art, acquired by experience and training. The experienced and skillful cook does more than apply heat to food—he knows how to blend various food substances so that appetizing flavors are developed; how to season for the same result; and how to get the most out of the food supplies on hand.

c. Although it requires experience and training to become an expert cook, anyone, after having learned the principles of cooking, can cook a satisfactory and appetizing meal by following the recipes given in this manual. These principles of cooking are simple but all-important. Two of them which should be carefully observed are use of the proper temperatures and proper cooking times for different foods. All foods cannot be cooked at the same temperature and for the same length of time. Some meats require long cooking at moderate temperatures, while others can be cooked at high temperatures for short periods; green vegetables should be given a short cooking; pastry is baked for a short time at comparatively high temperature, etc. From the foregoing it will be seen how important it is to learn the basic principles of cooking before starting to cook.

d. The term "cooking" is often used to mean the preparation of food for cooking as well as the actual cooking. This preparation may be merely peeling, as in the case of onions, potatoes, etc., or it may include cutting, slicing, grinding, chopping, etc. While preparation changes the form of food, the actual cooking may not only change the form but may also change the flavor or chemical composition, thus rendering the food more appetizing and digestible. An example of this is the cooking of potatoes and other starchy foods. Starch, when raw, is difficult to digest; when changed by cooking it is easy to digest. On the other hand, improper cooking decreases palatability and results in waste, loss of nutritive value, and may mean an inadequately fed soldier.

2. Methods of cooking and terms defined:

Baking. Cooking by dry heat, usually in an oven.

Boiling. Cooking in water at a temperature of 212° F. Slowly boiling water has the same temperature as rapidly boiling water, consequently is able to do the same work—a fact often forgotten by the cook, who is apt to wood the fire that water may boil vigorously.

Braising. To brown in a hot receptacle in a small amount of fat, then cook slowly in a small amount of liquid, covered.

Broiling. Cooking by direct heat from hot coals, a gas flame, or an electric element.

Deep-fat frying. Cooking in hot fat at a temperature of from 350° to 400° F., depending on the nature of the food to be cooked.

Fricasseeing. A combination of sauteing with stewing. The food to be fricasseeed is first sauteed, then stewed.

Frying. Cooking in just enough fat to keep the food from sticking.

Oven broiling. Cooking in a broiler pan that runs close under the heat in the broiling oven of a gas or electric stove.

Pan broiling. Cooking in a hot griddle or pan greased only enough to prevent food from sticking.

Pressure cooking. Cooking in steam at a pressure of 5 to 30 pounds and at temperatures 228° to 274° F. The rise in the temperature of the steam is caused by holding it under pressure. A special cooker is necessary for this cooking.

Roasting. As now used, this means the same as baking. The term is usually applied to meat cookery.

Sauteing. Cooking in a small quantity of fat. The article to be cooked must be shifted from side to side and turned to come in contact with the fat.

Searing. Browning the surface of meat by the short application of intense heat.

Simmering. Cooking in water at a temperature of 180° to 210° F., or below the boiling point of water.

Steaming. Cooking in the steam generated by boiling water.

Stewing. Cooking in a small amount of water. The water may simmer or boil, as indicated for the food that is to be cooked.

Baste. To pour liquid over a piece of meat during roasting or broiling to prevent drying. The liquid used may be pan drippings, water, stock, milk, or melted butter.

Bouillon. A soup stock made from lean beef, clarified by straining, and seasoned. It may be used as soup stock or served as soup.

Broth. The liquid resulting from simmering meat in water.

Consomme. A soup made from two or more kinds of meat, then seasoned, strained, and served clear.

Drawn butter. Melted butter, flour, seasoning, and hot water used as a sauce for fish and vegetables.

Lard. Placing strips of fat on top of, or inserting into, meat to add flavor and prevent dryness in roasting.

Lardoon. A long, slender, pencil-like portion of salt pork, bacon, or suet, used for larding.

Marinate. To let stand in a mixture such as oil, vinegar, lemon juice, and seasoning called a marinade.

Parboil. To boil until partly cooked.

Pot roast. A piece of meat cooked by braising. Usually the less tender meat cuts are prepared as pot roasts.

Stock. The liquid obtained by simmering meat and bones. A good base for soup and gravies.

3. Preparation of foods for cooking. Scrupulous cleanliness is the first consideration in the preparation of foods. The clothing and person of the cook, the utensils, and the food itself should be in as clean condition as possible. Much sickness has been traced directly to polluted foods or insanitary conditions in the kitchen. The food should be inspected and sorted and all decayed or unfit portions eliminated, followed by the necessary cleaning, trimming, cutting, soaking, or other operation preliminary to the actual cooking.

a. Canned foods. (1) *Inspection before cooking or serving.* Before cooking or serving any canned foods, inspect the exterior of the cans for signs of spoilage. After opening the cans, note whether there is an unnatural or disagreeable odor, or whether the contents seem unnaturally mushy, sloppy, or discolored. Never serve the contents of such a can, or of a can which shows signs of spoilage before it can be opened, as the food may be poisonous. Hold such cans for inspection by a commissioned officer.

(2) *Holding canned foods after opening cans.* The popular belief that canned foods must be emptied from the can immediately after opening to prevent spoilage is erroneous. It is not necessary to empty a can immediately after opening as (under the same conditions) food in a tin can will not spoil any more rapidly than in any other container. Canned foods are cooked when canned. Cooked foods will not spoil as rapidly as fresh foods, but any food will spoil eventually if exposed to the air. Unconsumed portions of cooked foods (canned or otherwise) which must be held over should be stored in the refrigerator in a clean container which can be covered. Like many other foods, canned foods may become moldy or sour after opening, in which case they should not be used.

b. Meats. (1) As the first step in preparation of meat for cooking, it should be a regular practice to examine it to determine whether it has become tainted. Meat which is even slightly tainted may cause digestive disturbances or even serious illness. The odor of the meat should be clean and natural; if there is the slightest suspicion of unnatural or spoiled odor, the meat should not be used except by authority of a commissioned officer. Meat should never be washed, but should always be wiped with a damp cloth preparatory to cooking.

(2) Tender meats need no special preparation for cooking, but less tender cuts of beef require special preparation.

(3) Meats for stew or fricassees are cut into small pieces.

(4) Poultry is dressed and drawn, if necessary, and cut into pieces if intended for stew or fricassee.

(5) Frozen meats are thawed.

(6) Meat which has more fat than needed to make it cook well (as in the case with some portions of the beef carcass and some cuts of pork) should have this fat trimmed away. The fat should be rendered for use in frying. No lean meat should be cut off with the fat because lean meat yields practically nothing but water when rendered and consequently becomes a loss. It is better to allow some excess fat to remain on the meat as this makes the meat more tasty (not so dry), and the drippings are caught in the pan and enrich the gravy.

(7) Further suggestions in the preparation of meats are given in Chapter 7.

c. Vegetables. (1) Fresh vegetables must be carefully washed and cleaned to remove dirt and insects. Vegetables are best when freshly gathered. Soaking in cold water keeps them from wilting and restores freshness if they are wilted. Soaking also helps to remove worms and lessens the odor of onions, cabbage, and cauliflower. The following fresh vegetables should be kept in cold water a short time before cooking: beets, carrots, cabbage, cauliflower, onions, parsnips, potatoes, spinach, squash, and turnips.

(2) Dried vegetables, such as beans, should be well cleaned and soaked over night in cold water before cooking. This shortens the time required for cooking. In hot weather it may become necessary to shorten the time of soaking to prevent souring unless they can be kept in an ice box over night.

(3) Hints for special treatment of certain vegetables before cooking are given below:

(a) *Green beans and peas* should be strung or shelled and washed immediately. If cold water is allowed to stand on them very long, it removes much of their nutritious quality.

(b) *Beets.* Care should be taken to avoid breaking the skins as this will cause much of the coloring matter to escape in cooking. Skin after cooking.

(c) *Cabbage.* Remove any wilted outer leaves, cut into halves or quarters depending on size of heads, wash thoroughly to remove dirt and insects, and soak in salted cold water for about 1 hour before cooking. This soaking insures that the cabbage will be clean and also makes it tender and crisp.

(d) *Carrots.* Skin or peel before cooking. If small, serve whole; if large slice lengthwise before cooking, or they may be diced to serve with peas.

(e) *Celery.* Exposing celery to a warm, dry atmosphere makes it tough and stringy. It should be kept in the refrigerator. Damp paper or cloth should be wrapped around the stalks, leaving only the leaves exposed to the air.

(f) *Cucumbers.* Peel, slice, and place in ice-cold salted water for at least 3 or 4 hours before serving. They are usually served raw as salad.

(g) *Parsnips.* Pare before cooking. If small, cook them whole; if large, cut lengthwise.

(h) *Potatoes* (Irish) should be fairly uniform in size in order to be uniformly cooked. Care should be taken to prevent waste in peeling. Peeled potatoes should be kept covered with cold water until ready to cook to prevent darkening. They must not be kept too long in this way as they might sour. New potatoes should be scraped—old ones peeled.

(i) *Spinach.* Remove grit by washing thoroughly, changing the water at least six times.

(j) *Squash.* Cut into pieces for boiling or baking. Before boiling winter squash, the hard thick rind should be cut off.

(k) *Tomatoes.* Wash and then scald for about 1 minute in hot water. The skins are then easily removed.

(l) *Turnips.* If small, cook whole; if large, cut or slice before cooking.

4. Heat, use in cooking. *a.* While all the general operations of the kitchen are called *cooking*, the term applies particularly to the application of heat to the food. This heat creates new flavors in the food and generally improves its edible properties and digestibility. Heat, assisted by moisture, swells and bursts the starch cells in flour, rice, and potatoes; hardens the proteins of eggs, fish, and meats; and softens the fibrous substances in meats, vegetables, and fruits. The quantity of heat depends upon the required *temperature* and the *time* of cooking as well as the size, density, and other properties of the food to be cooked.

b. Temperatures and times of cooking. (1) Tables showing temperatures and

times of cooking for different foods are given in Appendix III. On examining the table of temperatures, it will be noted that they vary greatly for different foods. Best results will be obtained by using the temperature indicated for each food. Further, this temperature must be uniformly maintained during the entire cooking period. It must be remembered that it requires time for the heat to penetrate to the center of the article being cooked. If the temperature is allowed to rise suddenly, the outside may become scorched or burned before the center is cooked.

(2) The proper temperatures and times for cooking are also shown in the recipes for various foods and dishes given in this manual. However, a study of the table and observation of a few rules will greatly assist the cook in understanding this important feature of cooking. A knowledge of these general rules will insure good cooking even when recipes are not available. These general rules are given below:

(a) *In the oven.*

1. *Starchy foods* (breads, pies, potatoes, squash, macaroni, etc.) are cooked at high temperature for a short time. A quick oven (400° to 450° F.—9 to 12 counts) is used, and the time of cooking is not over 1 hour.

2. *Sweet dough products* (rolls, buns, coffee cake, etc.) and cakes, pastries, cookies, etc., are baked in a medium oven (325° to 400° F.—12 to 16 counts). These products contain a high percentage of sugar and, because sugar will caramelize (turn brown or black) easily in great heat, these foods will scorch or burn on the outside before the inside is cooked if they are cooked in heat greater than 400° F. The time of cooking is not over 1 hour and usually less than 30 minutes.

3. *Protein foods* (meats, beans, fish, etc.) are roasted or baked for a longer time than starchy foods, but the temperature is lower. Meats are roasted in a moderate oven (250° to 325° F.—16 to 18 counts) and are braised in a slow oven (200° to 250° F.—18 to 20 counts) or at simmering temperature (180° to 200° F.—22 counts). Meats can be cooked at high temperatures (and sometimes are so cooked by careless or inexperienced cooks), but this impairs palatability and increases cooking losses. Beans should be baked in a slow oven as a high temperature toughens the skins.

(b) *Frying.* All foods are fried at a relatively high temperature. This is a necessity so that the hot fat will quickly seal the surface and prevent grease penetration. In order to insure that the center will be cooked before the outside has had time to become scorched, fried foods are cut in relatively thin or small pieces. In other words, a thick piece of meat or other food cannot be fried successfully. For these reasons (high temperatures and thin pieces of food) frying is a quick method of cooking.

(c) *Cooking in water.*

1. Vegetables, when cooked in water, are cooked at boiling temperature with the exception of dry beans which are simmered.

2. Vegetables are boiled only long enough to make them tender. They should never be cooked longer than this. A maximum of 15 minutes is required for the leafy vegetables (as cabbage, spinach, etc.) and between 30 and 45 minutes for the starchy and root vegetables (as potatoes, carrots, onions, turnips, etc.). Dry beans, being cooked below the boiling point, require a longer time.

3. Meats should never be boiled. They should be simmered. This requires a longer cooking time than vegetables.

c. As explained in b (1) above, it requires time for heat to penetrate to the center of food. Therefore, a thick article of food as a roast of beef requires longer than a thin article as a pork chop. If a roasting pan is filled with pieces of beef, some weighing 2 pounds and others weighing 8 pounds, the smaller pieces will be cooked first. Unless these smaller pieces are removed from the oven they will become overcooked before the larger pieces are cooked. Therefore, an effort should be made to cut the pieces to uniform size. This also applies to potatoes and many other foods. If it is desired to cook a food for a longer time at low temperature (as beans and less tender cuts of meat), a fireless cooker is valuable.

5. *Oven temperatures, practical method of determining.* A practical method of determining approximate oven temperatures in the absence of a thermometer is to insert the hand well into the oven and count the number of seconds you are able to keep it there, usually until a burning sensation is felt under the fingernails.

This method is termed the oven count. If the hand can be left in the oven for about 18 seconds, the oven is called an 18-count oven, and the heat is called moderate (about 250° F.), while a 12-count oven is when the hand can be left in the oven for 12 seconds, which is a quick oven (about 400° F.). The table given in appendix III shows oven counts and time of cooking for various foods; that is, how long to cook the food at a certain oven count.

6. Cooking in water. *a.* Water is important in cooking. It conducts heat throughout the cooking vessel easily and quickly and retains heat after the vessel is removed from the fire. During cooking some of the food is dissolved in the water; this dissolved food should not be thrown away. If not served with the food it should be used in gravies, stews, soups, sauces, etc.

b. Boiling is a quick and convenient way of cooking and requires little attention on the part of the cook as foods cannot burn or scorch while surrounded with water.

c. Foods cooked in water have a distinctive flavor which is quite different from the flavor of foods cooked by roasting, baking, or frying.

7. Cooking in fat. *a. General.* Cooking in fat is done either in shallow fat (just sufficient fat to form a film between the food and the hot pan) or in deep fat (sufficient melted hot fat to cover the food). Cooking in shallow fat is called sauteing by some chefs, and some cookbooks call it panfrying; however, the term commonly used in the United States is simply frying and foods so cooked are called fried. Foods cooked in deep fat also are called fried except that potatoes so cooked are called french fried. In this manual, when it is desired to indicate that a food should be cooked in shallow fat it will be called fried (example—potatoes, fried), and when it is desired to indicate that a food should be cooked in deep fat, this manual will use the expression, "fry in deep fat."

b. Advantages. Cooking in fat has the following advantages:

(1) It is a quick method of cooking.

(2) It gives a distinctive and pleasing flavor.

(3) Part of the fat is absorbed by the food, thus increasing nutritive value.

c. Fried foods not to be served too often. Fried foods should not be served too often as men quickly tire of them; they are unhealthful as a steady diet because of too much fat in the food and also because fat is digested less easily than other foods.

d. Frying in deep fat compared with frying in shallow fat. (1) Frying in deep fat has advantages over frying in shallow fat. One is that the flavor is better; another, that less time is required. The chief advantage is that the food is entirely surrounded by hot fat and therefore is cooked so quickly that there is not time for fat absorption.

(2) In shallow fat the food is not entirely surrounded by hot fat and is not cooked as quickly as in deep fat. Therefore, foods fried in shallow fat usually absorb more fat than if fried in deep fat.

(3) In deep fat the food does not come into contact with the pan. In shallow fat the food is in contact with the hot pan and it frequently becomes necessary to move the pan off the fire or reduce the temperature to prevent scorching. Therefore, frying in shallow fat is frequently done at a lower temperature than in deep fat. On account of this lower temperature it requires longer for the formation of a crust on the outside of the food and longer to cook; therefore, there is more chance for the food to absorb fat, that is, become grease-soaked. In fact, many foods fried in shallow fat (as fried potatoes) never develop any crust and therefore absorb considerable fat. If the cook is not careful they will be greasy. Greasy foods are difficult to digest.

e. Frying in deep fat, procedure. (1) The fat must be very hot so that the food is cooked quickly and a crust is quickly formed on the outside. However, the fat must not be heated until it smokes. Fat which is heated until it smokes imparts a disagreeable odor and flavor to food cooked in it. The proper temperature is just below the smoking point. An experienced cook easily recognizes this temperature. A good practical test is to drop into the hot fat an inch cube of bread from the soft part of the loaf. The bread will be golden brown in 50 seconds at the proper temperature for frying. If the cook is not certain that the fat has been heated to the proper temperature, he should test it with a thermometer. Lard substitute and vegetable shortening begin to smoke at about 450° F.; therefore, the proper temperature for frying is about 430° F. Pure lard begins

to smoke at about 380° F., and the proper temperature for frying is about 360° F. Lard substitute and vegetable shortening are better for deep fat frying than pure lard as they can be heated to a higher temperature without smoking.

(2) *Frying moist foods.* Care should be used in deep-fat frying of foods which have a moist surface as the moisture may form steam when it comes into contact with the hot fat, and this steam may cause the fat to boil over and catch fire, or to pop out on the cook. For example, potatoes prepared for french frying, which have been immersed in water, should be drained before being put into hot fat.

(3) *Avoid cooling fat.* Unless the fat is kept hot it will not cook the food quickly and will not quickly form a crust on the outside. This will allow the fat to soak into the food. A common error is to introduce too much food at one time (as in the frying of doughnuts), thus cooling the fat. Another common error is to cool the fat by introduction of foods which are cold on account of having been frozen or kept in a refrigerator. Such foods should be kept in a warm room sufficiently long to lose the chill before being fried.

(4) *Rolling in batter or crumbs.* Meat balls, potato balls, croquettes, etc., are rolled in egg batter and then in cracker or bread crumbs before frying. The egg coagulates and holds the crumbs which are quickly cooked into a brown crust. This brown crust not only improves appearance and flavor but also prevents absorption of too much fat by the food. Corn fritters, doughnuts, etc., which contain eggs quickly form their own crust and need not be dipped in egg batter or rolled in crumbs.

(5) *Drain foods after frying.* Foods fried in deep fat should be drained after frying. This may be done in a colander, wire basket, sieve, or by laying on paper. Ordinary brown wrapping paper will do.

(6) *Fat clarifying.* The question often arises whether fat which has been used for deep frying can be used again. To a great extent this depends on whether the fat has been heated to the smoking point, and whether any foods have been allowed to scorch or burn in it. In either case the fat will impart a disagreeable odor and taste to foods subsequently fried in it. It should be clarified. One method of clarifying used fat is to strain it by pouring the warm melted fat through a cloth. Two thicknesses of clean flour sack will suffice. This removes burned particles of food, but may not entirely remove the disagreeable odor and taste. Additional clarification may be accomplished by allowing the fat to cool until it hardens; then melt it, add a few raw potatoes cut into quarter-inch slices, and heat gradually. When the potatoes are well browned and no bubbles appear on the surface, the fat should be strained. The potatoes absorb the odors and most of the sediment and should be discarded as they will be grease-soaked.

f. Frying in shallow fat. (1) Shallow fat is used for frying potatoes, eggs, hot cakes, hamburger, pork chops, steaks, liver and onions, etc. In some cases, as pork chops, sufficient fat for frying is furnished by the food itself, but in most cases the fat must be added. When fat is added, it should be heated before the food is placed in the pan; otherwise the food will become greasy. It is bad practice to fry raw potatoes by placing cold fat on top of them.

(2) Pork chops, hamburger, meat balls, steaks, eggs, hash browned potatoes, etc., are usually fried in shallow fat. If the fat is kept very hot, that is, kept heated to just below the smoking point, these foods will become hard and tough; therefore, the heat is regulated so that the temperature of the fat is considerably below the smoking point. On the other hand, if there is not sufficient heat, the food will become greasy and unpalatable. Through experience the cook learns how to regulate the heat so that the fat is kept medium hot. The result is that the food remains soft. Since it remains soft it absorbs some fat; therefore, to prevent greasy food the cook should avoid use of too much fat for frying.

g. Quantities of fat required. The following approximate quantities of fat are required for each 100 men:

	Pounds
Frying in deep fat	10
Frying potatoes, etc., in shallow fat	2
Frying eggs	1
Frying steaks, chops, hot cakes, hamburger, etc.	1

Note: Frying in deep fat can be done with 5 pounds of fat for each 100 men if a smaller pan is used and less food fried at one time; however, if quick cooking is essential, it is best to use about 10 pounds for each 100 men and a larger and deeper pan. This does not mean that these quantities of fat are required every time frying is done as fat used for deep frying can be used again.

8. Seasoning of foods. *a.* All foods placed on the mess table should be seasoned so as to have a pleasing flavor. The quantities of seasoning given in recipes are only a guide; the expert cook seasons to taste. Because of the varying amounts of moisture, fat, sugar, etc., in foods, it is difficult to prescribe exact quantities of spices and other seasonings. Sometimes the cook falls into the error of assuming that because he has added pepper, salt, etc., the flavor is satisfactory. The only way to determine this is to taste the food. It is well to remember that seasoning, once in the food, cannot be removed. It is better to use too little than too much.

b. Left-over foods have usually been previously seasoned and great care must be used in adding seasoning, especially salt, when preparing them for subsequent meals.

c. The full strength of most spices, as sage, marjoram, cloves, etc., is not immediately noticeable in the food to which added, but increases as the food is cooked. The heat and moisture gradually bring out the full strength.

d. Garlic is used to advantage in seasoning meats, gravies, sauces, soups, salads, and salad dressings, but must be used with judgment, as many men do not care for any flavor of garlic, and to most persons a pronounced garlic flavor is objectionable. Garlic flavor, when present, should be delicate, which may be obtained by rubbing the inside of the cooking utensil or salad bowl with a cut clove of garlic; or the meat may be rubbed. Finely minced garlic may be added to any of the dishes mentioned above, but care must be taken not to use an excessive quantity. A delicate flavor of garlic makes all meats, especially roasts, more savory and appetizing, and gives a tang to soups, stews, salad dressings, etc., which is very appealing. A delicate garlic flavor can be obtained by using a garlic essence. To make garlic essence, soak a quart of garlic cloves in three quarts of olive oil. Before soaking, separate the garlic cloves and remove the dry skin. A little of the essence can be rubbed around the inside of the cooking utensil or on the surface of meat.

e. As a general rule, food should be seasoned during the process of cooking. Added flavoring and seasoning at the table cannot make up for lack of proper flavoring and seasoning while cooking.

SECTION II

PRACTICE

9. Soups. *a.* Army beef, as purchased, always contains bones. Some cuts of beef are boned before cooking. The bones should never be discarded. They should be used for soup stock. An inspector never finds a raw bone in the garbage can of a well-conducted mess. Soups can be made the means of preventing waste by incorporating in them food which might otherwise be wasted, such as all raw beef bones, shanks, etc., excess liquid from canned vegetables, left-over cooked vegetables, and vegetable scraps—celery tops, onion tops, beet tops, lettuce and cabbage trimming, etc. If meat is used in soup, it should be cut into small cubes, as this aids in dissolving the meat juices into the soup by exposing more surface to the heat.

b. **Soup stock.** A pot for soup stock should be found in every Army kitchen. To make soup stock, wipe the meat or bones with a damp cloth, crack the bones, and cut the meat into small pieces. Put bones and meat in a large container with a close-fitting cover and add 1 quart of water for each pound of meat and bones. Heat slowly to the simmering point and add salt; simmer for 4 to 5 hours; then cool. Fat will form on the top after cooling and should not be taken off until time to use the stock, as this layer of fat acts as a preservative by excluding the air. In warm weather soup stock may sour if kept for more than 24 hours. If necessary to keep longer than 24 hours the stock should be sterilized by being brought to a boil at intervals of 24 hours or less. Stock can be used as the base for either gravies or soups and to enrich many dishes, such as hash, meat loaf, etc.

c. Soups have an important place in the menu. In addition to their food value they stimulate the flow of digestive juices, and this aids digestion. Soup should always be served very hot.

d. *How made.* (1) Most soups are made by first making a stock. This stock is the base of the soup. It gives strength and flavor. Before making the soup the stock is allowed to cool. This results in the fat rising to the top and hardening so that it can be removed easily. It should be removed to prevent the soup being greasy. To the stock the cook adds mixed vegetables if a vegetable soup is desired, or beans if bean soup is desired, etc. Each soup should be well seasoned with salt, pepper, and other spices such as bay leaves, marjoram, etc. Meat may be added to many soups, if desired.

(2) Some soups are made without stock. These are usually cream soups (cream of cabbage, cream of celery, etc.). However, stock may be used as the base of cream soups if desired, for the added flavor and strength it gives.

e. *Kinds.*

(1) *Thin soups* like bouillon and consommé are not often served in Army messes as most soldiers prefer a thick soup; however, bouillon or consommé, if served occasionally, is acceptable and gives variety.

(2) *Cream soups* are made by boiling vegetables (as cabbage, celery, tomatoes, etc.) in water or stock, with seasoning, until the vegetables are tender, then thickening with a batter made from flour and fat and adding milk just before serving. Use of an acid vegetable (as tomatoes) sometimes causes the milk to curdle. This can be prevented by adding a pinch of soda (or about 1 teaspoonful for 100 men). If too much soda is added, the soup will have a disagreeable soda taste. Cream soups include cream of asparagus, cabbage, celery, and tomato.

(3) *Purees* are made from vegetables (or fish) which are cooked in stock until very tender and then forced through a colander or sieve to make a mush, which is then put back into the stock. A batter of flour and fat is added to thicken the soup, which is then allowed to simmer about 1 hour before serving. Milk may be added if desired. Purees include puree of beans, carrots, green peas, lima beans, potato, tomato, etc.

(4) *Oyster stew* (sometimes called oyster soup) is made by adding flour to the liquor drained from the oysters, to make a thin batter, which is added to the soup stock for thickening and flavor. The oysters are added just before serving. The stew is then seasoned and boiled for 5 minutes. Milk may be used if desired, and improves the stew.

(5) *Chowders* are soups usually made from fish or clams, although corn or potatoes are occasionally used instead. Vegetables and diced bacon are usually added. The vegetables and bacon may be boiled in stock with the fish or clams, etc., until tender; or, when onions and bacon are included, they may be browned in a frying pan before being added. Chowders are usually thickened with a batter of flour and melted fat. Milk is often added just before serving. Chowders should be well seasoned. They include clam, codfish (or other fish), corn, and potato chowders.

(6) *Meat soups* are made by simmering meats (usually beef) or poultry (usually chicken) until tender, then dicing the meat and adding to stock. Usually rice is added.

(7) *Barley soups* are made by simmering pearly barley in stock or water. Vegetables and bacon or other meats may be added if desired.

10. *Gravy, cooking.* a. (1) Gravy is the juices (drippings) which escape from meat while being cooked, to which flour and cold water (or cold milk or beef stock) are usually added. Sometimes the clear drippings are served without the addition of any other ingredient; such a gravy is called "au jus," or natural gravy, and is served with a rib or loin roast of beef. The white sauce made from milk, flour, and butter (or vegetable shortening instead of butter) is often called gravy, country style, or cream gravy, but is really a sauce. The term "gravy" is properly applied only when the base is meat drippings.

(2) *Brown gravy.* The brown color is obtained by heating, after the flour has been added, until the desired degree of brown color is obtained. Care must be used to prevent scorching as this will fill the gravy with black specks. If the meat has been seared, very little heating is necessary to get a brown gravy. On the other hand, if a light-brown gravy is desired as when served with pork

chops, the cook must be careful to avoid browning the gravy by too much heating after adding the flour.

b. *Rules for making.* (1) Gravy should be prepared in the pan in which the meat has been cooked. Some of the albuminous substances escape from the meat in the process of cooking and settle on the bottom of the pan. These add a flavor to the gravy that is not obtained if the drippings are drained into another pan and the gravy made in the latter. To the drippings escaping from the meat should be added flour in one of two ways:

(a) By sprinkling the flour into the drippings while being stirred and then adding cold water, cold milk, or beef stock, or

(b) By stirring into the drippings a paste made of flour and cold water.

In either case the quantity of flour and liquid added to the drippings is regulated to make a gravy of proper consistency. Where the meat cooked is very fat, excess drippings should be drained from the pan before the gravy is made. During preparation the gravy should be frequently stirred with a wire whip in order to loosen the particles from the bottom of the pan. When several pans are used to roast the meat, the drippings may be poured into one pan and the gravy made in this pan. In this case the meat particles should be loosened before pouring the drippings out of the excess pans.

(2) It is an easy matter to prevent greasy gravy, as it is merely necessary to use sufficient flour to absorb all the drippings. This may frequently result in more gravy than is required; however, it is always good practice to serve liberal portions of gravy. When the quantity of drippings is insufficient, beef stock or rendered suet may be added. With a little experience the cook learns to gauge the necessary quantity of drippings. A good general rule is, to each quart of drippings add 2 pounds of flour and 3 gallons of beef stock or water. This makes enough gravy for 100 men. (See recipe 122.)

(3) Prevention of lumpiness in gravy is more difficult. It is better for the inexperienced cook to add the flour direct to the drippings instead of making a paste as the latter method is more apt to produce lumpiness; however, some cooks prefer to make a paste of the flour and part of the water (or milk or stock) and add this paste to the drippings. If the finished gravy is lumpy this may be corrected by rubbing or straining through a sieve or colander.

(4) If too much water or milk or stock has been added, resulting in a gravy too thin, it should be thickened by boiling down, as the addition of flour may result in lumpiness.

(5) The use of beef stock is not essential; however, it does add richness when used instead of water. It will darken the gravy and therefore must be used sparingly, or not at all, if a very light-colored gravy is desired.

11. Fish cookery. a. Fish are a healthful and delicious food, if properly prepared. Salt water fish are an important source of bromine and iodine. In all fish the protein or tissue-building material is excellent.

b. Fish may be divided as follows:

(1) *White fish.* Fish that have less than 5 percent fat, examples of which are smelt, flounder, yellow perch, pike, pickerel, cod, and haddock.

(2) *Fat or oily fish.* Fish that contain 5 percent or more of fat, examples of which are salmon, herring, lake trout, mackerel, and eels.

(3) *Shellfish.* Oysters, clams, scallops, lobsters, crabs, shrimps, and prawns.

c. Fresh fish, or fish that were frozen while fresh, have full or bulging eyes, bright red gills, firm and elastic flesh, and fresh odor. Be sure the flesh along the backbone smells fresh; it spoils there first. Fresh fish sink in fresh water. If they float, they should not be used. Frozen fish need not be thawed before cooking. In case the fish have not been cleaned, they should be thawed only sufficiently to permit cleaning and then cooked. Frozen fish that come cleaned should be cooked without thawing, allowing slightly more than the usual time for cooking.

d. To fresh salt fish, place the flesh side down in a pan of fresh water, and let soak from 1 to 48 hours, changing water several times. If the fish are to be cooked in liquid, they will need a shorter time in soak than if they are to be cooked with very little moisture.

e. Fish must be well cooked to be palatable and wholesome. They are cooked sufficiently when the flesh separates easily from the bones. If underdone, they are not eatable; if cooked too long, they are dry and lose most of their flavor. All of the various methods of cooking may be applied to fish. The principal thing

is to be sure that the fish are well cooked and still not overcooked. Frying and deep-fat frying are the most popular methods of preparing fish in the Army. The fat for deep-fat frying should be maintained at 360° F. For large pieces the fat should be slightly lower temperature.

12. Eggs, cooking. Cooking changes eggs from a liquid to a solid form, making them easily handled, and increasing their palatability. It does not increase their digestibility. Boiling of eggs should be either very short (not over 4 minutes) or very long (30 minutes). In the first case we obtain a soft-boiled egg in which very little coagulation (hardening) of the albumen has taken place. If an egg is to be hard-boiled, it should be cooked slowly and thoroughly, so that the protein is completely coagulated. Eggs may be poached, fried, scrambled, or baked. They are also used to a large extent as ingredients of cakes, puddings, sauces, and other mixed foods.

13. Vegetable cookery. a. General. The method of cooking vegetables will usually have a decided effect, either good or bad, upon their color, odor, flavor, or nutritive value. In some vegetables one method of cooking will preserve all these qualities, in others it may be necessary to sacrifice one or two to preserve the third, but it is never necessary to sacrifice all four as is frequently the case. In general, vegetables should be cooked as short a time as possible.

b. Preservation of color. Vegetables naturally fall into four groups of color: green, yellow, red, and creamy white.

(1) Chlorophyll, the coloring pigment of green vegetables, is easily destroyed by heat and acid. When green vegetables are cooked for a long time in a small amount of water or steam in a covered vessel or under pressure, the chlorophyll is decomposed. Vegetables which can be quickly cooked, such as spinach or mustard greens, will retain their green color if not overcooked, but other items which require 20 to 30 minutes to cook will lose a considerable amount of their green color. The general rule for the preservation of green color is to drop them into boiling water and cook them uncovered for the shortest possible time.

(2) Yellow color found in carrots, squash, and sweet potatoes comes from a class of pigments called "carotinoids" which is always associated with the chlorophyll in green vegetables, but remains invisible until the latter is dissipated. This yellow color is largely due to carotene which the body transforms into vitamin A. It is relatively stable to heat but is destroyed by oxidation. It is necessary to consider these facts when cooking yellow vegetables. When green vegetables are overcooked the chlorophyll is dissipated, and the little which remains, together with the yellow pigment, gives the item a greenish bronze appearance. The yellow pigment is very stable and vegetables which have only this color can be cooked in any method without affecting any color change, but overcooking will tend to destroy carotene. When yellow vegetables turn dark brown it is usually the result of oxidation (improper care after preparation for cooking, and overcooking) or a scorching or caramelization of the sugar content.

(3) Red color is rather rare, being found in beets, tomatoes, red cabbages, and radishes. This color will remain red in the presence of acid but turns to violet or purple when cooked in an alkaline water. To preserve the red color when cooking red vegetables a little vinegar or lemon juice should be added to the water. Tomatoes and unpeeled beets can be cooked without added vinegar and retain their color because they have sufficient acid content. The acid also tends to retard the destruction of ascorbic acid.

(4) White vegetables are fairly stable in heat. White vegetables will turn a grayish color when a long time is consumed in the cooking. Discoloration can be avoided by the simple expedient of a "short cook," that is, only enough to make the vegetable tender.

c. Preservation of flavor. So far as cooking for retention of flavor is concerned, vegetables divide themselves into three classes: the cabbage family, which includes brussels sprouts, cauliflower, and turnips; the onion family, including garlic, shallots, and chives; all other vegetables.

(1) The vegetables of the cabbage family contain sulfur compounds which break up easily under the application of heat and produce products which are disagreeable to the sense of taste and smell. One of these substances is hydrogen sulfide, the same gas which causes rotten eggs to have such an offensive odor. Decomposition of the sulfur compound is brought about by long cooking or by cooking at low temperatures, which should be avoided. Vegetables of the

cabbage family should never be cooked in a pressure cooker as all of the volatile acids evolved from the vegetables are retained. Such vegetables should be cooked in the shortest possible time in an uncovered vessel and in a large amount of water.

(2) The onion family is really the "strong-juiced" group. They obtain their strength from certain volatile and aromatic substances formed in the growing stage. They do not behave like the cabbage family in cooking, for they do not form new odors or flavors but simply loose part of those present. When heat is applied, the volatile substances begin to dissipate with the steam. The properties which provide a pleasing flavor do not always provide a pleasing odor. With long cooking, the flavor is entirely volatilized and the resultant product is insipid and flat in flavor. Thus the flavor of these vegetables is controlled through the length of time they are cooked.

(3) All other vegetables lose flavor when cooked in a large amount of water and the method best suited for their preparation is to cook them in the least possible amount of water, or in a steamer or pressure cooker.

d. Preservation of nutrients. The inherent nutritive value of foods may be affected by storage, preparation, cooking, and service. It is necessary to give preference to those procedures which will retain the maximum nutritive value. In general, foods should be stored in a cool place; prepared with a minimum of handling, soaking, or removal of parts; and cooked the shortest time and at the lowest temperatures compatible with palatability. Food should be served as soon as possible after it is done. The three principally employed methods of cooking vegetables are baking, steaming, and boiling. These will be considered solely from the standpoint of nutrient savings.

(1) Baking means cooking in dry heat in an oven, with the addition of little or no water. This is a good method of cooking as nutritive losses are small, the chief loss being vitamin C. There will be some loss of B₁, depending upon the temperature, length of time the product is baked, and if the skins are left intact.

(2) The next best method is steaming. This can be done either in a vessel where the temperature never exceeds that of boiling or in a pressure cooker where 249° F. can be attained. The cooking is accomplished without the addition of water to the vegetables except a small quantity necessary for the steam. The special advantage of this method lies in the fact that the only water which comes in contact with the vegetables is the minute quantity which is formed by condensation of the steam.

(3) More nutrients are lost by boiling vegetables than by any other method of cooking. The loss is in direct proportion to the time of cooking and the exposed surface of the vegetables. When vegetables are exposed to the solvent action of water, the smaller the pieces into which they are cut, the greater will be the loss of nutrients. Some part of the minerals and other nutrients which have escaped into the boiling water can be recaptured by using the water in which the vegetables are boiled for soup, and this should be done as far as possible.

14. Salads and dressing. *a.* Salads are easily prepared, and when well seasoned and attractively served, meet with much favor. A little forethought is necessary as the different ingredients should be prepared some time in advance in order that the salad may be thoroughly chilled before serving.

b. The following fundamental principles must be observed in the preparation of salads:

(1) They must be served cold.

(2) They should be well seasoned.

c. Any vegetable may be used in salads, either alone or in combination with other vegetables. Lettuce, radishes, and onions may be used in several combinations. Cabbage, shredded fine and soaked in cold water for 2 hours, makes a satisfactory salad when seasoned. Stringless beans or peas that have been cooked and cooled may be used alone or in combination with other vegetables. An excellent salad may be made of beets, either alone or, preferably, combined with other vegetables. The beets should be cooked, then diced and allowed to stand in vinegar for an hour. Potatoes are frequently used in salads, either as the main ingredient or as a filler in meat, fish, or vegetable salads. Cold cooked carrots or grated raw carrots are a palatable ingredient.

d. When meat salads are served to troops, a vegetable filler should be added to diminish the cost and improve the flavor. Thus, when chicken salad is made, one-half boneless chicken and one-half diced celery or other green vegetables should

be used. The cost of chicken salad can be reduced by substituting about 25 per cent of veal or pork for an equal quantity of chicken; that is, the meat used is 75 per cent chicken and 25 per cent veal or pork (or both). When this is done, the veal or pork should be cooked with the chicken as it takes up the chicken flavor. Turkey, tongue, or lean beef cut fine may be used for salad. All meat must be cooked until well done before using in salad. Fat meat is undesirable as the dressing usually contains olive or cottonseed oil in such quantities that other fats are unnecessary.

e. The following fundamentals must be observed in the preparation of salads:

(1) *Washing ingredients.* Wash salad greens and examine to insure the removal of all insects. Then soak in cold water to crisp, and dry by shaking in a wire basket.

(2) *Chilling.* All ingredients, fruits, vegetables, and dressing should be chilled before mixing.

(3) *Cutting up materials.* Salad materials should be cut in uniform pieces small enough so that they will not lose their shape when mixed. When meat is used it should be diced and not ground.

(4) *Mixing.* When mixing the materials they should be lightly tossed with two forks or the hands. The salad dressing should never be added to the salad until time for serving, except in the case of potato salad, when it is preferable for the dressing to soak in. The dressing should be folded in. Excess dressing should be avoided; only sufficient added to coat the separate pieces of material. Free dressing in the bottom of the dish is an indication that too much dressing was added.

(5) *Garnishing.* The salad should be attractively served. If individual salads are served, the plate should be garnished with lettuce, parsley, green pepper, or similar small greens. Other garnishes that may be used are strips of pimento, dash of paprika, shredded carrots, whole radishes, cherries, or grapes.

f. Almost any kind of fish, fresh or canned, may be used in salad. When fresh, large fish are preferred on account of being more easily boned. The fresh fish should be boned, either before or after cooking, cooked until done, and the flesh mixed with one-third to one-half vegetables.

g. Salads made by placing various vegetables or fruits, whole, chopped, or shredded in gelatin are popular. They have a pleasing appearance and flavor.

15. Cereals, cooking (oatmeal, cornmeal, etc.). Bring the water to a boil, add salt, and then add the cereal slowly to the boiling water, while stirring or whipping. Boil for 5 to 20 minutes, according to the cereal, and then allow to simmer for the prescribed time. (See recipes.) A double boiler should be used, when practicable. If oatmeal is served where sugar is not placed on the tables, sugar should be added with the salt. Cold cooked cereal may be sliced, rolled in flour batter, and fried. An unsweetened cereal is better for this purpose.

16. Desserts. Only appetizing and palatable desserts should be served in the Army mess. It is better to use plain canned fruit for dessert than a dessert like plain cornstarch pudding. It is possible to serve a large variety of desserts, many of them easily made; therefore, if the cook be inexperienced it is better to utilize easily prepared desserts until the more difficult ones can be prepared in an attractive manner.

a. *Puddings* make one of the most economical desserts. They can be made and served so as to be very appetizing. They should be fairly rich. Bread pudding is economical because it may be made from left-over or dry bread, but there should be liberal additions of eggs, milk, and fruit, and it should be served with a well-flavored sauce. Tapioca pudding should often have a liberal addition of fruit and should always be well flavored. Dried fruits, including any left-over dried fruit, may be utilized to advantage in these puddings. Rice pudding should contain plenty of eggs, milk, and raisins or currants.

b. *Plain gelatin* should not be served as such. It should be colored with fruit juices, and whole or cut fruits added, or vegetables added to make a salad. Almost any kind of fruit or vegetable may be used. Using gelatin in this way is much more economical than the use of the various prepared gelatin desserts which have been flavored and colored by the manufacturer and are generally sold in small packages.

c. *Shortcakes* may be made with baking powder biscuits covered with crushed fruits, or sponge cake may be used instead of biscuits. If sponge cake is used

part of the fruit juice should be drained off; otherwise the sponge cake will be juice-soaked and unattractive. While the addition of whipped cream is desirable, it is high in cost and not essential.

d. *Custards* are made with a base of milk, eggs, sugar, and seasoning, and may have various fruits added. A moderate temperature must be used to prevent curdling of the milk. Should the custard appear to be curdling, place the cooking container in cold water and beat smooth. To determine when custard is done dip a silver knife in cold water and insert in center of custard. If the knife comes out clean the custard is done; if coated, longer cooking is necessary. Variations in custard may be made by adding caramelized sugar, fruit pulp, coffee, chocolate, etc.

e. *Fruit sauces*, such as apple sauce, rhubarb sauce, etc., may be improved by combination with other fruits, for example, adding pineapple juice or crushed pineapple to rhubarb sauce makes a delicious combination. The addition of a small amount of cinnamon-flavored hard candy to apple sauce is an improvement. Many combinations are possible.

f. *Baked apples and baked bananas* should be served occasionally as dessert. The addition of a small quantity of juice of other fruits improves the flavor.

g. *Dried fruits*. (1) It is thought by some that dried fruits are not popular and that many soldiers will not eat them. When this occurs, it is due either to serving dried fruits too often or because they are poorly prepared. It is a fact that dried fruits, skillfully prepared, and cooked and served in a variety of ways, are popular if not served too often.

(2) There are many different ways in which dried fruits can be served. Some of these are:

- (a) Stewed as a single fruit, or in combination with other dried or fresh fruits.
- (b) As fillings for pies, cobblers, fruit rolls, etc.
- (c) Made into jam or fruit butter.
- (d) Cut or ground and worked into sweet dough products.
- (e) Cooked and mashed for toppings for sweet rolls.
- (f) In desserts, as prune whip, etc.
- (g) In fruit cup.
- (h) In fruit salad.

(3) When dried fruits are served stewed, water and sugar are added to form a sirup. The sirup should have the same flavor as the fruit. When dried fruits are placed on the table they should be tender. To obtain these results it is necessary to allow the fruit to soak and cook in the sirup sufficiently long to become tender and for the sirup to take up the flavor of the fruit. This can be done by soaking over night and simmering for about 1 hour the following morning, or by first simmering and then allowing to soak over night.

(4) Dried fruits, especially prunes and figs, sometimes become sugared in storage. This means that the natural sugar of the fruit works out through the skin and shows as a white bloom. This is harmless, but may be mistaken for mold; however, mold is always in fuzzy, thread form, while the fruit sugar is in crystals.

17. Beverages. The beverages most used in Army messes are coffee, tea, cocoa, and lemonade. Fruit punches may be served occasionally in hot weather if the cost is moderate.

a. *Coffee*. (1) *Rules for making*. In brewing coffee by any method, the following rules should be strictly observed:

(a) *Keep the supply of roasted coffee in airtight containers*. Exposure to air causes roasted coffee to lose rapidly some of its flavor and strength.

(b) *Use ground coffee only once*. Coffee grounds from which coffee has been made should always be thrown away. Never use them the second time. Coffee made from them is sure to have a bitter and unpleasant flavor. This is true even if fresh roasted coffee and old grounds are mixed. To mix fresh coffee and old grounds is a waste, not a saving.

(c) *Use fresh boiling water*. The water must be boiling to extract all the desirable flavors from the coffee. It must be fresh. Water which has boiled for a long time has a flat taste which will appear in the coffee.

(d) *Regulate preparation of coffee so that it will be ready not more than 10 minutes before serving time*. Once prepared, coffee loses its flavor rapidly and if held more than 30 minutes becomes bitter.

(e) *Never make more than enough coffee for one meal.* Warmed-over coffee is bitter and has lost aroma.

(f) *Scour the coffee pot.* Unless thoroughly scoured daily, some of the spent grounds and oils of the coffee will stick in the corners of the pot and impart a bitter taste to subsequent brews.

(g) *If filter bags are used, they should not be dried, neither should they be washed in hot water.* Hot water cooks in the coffee stains throughout the filter bag and, in subsequent brews, imparts a bitter and off flavor to the coffee. After the bag is rinsed in cold water, submerge it in cool or cold water until time to use it again.

(2) *Coffee for the cooks.* It is the practice of some cooks to make the coffee for breakfast as soon as the fire is started in the morning in order to have coffee for themselves. This is bad practice. It means that stale and bitter coffee is served at the mess table. Every mess should have a small coffee pot, percolator, or tricolator for the purpose of providing good hot coffee for the kitchen detail, members of the guard, etc., who desire coffee earlier or later than the regular serving time for the organization. In making small quantities, use a level tablespoonful of ground coffee to each cup of water and add one level tablespoonful for the pot.

(3) *Proper quantities.* One pint of coffee per man is ample for one meal. This is $12\frac{1}{2}$ gallons for 100 or $2\frac{1}{2}$ gallons for 20 men. For each 20 men use 1 pound of roasted and ground coffee and $2\frac{1}{2}$ gallons of water. Therefore, to find the number of pounds of roasted and ground coffee, divide the number of men to be served by 20. For example, if 80 men are to be served, 4 pounds of coffee are required. To find the number of gallons of water, multiply the number of pounds of ground coffee by $2\frac{1}{2}$. Thus, for 80 men, 4 pounds of ground coffee and 10 gallons of water are required. These proportions of ground coffee and water should be used regardless of the method of preparation—whether boiled, or made in percolators, or tricolator, etc.

(4) *Methods of brewing.* (a) *Boiled coffee.* Heat fresh water in a separate container until it has just reached the boiling point. Place the ground coffee in a cloth sack, tie the top. Ground coffee expands in water; therefore, leave plenty of room in the sack for this expansion. Place the sack of ground coffee in the coffee pot or boiler and pour the water over it; or, the sack of coffee may be suspended or dropped into the water. Keep hot on the back of the stove; do not permit boiling. The value of a cloth sack is that the grounds can be removed easily as soon as the coffee is brewed. Sometimes a sack may not be available. In this case the ground coffee is placed in the bottom of the pot or boiler and the boiling water poured over it; at the end of 10 minutes heating over a slow fire, settle the coffee by the addition of a small quantity of cold water.

(b) *Percolated coffee.* Use either cold or hot water. The use of hot water reduces the length of time required to complete the brew. For quantities in excess of 20 cups the coffee will be ready to serve in 10 minutes after it starts coming over the top of the tube. For smaller quantities 8 minutes is sufficient.

(c) *Filtered or drip coffee.* This is made in a utensil having three compartments, the upper for water, the center for ground coffee, and the lower for the brewed beverage. Filter papers are usually provided to be placed on the bottom of the center compartment before putting in the ground coffee. This type of utensil is sold under various trade names as "Tricolator," "Filtrator," etc. For best results the coffee must be finely ground. Place the filter paper in the bottom of the center compartment, add the ground coffee and cover with the perforated metal cover which is usually provided; then pour in boiling or fresh water. When all the water has filtered through the ground coffee and into the lower compartment, the beverage is ready to serve. Before serving, stir the beverage to equalize strength throughout. Some arrangement must be made to keep the lower compartment hot but not boiling. If of earthenware or glassware, keep it in a pan of hot water until just before serving. If of aluminum or other metal it should be placed on the back of the stove. Do not permit the brewed coffee to boil.

b. *Tea.* (1) Tea should be served hot occasionally in lieu of coffee. In the summer months it should be served often as an iced beverage, especially at the noon meal.

(2) Tea should be made in glass or earthenware utensils, if available, as metal utensils give an off flavor and tend to blacken the tea.

(3) One to three ounces of tea to 1 gallon of water should be used in making tea, depending on the quality of the tea and the strength of the beverage desired. Two ounces of tea leaves to 1 gallon of water should make a beverage to suit the average person.

(4) Bring the required quantity of water to a boil. Place the dry tea in a clean cotton bag, tie the top, and drop the bag into the boiling water. Tea expands in water, therefore, leave plenty of room in the bag for this expansion. Allow the bag of tea to remain in the water for 5 or 7 minutes, then remove it. If tea leaves are allowed to remain in the water longer than 7 minutes the tea becomes strong and bitter. Agitate the bag of tea 3 or 4 times during the period it is in the water. Stir the tea just before serving, to equalize strength throughout. If not stirred the tea on the bottom of the container will be stronger than that on top. Unlike coffee, tea may be made several hours before serving, if kept in earthenware or glass containers, as it does not lose its flavor and aroma. If lemons are available, they may be sliced and served with the tea in lieu of milk, for those desiring this.

(5) Tea to be used as an iced drink should be made in concentrated form. Use the total required quantity of tea leaves, and one fifth the required amount of water. Prepare the same as hot tea, but a sufficient time in advance to permit cooling. Just before serving add the remainder of the water, either cold water or chipped ice or a combination of the two, and stir vigorously in order to equalize strength throughout. Added lemon materially improves the flavor.

c. *Cocoa*. (1) Cocoa makes a good beverage, especially for the evening meal. Five ounces of cocoa to one gallon of liquid makes a beverage of average strength. The best results are obtained when the liquid used consists of 75 per cent milk and 25 per cent water. The quantity of milk may be reduced, with corresponding increase in the quantity of water when it becomes necessary to reduce cost. Cocoa made with water alone lacks palatability and body, and is generally unsatisfactory.

(2) Some cooks make cocoa by placing the ground cocoa in a pot, adding hot water, bringing to a boil, then adding sugar and milk. A better method is first to make a thick paste with the ground cocoa, sugar, and a little hot water. This method prevents lumpiness.

(3) Some cooks prefer to leave out the sugar when making cocoa so that the men may add it at the table according to individual taste. This is a matter of mess management.

18. Ice cream. Ice cream is probably the most popular dessert. It is especially welcome in hot weather. For economy and good quality, ice cream, frozen custard, and water ices should be made in the mess instead of being purchased. Good ice cream can be made in the mess kitchen at a cost of 25 to 50 per cent less than the cost of commercial ice cream. When frozen desserts are served, an inexpensive cake like gingerbread or white cake which costs from a cent to a cent and a half a portion should also be served.

CHAPTER 5

BAKING

INTRODUCTION

This chapter includes almost the whole of TM 10-410, *The Army Baker*. Few, if any, organizations of company or battalion size will ever need all the information contained in this chapter, since baking, and especially bread baking, will rarely if ever be performed in the quantity, or with the equipment, contemplated in TM 10-410. However, since it is impossible to judge just how much baking will have to be done by an organization in a wide-spread war, and just what equipment may be found in out-of-the-way places from Greenland to Guadalcanal, we present the entire picture, trusting to the judgment and ingenuity of mess personnel to abstract from this chapter (and from the recipes in Chapter 9) the material they need to solve the problem at hand.

SECTION I

DEFINITIONS

1. General. Baking is cooking in dry heat, in an oven or under coals or on heated stone or metal. To bake successfully requires a knowledge of the kind, quantity, and quality of the ingredients to be used and temperatures at which products are to be prepared and baked.

2. Object. a. The object of baking is to produce articles of food which have the following qualities:

(1) *Nutritive value.* Necessary to relieve hunger.

(2) *Palatability.* Appeal to the appetite.

(3) *Attractiveness.* Appeal to the eye.

b. To obtain the qualities given in a above necessitates the use of:

(1) Ingredients of good quality.

(2) A balanced formula.

(3) Careful and proper handling throughout every step in the baking production process.

3. Definitions.

Baking. Cooking in a dry heat.

Batter. Several ingredients beaten together to form a semiliquid mixture suitable for baking or cooking.

Bench. A molding table.

Bread. The sound product made by baking a dough consisting of a leavened or unleavened mixture of ground grain and/or other clean, sound, edible farinaceous substance, with potable water, and with or without the addition of other edible substances.

Bread room. A room for storing bread after baking. Steel racks are usually employed as receptacles.

Buns. Small cakes or breads, generally round or oval in shape and frequently spiced.

Cake. Leavened or unleavened flour compositions, generally sweetened before baking.

Caramel. A sirup made from scorched sugar used for coloring food products.

Caraway seed. A highly aromatic seed used whole for flavoring rye bread of certain types. Also used in cooking.

Carrying rack. An oblong frame suitable for two men to carry bread in about the same manner as a hospital stretcher is handled. A suitable type is an oblong frame 8 feet by 2 feet made of 1 inch by 4 inch material with side piece extended about 12 inches to form handles, covered with slats 2 inches by 6 inches and a 12-inch upright fastened at one end. Will hold one run of field or garrison bread when taken from the oven.

Corn bread. A bread prepared from corn meal, with flour, sugar, lard (or substitute), and baking powder.

Cover. A canvas cover is used on proof racks for steaming the dough and for

covering mixed dough to retain the heat, keep the dough from crusting, and to avoid fly intrusion.

Crullers. Ring-shaped cakes of dough, usually sweetened and fried brown in smoking lard.

Crumb. The soft inner part of the loaf, as distinguished from the crust.

Crust. The outside of a loaf of bread. It is formed by the intense baking heat and consequent drying of the surface. This drying and a certain chemical change in the starch are known as caramelization. In the crust the gluten has hardened or gummied and the starch has changed into a more digestible form.

Currant buns. Buns with currants added.

Dam boards. Partitions placed in dough troughs to limit the space and facilitate handling.

Dampers. Devices for regulating the fire and consequent heat used in baking, cooking, etc.

Dough. A name given to the product resulting when flour, water, yeast, salt, and other ingredients are combined by mixing.

Dough mixer. A machine for mixing ingredients. It should be kept thoroughly cleaned.

Dough troughs. Troughs for containing dough. They must be kept clean. Though formerly made of poplar wood, the present type is largely steel, which is more satisfactory from a sanitary and handling standpoint. Sourness in bread is frequently caused by allowing old dough to stick to troughs.

Doughnuts. A sweet, round dough composition with center cut out, fried in deep fat.

Dredge. To sprinkle, as with pepper and salt, or rub in, as with flour, etc.

Fermentation. A chemical change in organic substances caused by micro-organisms.

Fermentation period. The period elapsing between the time dough is mixed and the time it is sent to molding machine or bench for molding.

Fermentation room or cabinet. A room or cabinet, kept at a temperature of 78° to 82° F., with free steam or moisture to obtain proper humidity and free from draft, into which the mixed dough, contained in troughs or other receptacles, is placed for the purpose of fermenting the dough. In lieu of fermentation room or cabinet, pans of water into which hot bricks are placed or jets of flaming gas or oil against the bottom of water-filled pans may be used to provide the necessary humid heat for fermentation of the dough.

Flour. Bolted grain meal.

Gems or muffins. Hot breads made from white flour, graham, or corn meal and baked in gem pans.

Gluten. That constituent of wheat flour dough which enables the dough to expand and thus retain the fermentation gases. Two elements of flour, distinct from each other in a dry state, unite upon the addition of water to form gluten.

Grits. Grains, as of wheat, corn, or oats, coarsely ground.

Hominy. Cracked Indian corn from which the outer husk has been removed.

Hops. The cured, kiln-dried blossoms of the hop vine, a perennial, climbing plant cultivated in Europe and on the Pacific coast for its blossom. The flavoring element is known as lupulin and can be extracted by boiling 10 or 15 minutes.

Icing. A glazing or coating of sugar, usually mixed with white of egg and suitable flavoring, and applied to cakes. Sometimes called frosting.

Ingredients. A general term describing the factors that constitute a substance. For example, ingredients of bread include flour, water, yeast, salt, sugar, shortening, and in some instances milk, hop tea, or malt.

Leaven. A piece of old dough used as a ferment in making bread by the left-over process.

Loaf. The characteristic shape of the bread after it has been molded and after the baking process is completed.

Make-up period. The length of time between end of fermentation period and time molded and panned dough is placed in proofroom or cabinet.

Molding. Shaping bread into forms suitable for baking.

Molding table. The wooden table on which loaves are molded.

No-time dough. A straight dough that has no fermentation period. As soon as the dough is mixed it is molded and panned and then placed in proofroom or cabinet for proofing.

Open-trench baking. Process of baking in an open trench about 6 feet long, 1 foot deep, and 15 inches wide.

Ovens. The receptacles in which bread is baked.

Pan holder. A folded cloth or other heat-resisting material for handling pans.

Pastry. Food preparations made from a paste, or from which the crust is made, such as cakes, pies, jelly rolls, ladyfingers, cookies, plum duff, etc. Sugar, butter, eggs, baking powder, and extracts are generally employed in their preparation.

Poppy seed. The seed of the black or white poppy. Contains about 50 per cent oil. Used for enriching rolls and loaves of Vienna style bread.

Porcelain ware. A very hard, usually white, and more or less translucent, earthenware suitable for preparing yeast ferments.

Proofing period. The period elapsing between the time of placing the panned dough in the proofroom or cabinet and that at which it is removed therefrom to be placed in the oven.

Proofroom or cabinet. A room kept at a constant temperature of about 90° F. with free steam or moisture and free from draft, into which dough or bread is conveyed for proofing. In smaller bakeries, proof cabinets are provided. Pans of water into which hot bricks are placed or jets of flaming gas against the bottom of water-filled pans provide the necessary humid heat.

Protein. That constituent of foods that builds muscle. Lean meat and white of egg are rich in protein. Gluten of flour is a protein substance.

Pyrometer. A instrument used for measuring high temperatures when the use of a thermometer is impracticable. These instruments are usually operated by the contraction or expansion of a metallic bar or plate.

Scald. As applied to flour, potatoes, etc., to submerge or wet with water at a temperature of 160° F. or more, which is sufficient heat to dissolve the bands of the starch cells and expose the individual grains composing it to the action of the yeast plant.

Short-time dough. A dough which, by reason of increased amount of leavening agent and/or temperatures of mixed dough or fermentation room or cabinet, requires a shorter fermentation period than ordinarily required.

Shortening. Lard, butter, or other fats or oils mixed in bakery products to make them more friable and easier to crumble.

Slack dough. A dough that contains more water or other liquid than required to make a dough of the proper consistency. It has a tendency to flatten out and to stick to the hands or the mixer.

Sponge. A dough that contains part of the flour, part of the water, all or part of the yeast and all, part, or none of the other ingredients to be used in making baked products.

Sponge and dough process. A process resulting from the combining of a fermented sponge with the remainder of the ingredients to be used and mixing same. A sponge and dough necessitates at least two mixing periods, that is, the mixing of the sponge ingredients and the mixing of the fermented sponge with the other ingredients to form the sponge and dough.

Sponge cans. Cans generally used in the field for preparation of the sponge. They include the dough cans, hot and cold water cans, and one for yeast, if a liquid yeast is used.

Stiff dough. A dough that contains less water or other liquid than required to make a dough of proper consistency. It is hard to handle, especially when hand-mixed. Generally used in making field bread and also to overcome deficiencies in flour.

Straight dough process. A process whereby a dough is obtained by mixing together at one time all the ingredients to be used.

Temperature. A condition that pertains to heat or cold; that is, the relative degree of each. This is one of the most important factors in bread making and must be taken into consideration in connection with the yeast, water, dough, proofroom, sponge, fermentation development or retardation, bake ovens, etc.

Trench cover. In field baking, an expedient by which a covered trench is constructed, generally of clay if procurable, for the purpose of creating what amounts to a firebox underneath the oven.

Unfermented bread. This includes all breads made without yeast, such as aerated bread, crackers, baking-powder biscuits, etc.

Vitamins. Recently discovered but very important food factors that are essential to normal growth and maintenance of good health.

SECTION II

GRAINS AND FLOURS

4. Description and composition of grains. Grains or cereal grains are the seeds of such plants as wheat, corn, rice, oats, rye, buckwheat, barley, etc. Grain seeds, as such, or in some manufactured form, constitute one of the most important food items of man and animals. While they vary somewhat in composition, they all contain:

a. *Carbohydrates.* Carbohydrates include starch and sugar used by man to provide and replace the energy necessary for activity such as working, walking, etc.

b. *Protein.* Protein is used by man to build up and replace muscle and other body tissue. Protein in food causes growth and replaces worn-out or damaged cell structure.

c. *Fat.* Fat is used by man as a reserve energy supply and is stored in the body in that form. When the quantity of carbohydrate food eaten is insufficient to supply the energy required for the activities of man, the stored-up fats are used to supply this deficiency.

d. *Mineral matter.* Mineral matter is used by man for teeth, bone building, and other essential body functions. Much more mineral matter is contained in the whole or ground grain than in the manufactured form, such as wheat flour, because in the manufacturing process much of the mineral matter in the form of hulls and bran is invariably removed.

e. *Water.* Water in a considerable amount is needed to promote elimination, perspiration, circulation of the blood, and many other functions of the body. The water contained in grains, or manufactured products thereof, which man ordinarily consumes, is far insufficient to meet his requirements. To a certain extent, the eating of grain foods, such as bread, encourages the drinking of water by imparting a dry feeling to the throat.

5. Milling of grain. The preparation of grain for human consumption, commonly called milling, involves the removal of the hull and bran coats from the kernel and the grinding, sifting, bolting, and separation into various grades of the endosperm (starch granules.) If the grinding is limited to rather coarse particles, the product is known as meal, such as corn meal. If grinding is continued until a powdery product is produced, it is called flour, such as wheat flour, rye flour, rice flour, etc.

6. Wheat. Wheat is by far the most important of the grains, especially in the United States. It is grown in all temperate climates; when manufactured into flour it makes better and more palatable bread than flour from other grains which, to a large extent, does not possess the qualities which make well-risen loaves of bread.

a. *Classification.* There are many classifications of wheat, but for purposes of this manual they will be confined to:

(1) *Winter.* Winter wheat is wheat sown in the fall and harvested the following summer.

(2) *Spring.* Spring wheat is wheat sown in the spring and harvested in the fall.

(3) *Hard.* Hard wheat may be either winter or spring wheat and has kernels that are hard, tough, and difficult to cut. It contains from 10 to 12 per cent protein. The gluten of hard wheat flour is tough, resistant, generally of good quality, and best suited for bread making.

(4) *Soft.* Soft wheat is composed of kernels that are soft and of a starchy appearance when cut and usually contain from 6 to 10 per cent protein. It produces a soft and weak gluten, does not make a good loaf of bread, but is suitable for pastry, crackers, and cakes.

b. *Products obtained from milling.* The chief products obtained from the milling of wheat are:

(1) *Bran.* Bran is the coarse particles of the outer coatings of wheat. It is used largely as animal feed but to a limited extent as a breakfast cereal.

(2) *Shorts.* Shorts is the fine particles of the outer coatings and germs of wheat. Like bran, it is used largely as animal feed.

(3) *Flour.* For various grades of flour obtained from milling wheat, see paragraph 7.

7. Wheat flour. *a. Classes.* Within each class of wheat flour, each of the grades described in *b* below may be obtained. Flours are classified according to the kind of wheat from which they are obtained, as follows:

(1) *Hard spring.* This is flour milled from wheat grown in Minnesota, North and South Dakota, and nearby territory. It has a rich, creamy color and a large amount of gluten of the best quality, and makes a good, well-risen loaf of bread when properly handled. It is sharp or granular to the touch and is an excellent bread flour.

(2) *Hard winter.* This is flour milled from wheat grown in Kansas, Nebraska, Oklahoma, and other western States, has a good color, an excellent flavor, and a good strong gluten. Although its gluten is not generally as strong as that of hard spring wheat, it is an excellent bread flour if properly handled.

(3) *Soft winter.* This flour comes from the more humid central States and the Pacific coast. Its gluten is low in quantity and it has poor tensility. It is white, has a soft and fluffy texture, and an excellent flavor. It is used mostly for pastry and biscuits.

(4) *Durum.* Durum flour is milled from durum wheat, grown mostly in the northwest section of the United States. It has a yellowish creamy color and a large amount of very hard and tough gluten. It is not satisfactory for bread making purposes unless blended with a weaker flour.

b. Grades. (1) *Low-grade.* About 3 per cent of the total flour obtained at first and last stages when milling wheat is low-grade flour. It is dark in color, contains considerable bran specks and dirt, and does not make a satisfactory loaf of bread. It is used for purposes other than bakery products, such as sizing, paste, etc.

(2) *Patent.* Patent flour is sometimes further divided into short and long patent, and constitutes from 40 to 90 per cent of the best portion of the flour; that is, that portion which contains the smallest quantity of bran specks and is capable of producing an excellent quality of gluten desired for bread making purposes. Short patent flour is a higher or better grade than long patent.

(3) *Clear.* Sometimes further divided into first clear and second clear, this flour is that portion remaining after the patent flour and low-grade flour are separated from a run of flour. First clear is a higher or better grade than second clear, as the first clear is that portion remaining after separation of a short patent, and a second clear is that remaining after separation of a long patent. Clear flour does not make satisfactory white bread as it imparts a dark color to the crumb of bread, but it may be used advantageously when making part whole wheat bread or rye bread, the dark color of crumb not being objectionable in such products.

(4) *Straight.* Straight flour is the total produced from a run of wheat, excluding the low-grade; that is, the product obtained by combining the patent and the clear flour. Federal specifications provide for the purchase of straight flour for Army ration purposes. Although generally not as high in quality as a patent flour, straight flour is capable of producing an attractive, palatable, and highly nutritive loaf of bread if properly handled.

(5) *Cut straight.* Cut straight is a straight flour from which a portion of the best or patent flour has been removed.

(6) *Stuffed straight.* This is a straight flour to which an additional amount of clear flour from another run of flour has been added.

c. Enriched flour. Enriched flour is a normal flour with minerals and vitamins added to replace those lost during the process of milling wheat, thus restoring its nutritional value to that of wheat.

8. Additional flours. In addition to the white flours described in paragraph 7, there are several other flours available commercially which are frequently used in making bread and other bakery products. These flours are highly desirable, especially to provide variety in the diet. Among the more important from the Army standpoint are:

a. Whole wheat. Whole wheat flour is the product made by grinding the entire wheat grain to a powdery consistency. It contains not only starch granules, but also all the bran or outer coats of the wheat. Whole wheat flour may be used by itself as the flour component of bread, or it may be blended with either patent, straight, or clear flours, or a combination thereof. Bread produced from whole

wheat flour is brown in color and high in mineral and roughage content as compared with bread produced from all patent, straight, or clear flours. Whole wheat bread makes an excellent substitute for white bread for the sake of variety.

b. *Rye.* Rye flour is lacking in gluten-forming protein, which quality is essential to the formation of a loaf of bread having a good volume and smooth, porous texture. For this reason it is generally used in proportions of 10 to 40 per cent rye flour and the remainder wheat flour when making so-called rye bread. Bread made from 100 per cent rye flour would be small in volume, soggy, and compact, and unpalatable to the average American. There are three types of flour obtained from the milling of rye, as follows:

(1) *White.* While darker in color, this flour corresponds to the short patent wheat flour. It is nearly white, has a small percentage of ash, but is deficient in gluten-forming protein.

(2) *Dark.* Dark rye flour corresponds to the clear grade wheat flour. It is very dark, has a branny taste, and is used to obtain a dark rye loaf of bread.

(3) *Medium.* Medium rye flour corresponds to the straight grade of wheat flour. It is a blend of the dark and white rye flours. It possesses more of the true rye taste than white rye and for this reason is the type mostly used when making rye bread.

9. **Bleached flour.** Flour improves with age under proper storage conditions, up to 1 year, both in color and quality. However, some flour is shipped from the mill before it is naturally aged. In lieu of natural aging, flour is often bleached. Bleaching has the effect of whitening and artificially aging flour. There is no objection to the purchase of bleached flour for Army use provided the bleaching agent was used solely for the purpose of aging the flour and not to cover up inferior qualities such as original dark color, off odors, etc.

10. **New flour.** New flour is freshly milled flour from recently harvested wheat. Such flour is unstable and presents difficulties in bread making until it matures. This is due to the fact that the proteins of the wheat must undergo certain changes before they combine to form a satisfactory gluten. A warm, dry storage is the best means of aging the flour and developing the gluten qualities. Under good storage conditions, new flour may be considered as sufficiently aged for use after a period of 1 month. If new flour must be used before it is aged, it is best to mix it with an equal quantity of flour that has been on hand for some time. If no old flour is available, good bread may be made with new flour by giving a rapid fermentation at a slightly higher temperature than that ordinarily used, making a stiff dough, and using a larger quantity of yeast and salt. New flour should not be confused with green flour, which is flour obtained from milling wheat that is unsweated or insufficiently sweated. Proper sweating of wheat is obtained by leaving wheat in stacks 10 days to 8 weeks before threshing. Green flour will not produce a satisfactory loaf of bread, even if allowed to age.

11. **Storage of flour.** a. Flour should be kept in a dry, well-ventilated storeroom at a fairly uniform temperature. A temperature of about 70° F., with a relative humidity of 65 per cent, is considered ideal. Flour should not be stored in a damp place. When milled, flour contains moisture up to 15 per cent but it will take up additional moisture when stored in damp places or shipped into moist climates. Moist storerooms or climates accompanied by temperatures greater than 75° F. are very conducive to mold growth, bacterial development, and rapid deterioration of the flour. The storage room should be well-ventilated, as flour absorbs and retains odors. For this reason, flour should not be stored in the same room with supplies, such as cheese, onions, or paints, which give off strong odors.

b. All flour should be stacked on skids or dunnage so as to be at least 5 inches off the floor. The lowest layer of sacks should be laid lengthwise, the next layer crosswise, etc., to permit proper circulation of air. If it can be avoided, sacks of flour should not be stacked more than seven high, as additional weight on bottom sacks tends to weaken the flour therein. Sufficient aisle space should be available to assist ventilation and facilitate counting or inventorying. Sacks should not be permitted to lean against pillars or walls, as circulation of air is retarded and the weight causes undue strain on the building.

c. The best precaution against rats and mice in the storeroom is the elimination of holes and large cracks in the floor and walls. If the rats get into the flour storeroom, they are best exterminated by means of traps. Rats and mice do not care much for flour as a food as it forms a paste in their mouths due to the dryness

of the flour, but they consider sacked flour ideal for nesting purposes. In nesting, they bore into the sacks, strewing loose flour along the outside of them and on the floor, a condition conducive to development and multiplication of insect infestation.

d. Absolute cleanliness is essential to prevent infestation from beetles and other insects. Storerooms should be well-cleaned on receipt of each new lot of flour. Frequent sweepings underneath and around sacks or stacks of sacks should be made and no refuse, empty uncleaned sacks, or other material should be permitted to remain in the vicinity of the flour. Each shipment of flour should be inspected as soon as it arrives to detect the presence of insects. Old stock should be reinspected frequently and when beetles or insects are found, prompt steps taken to remove them. It is far better and easier to keep insects out of the storeroom and out of the flour than it is to sift them out before baking. Infested flour always contains a certain amount of filth which cannot be removed by sifting or bolting.

e. A good patent or straight flour will keep for 1 year if properly stored. On account of the liability to infestation from beetles and insects, it is preferable to limit the stock on hand to a 3 months' supply, particularly during the summer months. In warm, moist climates like the Tropics, flour deteriorates very rapidly, and more than 30 days' supply is not very desirable. Patent and straight flours keep best, as they are freer from the oily germ stock. Lower grades, whole wheat, rye, corn, and barley flours do not keep as well; their keeping qualities, however, are improved by using tightly closed containers.

12. Testing of flour. The testing of flour to determine the quantity of carbohydrates, protein, moisture, and ash contained therein requires the services of an experienced chemist and technical equipment. However, there are several tests which can be made at post bakeries and in the field which will give a good indication of the quality and characteristics of the flour on hand.

a. *Soundness and odor.* The odor of flour should be sweet and similar to that of freshly ground wheat. Flour which is in unsound condition or has a musty, garlicky, or other objectionable odor will not make a well-flavored bread.

b. *Granulation (feel).* Rub the flour between the thumb and fingers. Good hard wheat flour has a somewhat granular or gritty feel. A soft, smooth, or slippery feeling denotes a soft wheat flour or a blend of a soft and hard wheat flour. Hard wheat flours retain their form when pressed in the hollow of the hand and fall apart readily when touched. Soft wheat flour tends to remain lumped together after pressure.

c. *Color (pekar) test.* Place a small quantity of flour on a smooth glass or porcelain plate and "slick" with a steel flour trier, spatula, or table knife to form a firm smooth mass of about 2 inches square, the thickness running from about one-half inch at back to a thin film at front of plate. This test should be made in comparison with a flour of known grade and quality, both flours being "slicked" side by side on the same plate, if possible. A bright, rich, creamy-white color indicates a hard flour of good gluten qualities. A dark or grayish color indicates a poorer grade of flour or presence of dirt in the flour. The presence of bran specks indicates a lower grade of flour; a dead chalky-white color indicates a soft wheat flour or excessive bleach. After making color comparison on the dry samples, dip the plate obliquely in a vessel of clean water, remove, and allow to partially dry. Variations in color and presence of bran specks are more pronounced in the damp samples. Owing to the custom of bleaching flours, color is not always a reliable guide. Bleaching will, however, not improve the dull appearance of a poor flour and will not conceal dirt and bran specks. Unless overdone and when it does not conceal inferiority, bleaching is not considered objectionable.

d. *Baking test.* (1) The final and conclusive test of any flour is the kind of bread that can be made from it. A single loaf should be baked and compared with a loaf baked from a known flour. To make baking tests of value, all conditions should be standardized. Definite weights of flour, sugar, salt, yeast, and shortening should be used and water taken in accordance with absorption ability. The same materials, except flour, should be used in each dough. A definite procedure must be followed, using identical times and temperatures for all operations.

(2) In addition to the identical doughs described above, two additional doughs of the unknown flour should be made, using the same formula and the same tem-

perature and baking conditions throughout, but varying the fermentation time by giving one dough 30 minutes less fermentation than the normal loaf and the other 30 minutes more fermentation.

(3) When two or more flours are thus treated under the same conditions, any differences in quality of bread can be laid to the quality of the flour. Also, by comparing the three loaves of bread made from the unknown flour, the procedure to follow to obtain best results with that flour may readily be determined.

Composition of wheat flour and bread
[Percentage form]

	<i>Average hard wheat</i>	<i>Average hard flour</i>	<i>Average loaf of white bread</i>
Moisture	14.5	13.0	37.0
Protein	13.0	12.0	9.5
Carbohydrates	68.7	73.25	49.0
Fat	2.0	1.3	3.0
Mineral matter	1.8	.45	1.5

SECTION III

OTHER INGREDIENTS

YEAST

13. Importance of yeast. Next to flour, yeast may be considered as the most important ingredient used in bread making. The quality of the finished loaf of bread is dependent to a large extent upon the kind, quality, and condition of yeast used in the dough. Although flour is a highly nutritious substance, it is not suitable for human food until it has been made into a form which is palatable and readily acted upon by the digestive juices of the human system. Cooking or baking alone causes certain changes to take place which make the product more palatable and digestible, but unleavened products, such as hard bread, crackers, etc., are not relished as a steady diet. Incorporating yeast in a flour dough results in a leavened product or an expansion, and a mellowing and development of the starch cells which considerably improve the palatability and digestibility of flour foods.

14. Description of yeast. A yeast cell is a minute vegetable substance which cannot be seen with the naked eye. Although not generally known, yeast cells are constantly floating about in the air and settling on food substances. With proper food, air, moisture, and temperature conditions, yeast will grow and reproduce rapidly. Light is not necessary for its growth. When yeast is exposed to unfavorable conditions it may go into spore form, a condition in which the cells are temporarily inactive but still possess the ability to become active again as soon as favorable conditions are provided. Dried yeast is a good example of yeast in spore form. The absence of sufficient moisture in dried yeast prohibits growth and development until such time as the dried yeast is mixed with water and flour or other carbohydrate substance. When so mixed, the yeast changes from spore to active form.

15. Kinds of yeast. There are numerous varieties and strains of yeast, all capable of fermenting sugar, but each is best suited to certain conditions and substances. While these all produce alcohol and carbon dioxide, the quantities produced and the character of the other products formed are such that many of them are inefficient or undesirable for baking purposes. Bread yeast is the particular kind of yeast used in bread making. It is generally obtained from manufacturers who carefully grow selected pure strains and sell them in practically pure condition. The use of a cultivated yeast eliminates much uncertainty as to results of the fermentation. Wild yeasts are present in nature and are the cause of many natural fermentations. These organisms are undesirable in bread making.

a. Compressed.

(1) Compressed yeast is a pure culture of bread yeast grown on a large scale, collected and compressed into cakes. It may be mixed with not more than 5 per cent starch to absorb the excess moisture and give it body. For bakery use, it is compressed into 1-pound bricks or $\frac{1}{2}$ -pound bricks and wrapped in paraffined cloth or paper. For household use, it is put up in $\frac{1}{2}$ -ounce packets wrapped in tinfoil. It is very perishable and spoils quickly when removed from cold storage and exposed to warm temperatures. For this reason, it can be used at posts distant from railroad and good road facilities and in the field in warm climates only when arrangements are made for its cold storage. If wrapped in heavy paper when removed from cold storage or if placed in a moderately cool place such as a basement, a hole in damp ground, or a porous jar covered with wet cloths, compressed yeast will keep in fair condition for a number of days. If well chilled, it can be shipped almost any distance in a fireless cooker. When obtainable, compressed yeast should always be used by Army bakers.

(2) Good compressed yeast should feel firm, tough, and springy, and should break with a clean fracture resembling broken plate glass. It should have a fresh yeasty odor and be practically tasteless. The color of yeast is not a safe guide in determining its quality. Spoiled yeast is soft and has a sour or putrid odor. A quick test is to roll a small amount into a firm ball about one inch in diameter and drop it into a glass containing a dilute solution of sugar. Note the time required for the ball to float to the surface. A good sample will rise to the surface in a few minutes; a poor sample will take a much longer time. The time required will vary according to the temperature of the water and the amount of sugar dissolved in the water.

b. Dried.

(1) Dried yeast is prepared by mixing a large proportion of starch or corn meal with yeast and drying the mixture at a comparatively low temperature. It is packed in cans or moisture-proof fiber containers, 3 ounces net. For Army use, the small packages are best assembled in hermetically sealed shipping containers. Dried yeast is inert and largely in spore form and will keep under ordinary storage conditions for several months. It can be taken and used anywhere and gives fairly good results in bread making. Dried yeast will not, however, keep indefinitely. The packages should be marked with the date of manufacture and should be used within three months, if possible. Deliveries of dried yeast should be carefully tested to see that worthless, old, or poorly prepared dried yeast is not being furnished.

(2) Dried yeast, being largely in spore form, requires considerable time to develop growth when mixed with water and other ingredients. The yeast should be given a start by using the sponge and dough method, making the sponge part rather slack and containing at least 2 pounds of sugar to each 100 pounds of flour. One pound of dried yeast to a dough containing 100 pounds of flour is the best proportion to use. When so used, the sponge part of the sponge and dough should be given approximately 10 hours' fermentation. If bread is to be made with dried yeast by the straight dough method, the dried yeast should be left overnight in a semiliquid mixture of some of the water, flour, and sugar which are to be used in the dough the following morning.

c. Dehydrated. Dehydrated yeast is compressed yeast from which most of the water has been extracted. Since yeast is approximately 75 percent water and since a few yeast spores will have been destroyed during dehydration, it is necessary to use approximately one-half as much by weight of dehydrated yeast as ordinary compressed yeast. Dehydrated yeast, if kept hermetically sealed and in a dry state, will keep well for 6 months. The dehydrated yeast should be rehydrated in part of the water and may be used within 45 minutes after reconstitution. Desirable temperatures for handling are identical with those under which compressed yeast is used.

d. Liquid. When commercial compressed or dried yeast is not available or when only a small quantity is on hand, it may be necessary for the baker to make his own yeast in the form of liquid yeast. These are liquid cultures of yeast prepared in the bakery. Once having a good stock of yeast, the baker may prepare fresh yeast from day to day by inoculating fresh lots of liquid with the yeast made the previous day. Liquid yeasts cannot be made as pure and uniform as com-

mercial compressed yeasts and they have no place in the modern bakery. They require considerable time and trouble not warranted by any saving in expense. However, all Army bakers should know how to make and use liquid yeasts, for there may be times when compressed or dried yeast is not available. It should be the practice for Army bakers to make and use at frequent intervals stock liquid yeasts such as potato yeast, and flour and malt yeast, even when compressed yeast can be obtained daily.

(1) *Kinds.* There are two kinds of liquid yeasts:

(a) *Stock yeast.* A mixture of water and some carbohydrate substance such as flour, sugar, malt, potatoes, corn flour, rice flour, etc., to which a small quantity of compressed, dried, or part of a previously prepared lot of stock liquid yeast has been added.

(b) *Virgin yeast.* A mixture of water and some carbohydrate substance to which no yeast is added but which depends upon the development of any yeast which may be present in the materials used or which may be floating in the air. This yeast is obviously unreliable as there is no assurance as to what kind of fermentation will develop. It should never be made and used until all efforts to obtain stock liquid yeast have been exhausted.

(2) *Recipes.* When making stock liquid yeasts, be sure that paste is cooled to approximately 80° F. before adding yeast. At higher temperatures, yeast will be seriously injured, if not killed. Similarly, if left to develop in a temperature much lower than 80° F., the growth of yeast is considerably retarded and if below 45° F., may cease. Use earthenware, granite, porcelain, or clean wooden receptacles for preparation and development whenever possible, as metal containers have a deleterious effect on yeast growth and development. All containers used in the preparation of liquid yeast should be thoroughly cleaned before being used again in order to prevent contamination of subsequent batches with wild yeasts, etc.

(a) *Stock potato yeast* (yield 1 gallon).

1. *Formula.*

Potatoes	1 lb.
Flour	¼ lb.
Salt	¼ oz.
Water	Enough to make 1 gallon
Compressed yeast	½ oz.

or

Dried yeast	1½ oz.
-------------------	--------

or

Stock liquid yeast	1 pt.
--------------------------	-------

2. *Procedure.* Clean the potatoes thoroughly. Cut up and boil in water enough to cover. When well done, strain and mash thoroughly. Add the flour to the mashed potatoes. Add potato water and, if necessary, additional boiling water to make 1 gallon of thin paste. Mix paste thoroughly. Allow to cool to 80° F. Add compressed yeast, dried yeast, or previously prepared stock liquid yeast. Set to ripen or develop at 80° F. It will be ripe and ready for use in from 9 to 12 hours.

(b) *Stock flour yeast* (yield 1 gallon).

1. *Formula.*

Flour	3½ lb.
Water	3 qt.
Sugar	1 oz.
Salt	¼ oz.
Compressed yeast	½ oz.

or

Dried yeast	1½ oz.
-------------------	--------

or

Stock liquid yeast	1 pt.
--------------------------	-------

2. *Procedure.* Dissolve sugar and salt in 1 quart of water. Heat solution to approximately 125° F. Place flour in earthenware, granite, or wooden receptacle. Add the 125° F. sugar and salt solution to flour and mix by hand until stiff dough consistency is obtained. Allow remainder of water to come to a boil and then add gradually to dough, stirring constantly so as to make a thin batter and eliminate lumps. Set to cool. When cooled to 80° F., add either compressed yeast,

dried yeast, or previously prepared liquid stock yeast. Endeavor to maintain temperature at 80° F. It should be ready to use in from 18 to 24 hours.

(c) *Virgin flour yeast* (yield 1 gallon).

1. *Formula:*

Flour	3 lb.
Water	4 qts.
Sugar	1 oz.
Salt	¼ oz.

2. *Procedure.* Dissolve sugar and salt in water and bring to a boil. Place flour in earthenware or wooden receptacle. Pour 1 quart of boiling water on flour. Stir well to break up lumps. When remainder of water has cooled to about 160° F., add to flour paste. Allow the mixture to cool to 80° F. and keep at this temperature for about 48 to 60 hours, or until all hissing has stopped. The yeast is then ready for use.

(d) *Virgin potato yeast* (yield 1 gallon). Same ingredients and procedure as in (c) above, substituting 4 pounds of potatoes for the 3 pounds of flour.

(e) *Tuba de nipa.* Tuba de nipa, as it is commonly called by the Filipinos, furnishes an excellent substitute for stock yeast. It is the sap collected from the nipa palm. The sap, having been placed in a deep can with a small opening at the top, is set in the sun for about 12 hours and allowed to ferment. A thick scum forms on the surface and the tuba is removed to a cool place where it will keep for several days. The scum should be allowed to remain as a protection against contamination. Fermented tuba de nipa is used as stock yeast and in the same proportions.

16. Conditions necessary for efficient functioning of yeast. Yeast, in order to grow, multiply, and act efficiently as a leavening agent, requires proper air, moisture, temperature, and food conditions. Like all other living organisms, yeast requires a certain amount of oxygen (obtained from air) and moisture in order to live and thrive. In a slack dough, its activity is increased, whereas in a stiff dough, its action is retarded. Yeast works best in temperatures of 78° to 82° F. As temperature increases beyond this point, action is accelerated; but the chances of obtaining undesirable fermentation, such as acetic and wild yeast, are greater. At about 120° F. the action of yeast is killed. Similarly, as temperature of dough containing yeast is lowered from the 78° to 82° F. range, the action of yeast is retarded until about 45° F. is reached, at which point activity practically ceases. Food, in the form of carbohydrates (starch, sugar, malt), must be present before yeast will cause fermentation.

17. Fermentation. Fermentation may be considered as the chemical action that takes place in certain substances, caused by the action of micro-organisms (bacteria, yeasts, molds), under favorable conditions. Common fermentations are:

a. *Alcoholic.* A conversion of sugar to approximately equal parts of carbon dioxide (a gas) and alcohol, caused by the action of yeast. This is the type of fermentation desired in bread making.

b. *Acetic.* A conversion of dilute alcohol to acetic acid (vinegar) caused by the action of acetic bacteria. At high temperatures (above 90° F.) or on prolonged fermentation acetic fermentation may take place in an alcoholic fermentation of yeast action on sugar. If this happens, sourness of bread results.

c. *Lactic.* A conversion of sugar (cane sugar, beet sugar, milk sugar) to lactic acid caused by the action of lactic bacteria. It is this fermentation that causes the souring of milk and, to a certain extent, it may be formed in connection with yeast fermentation of sugar in bread making, thereby imparting a lactic acid flavor to bread.

18. Action of yeast in a dough. a. Yeast secretes four substances known as enzymes. The enzyme diastase breaks down some of the starch in flour into compound sugar. The enzyme invertase breaks down compound sugars to simple sugars. The enzyme zymase breaks down simple sugars to carbon dioxide gas and alcohol. The enzyme protease has a softening effect on the gluten, thereby giving it more expanding power.

b. It may be seen that it is not necessary to add sugar to a dough in order to secure fermentation by yeast, as part of the flour may be converted to sugar by the enzyme diastase and subsequently acted upon to produce carbon dioxide and alcohol.

However, it is advisable to use some sugar substance (cane sugar, beet sugar, corn sugar, malt, sirup, etc.) as yeast food in a dough in order to prevent extensive fermentation periods and possible breaking down of gluten by enzyme protease to the point where only small volume is obtainable.

c. The carbon dioxide gas formed by the action of yeast on sugar is the element which it is desired to retain in a dough. The alcohol formed is usually vaporized during baking. It is the expanding of the carbon dioxide gas (caused by heat) within and between the cells of the dough that causes it to rise and expand and form the silky, spongy texture which aids materially in making bread attractive and palatable.

19. Factors affecting growth of yeast in bread making. a. The action of yeast in a bread dough is accelerated by:

- (1) A slightly smaller percentage of salt.
- (2) The use of malt.
- (3) A slightly higher dough temperature.
- (4) The use of yeast food.
- (5) The use of a greater percentage of yeast.

b. The action of yeast in a bread dough is retarded by—

- (1) A slightly larger amount of salt than is ordinarily used.
- (2) Slightly lower temperatures than ordinarily used.
- (3) No malt.
- (4) No yeast food.

20. Leaven or old (left over) dough. Retain a piece of the leavened dough to be used for a certain day's baking and store it in a cool place (preferably under 50° F.) until ready to mix dough for the following day. This piece of leaven or old dough may be used in lieu of other leavening agent. Leaven or old dough to be used successfully as a leavening agent should not be more than 24 hours old, as longer periods tend to develop sour fermentations which will be reflected in the finished bread. A piece of the dough made by using old leaven retained from the previous day may also be retained for the following day, and so on, indefinitely. For best results, about 2 pounds of old dough to 100 pounds of new dough should be used.

WATER

21. Water. a. *Reasons for use.* Water is an essential ingredient in bread making. Without water, the formation of a dough would be impossible. When mixed with wheat flour, water unites with the protein substances of flour called glutenin and gliadin and forms the substance known as gluten, this substance being essential in order to produce a well-risen leavened loaf of bread. The presence of water in comparatively large quantities is also essential to cause fermentation by use of yeast. Before being incorporated in a dough, the yeast should be dissolved separately in a portion of the water to be used in the dough. When so treated, the yeast is uniformly distributed throughout the entire mass of the dough, resulting in a much better and more uniform fermentation. Water plays an important part in the fermentation, eating qualities, and freshness of a dough and bread made therefrom, mainly from the following standpoints:

- (1) Without water, yeast activity would cease.
- (2) The presence of water makes possible the pliable and expansible properties of the dough so that in this form it can be raised by the carbon dioxide gas resulting from yeast activity.
- (3) The presence of water aids materially in imparting good eating qualities to the loaf of bread. A dough containing insufficient water when baked would result in a dry, brittle product. Conversely, too much water remaining in a baked loaf of bread results in a soggy, unpalatable product and makes it readily susceptible to mold development.
- (4) Water in bread imparts the characteristic of freshness. The evaporation of the water contained in a loaf of bread into the surrounding atmosphere is the principal cause of staleness.

b. *Types and effect in bread making.* All water used in bread doughs should be a purity equal to that of drinking water. Usually the water used at Army posts for drinking purposes is in every way suitable for bread-making purposes. Even moderately chlorinated water will not materially affect the quality of the bread or impart an off odor. The type of water available varies in different sections

of the country. To ascertain the type of water being used and a possible remedy for defects in dough caused by its use, local military authorities should consult with officials of the local water works. Briefly, water may be classified as—

(1) *Hard water.* Hard water is water which, after falling as rain, seeps through the soil and while so doing absorbs minerals, such as carbonates and sulphates of calcium and magnesium. If water is hard, it is difficult to form a lather with soap. Medium hard water is desirable for bread-making purposes as it provides the essential mineral matter necessary to activate yeast in the dough. Excessively hard water retards the progress of fermentation by toughening the gluten; it may be softened by boiling prior to use.

(2) *Soft water.* This is water which is relatively free of mineral matter. Soft water readily forms a lather with soap. Very soft water, when used for bread making, has a tendency to soften the gluten and result in a soft, sticky dough. If soft water must be used, this softening of gluten and stickiness of dough may be remedied by using larger quantities of salt. The mineral matter contained in the salt will supply the mineral deficiency of the water.

(3) *Alkaline water.* This is water which contains in solution an alkaline substance, such as sodium carbonate. In rare cases water may be sufficiently alkaline to require special treatment before using in a dough. Excessively alkaline water will either neutralize or change to the alkaline side a dough that should be slightly acid for best yeast activity and fermentation. If alkaline water must be used, its ill effects may be overcome by adding to it a small quantity of vinegar.

c. *Quantity to be used.* The use of slack or stiff doughs may be desirable under certain conditions, but it must be remembered that the quantity of water to be used in any case should be such as to not materially affect the quality of the finished bread. From a commercial standpoint, the retention of more water in a loaf of bread is beneficial to the civilian baker as it results in increased profits; but in the Army, where no profit is derived from the sale of bread, no advantage is gained by the use of more water than is necessary to produce a palatable and attractive product. According to Government standards, it is not permissible for bread 1 hour or more after completion of baking to contain more than 38 per cent of water, based on actual weight of the loaf. If the proper amount of water is used in a dough, and the dough is properly handled and baked, the finished loaf will usually contain about 36 per cent of water, based on actual weight of the loaf. For practical purposes, a pint of water may be considered as weighing 1 pound and a gallon of water 8.3 pounds.

d. *Ice calculation.* During hot summer months and in tropical climates, the temperature of the available tap water will be higher than the temperature of the water required to obtain a given mixed dough temperature. In such cases ice may be used in the dough in lieu of a part of the required water in order to obtain the desired mixed dough temperature. The following method of calculation may be used and will prove satisfactory:

After determining the desired temperature of the water required, record the temperature of the available tap water. Find the difference between the temperature of the water required and the tap water. Multiply this result by the weight of the water to be used in the dough and divide this difference by 144 (144 b. t. u.'s of heat are absorbed by 1 pound of ice in melting). The resulting figure will give the amount of ice required to obtain the desired mixed dough temperature. Deduct this amount from the number of pounds of water originally called for to obtain the new amount of water to be used with the ice.

Examples:

Temperature of available tap water 70° F.

Temperature of water required 60° F.

Difference 10° F.

Two hundred forty-three pounds of water are required in the dough.

$10 \times 243 = 2,430$ (number of b. t. u.'s of heat to be removed from 243 pounds of water to lower its temperature 10° F.)

$2,430 \div 144 = 16.8$ or $16\frac{3}{4}$ pounds (the amount of ice required)

$243 - 16\frac{3}{4} = 226\frac{1}{4}$ (pounds of tap water to be used with the ice).

NOTE.—The ice used in the dough must be clean and shaved or broken into small particles in order to obtain a smooth dough free of lumps of ice.

MISCELLANEOUS INGREDIENTS

22. Salt. *a.* Salt used in bakeries is the kind universally used as table salt; that is, a chemical compound of the elements of sodium and chlorine. Salt, flour, yeast, and water constitute the essential ingredients of a bread dough. In other words, a good leavened bread may be made by the use of these ingredients only. Other ingredients such as sugar, milk, and shortening, when added to a dough improve the quality and attractiveness of the finished product but they are not essential to the production of a good quality of leavened bread.

b. Salt is used primarily to impart a desirable flavor to bread. Without salt in a dough, the resultant bread would be flat and insipid. In addition to imparting flavor, salt to a large extent may be considered as a controlling factor in fermentation. As the amount of salt used in a dough is increased, the proper fermentation time for that dough is increased, and vice versa.

Example: If 2 per cent is the normal amount of salt used in a dough and it is desired to shorten the fermentation period, reducing the amount to 1 per cent is one way of accomplishing the desired result. Conversely, if it is desired to lengthen the fermentation period, increasing the amount of salt to 3 per cent will accomplish this result.

c. In order to insure equal distribution throughout the dough, the salt and sugar to be used should be dissolved in a part of the water before being added to the dough. The salt should never be mixed with the yeast nor added to the yeast and water solution, as this high concentration of salt with yeast will invariably seriously weaken, if not kill, yeast activity.

d. Normally, $2\frac{1}{2}$ per cent salt, based on weight of flour used, will give best results. Amounts above and below this percentage may be used to meet special situations but in no case should the amount used exceed 3 per cent, based on weight of flour. Amounts in excess of 3 per cent will seriously injure the quality and flavor of bread.

23. Sugar and substitutes. *a. General.* The word "sugar," without qualification, means the sugar obtained from sugarcane or sugar beets. For all practical purposes, there is no difference between cane and beet sugar. The chemical name for cane or beet sugar is sucrose. The sugar obtained by chemically treating cornstarch is known as corn sugar. Its chemical name is dextrose. The chemical name for sugar contained in milk is lactose and that obtained from the malting of grains is maltose. Other sweetening agents such as brown sugar, corn sirup, cane sirup, molasses, and honey may be used in bakery products in lieu of sugar. Sugar is available commercially in different size granules such as cubes, coarse granulated, fine granulated, extra fine granulated, and powdered. For bread making purposes, fine granulated sugar (the kind ordinarily used for sweetening foods) is most desirable.

b. Function of sugar in bakery products.

(1) Sugar is added to a bread dough primarily to provide immediate food for yeast. It is the sugar in a dough that is acted upon by yeast to produce the carbon dioxide gas resulting in a leavened product. Its second important function is to provide a sweet flavor to the finished loaf. It also gives to the crust of a loaf of bread that golden brown color which adds materially to its attractiveness. For this reason, more than just enough sugar to act as yeast food should be incorporated in a bread dough; if no sugar remains in the dough upon completion of fermentation, the resultant product will have an unattractive, light-colored crust.

(2) In order to be fermentable by yeast, sugar must be in simple form. The starch of flour may be broken down from its complex form through compound sugar to simple sugar by the action of enzymes secreted by yeast. Sucrose, or cane and beet sugar, is a compound sugar and must be broken down to simple sugars by the yeast enzyme invertase before it is fermentable. Dextrose, or corn sugar, is a simple sugar and is, therefore, directly fermentable by yeast. The conversion of a compound sugar to a simple one within a dough is so rapid that no difference in fermentation time need be considered in using cane sugar or corn sugar. Lactose, or milk sugar, is not fermentable by yeast. Therefore, any lactose present in a dough will remain as such during fermentation and, as a result of caramelization caused by high heat of oven, will tend to give a golden brown color to the crust of bread.

c. Amount of sugar to be used. The amount of sugar used depends on the kind

of bakery product desired. For ordinary bread doughs, the amount of sugar generally used ranges from 2 to 4 per cent, based on the weight of flour used. The same weight of either sucrose or dextrose may be used, even though the latter is only three-fourths as sweet as sucrose. Unless the fermentation period is rather extended or the amount of yeast used is more than 2 per cent based on the weight of flour, the incorporation of from 2 to 4 per cent of sugar in a dough will give satisfactory results as to flavor and color of crust, provided the dough has been otherwise properly handled. When there is a long fermentation period (over 5 hours) or the amount of yeast used exceeds 2 per cent, the amount of sugar used should be correspondingly increased.

d. Amount of substitutes to be used. The use of molasses, sirup, brown sugar, malt, etc., in lieu of white sugar is satisfactory and often desirable, especially in dark-colored products such as rye bread, whole wheat bread, or dark-colored cake. It must be borne in mind, however, that sirups, molasses, and malt contain from 25 to 35 per cent moisture, while white sugar contains practically no water, so that an additional quantity of the substitute must be used to obtain an equivalent proportion of sugar in a dough. When used in the production of white bread, substitutes for white sugar have a tendency to transmit their dark color to the crumb of the finished loaf.

24. Shortening. *a. Definition.* Shortening is the fat or oil added to a dough. It gives the finished product "shortness," that is, the property of breaking and crushing easily, and produces a soft, velvety crumb.

b. Kinds. If liquid at ordinary room temperature, a shortening is called an oil; if solid at room temperature, it is called a fat. Among the oils are cottonseed, peanut, corn, and olive. Among the fats are lard and lard substitute. Lard is rendered hog fat. Lard substitute is either all vegetable fat or a combination of vegetable and animal fats. Butter is also considered as a shortening but its high cost in comparison with other shortenings precludes its use by the Army in bread making.

c. Use in a bread dough. Shortening in solid form (fat) is preferred to shortening in oil form for the reason that measurements are more easily and accurately made. In liquid form, part of the shortening tends to adhere to the sides and bottom of the measuring container. There is very little preference between lard and lard substitute. It is thought by some that lard imparts a superior flavor to bread, but the quantity ordinarily used is so small that this superior flavor is difficult, if not impossible, to detect by the average consumer. If lard substitute meeting Federal specifications can be obtained at a cheaper cost than lard meeting Federal specifications, the lard substitute should be used as the shortening for bread doughs.

d. Effect on bakery products. Shortening imparts desirable chewing quality to bread. The smooth, pleasing crust and the soft velvety crumb so desirable in bread are to a certain extent obtained by the proper use and handling of shortening in a dough. A finished loaf of bread containing shortening will retain its freshness for a longer period of time than one without, as the presence of shortening tends to lessen the loss or evaporation of water from baked goods. Shortening is the most concentrated fuel-furnishing food known, therefore its incorporation in a bread dough increases the nutritive value of the bread.

e. Quantity to be used. Like other ingredients, the quantity of shortening to be used depends upon the product to be baked. For soft rolls, sweet dough, pies, etc., the quantity of shortening used is much greater than for bread. Conversely, for hard rolls, the quantity is lessened. For bread doughs, from 1½ to 3 per cent is ordinarily used, 2 per cent (based on the weight of the flour) being considered the most desirable for Army garrison bread. Shortening should be the last ingredient added when mixing a dough as its incorporation at an earlier stage will tend to prevent thorough incorporation of other ingredients, thereby retarding active and uniform fermentation.

f. Storage. Light, warmth, air, and moisture favor the development of rancidity in fats and oils. Therefore, shortening should be kept tightly covered in a cool, dry, dark place prior to its use. Rancid shortening, even if used in very small quantities, will impart its very disagreeable off flavor throughout a large batch of bread, making it practically inedible. Every precaution should be taken to prevent shortening from becoming rancid and to preclude the use of rancid shortening in doughs.

25. Milk. a. General.

(1) Milk is one of the few almost complete natural foods. When incorporated into a bread dough, it materially increases the nutritive value thereof. Bread becomes very nearly a completely balanced diet in itself when milk is used in the dough. Milk also enhances the flavor of bread, its appearance (by imparting a golden brown color to crust), and its keeping qualities. It is available not only in its original liquid state, but also in various concentrated forms such as evaporated, sweetened condensed, dried whole, and dried skim.

Average composition of various forms of milk
[Expressed in terms of percentage]

	Water	Butterfat	Protein	Milk sugar	Other sugars	Mineral matter
Liquid whole milk	88	3.5	3.25	4.5	-----	0.75
Evaporated milk	72	8	7.25	10.5	-----	1.75
Sweetened condensed milk	31	8	7.25	10.5	41	1.75
Dried whole milk	1.5	27.5	27	38	-----	6
Dried skim milk	2.5	1.5	36.5	61.5	-----	8

(2) If used at all in a bread dough, at least one-third and preferably one-half of the liquid content of the dough should be the equivalent of whole milk.

Example: If water is used as the liquid content of a dough, and 60 pounds of water is the proper absorption for 100 pounds of flour, from 20 to 30 pounds of such water, or one-third to one-half, respectively, may be replaced by whole milk or the equivalent thereof. For rough calculation, one-half as much evaporated milk or one-eighth as much dried whole milk may be considered the equivalent of whole milk. If it is desired to replace one-half the amount or 30 pounds of the water content of a dough with milk, it can be accomplished by adding:

30 pounds of whole milk, or

$\frac{1}{2}$ or 15 pounds of evaporated milk combined with 15 pounds of water, or

$\frac{1}{8}$ or 3.5 pounds of dried whole milk combined with 26.5 pounds of water;

or, expressed otherwise:

30 pounds of whole milk plus 30 pounds of water equal 60 pounds of liquid content,

15 pounds of evaporated milk plus 45 pounds of water equal 60 pounds of liquid content,

3.5 pounds of dried whole milk plus 56.5 pounds of water equal 60 pounds of liquid content.

b. Types to be used. The use of milk in dried form for baking is considered more advisable than in either whole or evaporated form for the following reasons: Increased keeping qualities; decreased bulk; more easily and readily stored; quantities may be more accurately measured. As between dried skim and dried whole milk, the former is recommended for bread-making purposes because of better keeping qualities, lower cost, and because the fat content of dry whole milk may be replaced by other shortenings without appreciable loss of flavor and nutritive value. Dried skim milk and dried whole milk may be obtained to economic advantage in regular commercial 50-pound tins and 200-pound barrels. Requirements for a 6 months' supply may be kept on hand without fear of deterioration if it is kept dry and ordinary precautions are taken to prevent contamination by insects and/or dirt.

26. Improvers. a. Other ingredients called "dough improvers" may be added to a bread dough. These are supposed to effect an improvement in either economic production of bread or its quality. The use of these improvers is not essential to the production of bread of good quality and their use in bakeries at Army posts should be limited to emergencies or when the time allowed for production of a certain quantity of bread necessitates short and rapid fermentation periods for dough. It is an accepted principle of the Army to produce good bread out of the minimum number of ingredients, so as to make the least demand upon our supply and transportation facilities in time of war or emergency. Doughs containing these improvers must be watched very carefully to prevent overfermentation. The

quantity used must also be carefully checked. In no case should the quantity of improver used in a dough exceed one-half of 1 per cent, based on the weight of the flour to be used ($\frac{1}{2}$ pound of improver to 100 pounds of flour). Unless absolutely essential to conserve time, the quantity used should not exceed one-fourth of 1 per cent ($\frac{1}{4}$ pound to 100 pounds of flour).

b. Fruits, such as prunes and raisins, and other products, such as peanut butter, are occasionally added to a dough to provide variety in breads and impart additional flavor to bread products. When added to a dough, they should be used in the proportion of from 20 to 30 per cent, based on the weight of flour. The use of smaller quantities would practically nullify the purpose for which they are added and larger quantities might have a deleterious effect on fermentation, loaf volume, and texture.

SECTION IV BREAD BAKING

27. Equipment. a. If bread of good quality is to be produced, it is essential, in addition to a knowledge of the kind and quantity of ingredients to be used, that sufficient and serviceable equipment be available; that the purpose of and method of operating such equipment be fully understood; and that there be a complete understanding of each step in the manufacture of bread.

b. The kind and quantity of machinery and equipment needed will vary depending upon the output of a bakery; a bakery manufacturing 300 loaves of bread a day will not need the same equipment as one manufacturing thousands of pounds of several different kinds of bakery products daily. Machinery generally in use in large bakeries includes dough mixers, dividers, rounders, molders, fermentation and proof cabinets (either stationary or portable), and stationary, revolving, or traveling ovens. Essential equipment consists of floor and counter scales, pint, quart, and gallon measure containers, dough thermometers, dough troughs, dough cutter, bakepans, cooling racks, molding table, mixing bowls, and an oven. Too much emphasis cannot be placed upon the necessity for keeping all machinery and equipment in scrupulously clean condition. Frequent inspections should be made to prevent undue deterioration or unserviceability.

28. Adjustment of water temperature. a. Yeast activity in a dough produces best results at temperatures from 78° to 82° F. In order to obtain any desired temperature in a mixed dough, four factors must be considered; temperature of mixing room, temperature of flour, temperature of water, and heat developed by friction of either hand or machine mixing. The temperatures of the flour and mixing room may be determined readily by use of a thermometer. The friction heat developed in mixing by either hand or machine will be known after a few doughs are mixed. The heat developed by friction will usually be about 5° for hand mixing, 10° to 15° for slow-speed mechanical mixers, and 15° to 25° for high-speed mechanical mixers. As the temperature of the water is readily adjusted by using varied quantities of hot or cold water or ice, this temperature is changed as occasion demands in order to obtain a desired mixed-dough temperature; therefore, to obtain a desired mixed-dough temperature, multiply the desired temperature by three. From this total deduct the sum of the temperature of the room and of the flour, and degrees of friction heat developed in mixing. The remainder is the temperature of the water to be used in the dough.

Example: Assuming temperature of the mixing room to be 75°, temperature of the flour to be 73°, degrees of friction heat obtained in mixing to be 10, and the desired mixed-dough temperature to be 80°:

	Degrees
Temperature of mixing room	75
Temperature of flour	73
Friction developed	10
Total	158
3 times 80 (desired mixed-dough temperature) equals	240
Less	158
Temperature of water to use to obtain mixed-dough temperature of 80° is	82

b. If the result obtained indicates that water of a temperature in excess of 100° F. must be used in order to obtain the desired mixed-dough temperature, that part of the water used to dissolve the yeast should be cooled to at least 95° F. and a compensating increase made in the temperature of the remainder. If yeast is permitted to come in contact with temperatures exceeding 95° F., its activity is seriously retarded, and in excess of 120° F., it is killed. Water adjusted to a certain temperature for dough purposes is usually referred to as tempered water.

29. Dough mixing. *a. Purposes.* The four main purposes of dough mixing are to bring about an intimate and uniform mixture of ingredients so as to form the smooth mass called the dough; to induce the formation and development of gluten in flour by causing moisture to come into contact with the gluten-forming protein substances in flour; to distribute the yeast cells completely and uniformly throughout the dough mass; and to provide a uniform quantity of yeast food throughout the mass.

b. Methods. There are two principal methods of dough mixing:

(1) *Straight dough.* A method whereby a dough is obtained by mixing together at one time all the ingredients to be used.

(2) *Sponge and dough.* A method whereby part of the ingredients are mixed (usually part of the flour, part of the water, part or all of the yeast, and part or all of the sugar, plus part or all of the other ingredients to be used); the resultant product, called the sponge, is permitted to ferment; the fermented sponge is then mixed with the remaining part of the ingredients to be used, forming what is called the sponge and dough. The ingredients used in the sponge are referred to as the sponge ingredients and those reserved for later incorporation as the dough ingredients.

c. Procedure.

(1) *Straight dough.*

(a) *Machine mix.*

1. Carefully weigh and assemble all ingredients to be used.

2. Place approximately one-fourth of the tempered water in separate container. Into this crumble the yeast and whip thoroughly until the yeast is well dissolved. Be careful that the water used for this purpose is not over 90° F., as a higher temperature will kill or injure the yeast.

3. Place remainder of water in the mixer. Add the sugar, salt, and other dry ingredients except flour. Dissolve ingredients in the water by beating with a wire whip or running the mixer slowly for a short period of time.

4. Stop the mixer. Add about one-half of the flour. Run the mixer slowly until all ingredients are thoroughly incorporated.

5. Stop the mixer. Add the dissolved yeast, then the remainder of the flour, and lastly the shortening. Continue mixing until dough of a proper consistency is obtained.

6. Note and record mixed-dough temperature and make necessary adjustments in temperature of the water to be used in subsequent batches if the mixed-dough temperature obtained is different from that desired.

(b) *Hand mix.* Procedure is the same as for machine mixing except that, especially where only small quantities of bread are baked daily, each batch of dough mixed by hand should contain not more than 30 pounds of flour (the other ingredients being present in proper proportion). For example, if it is desired to produce approximately 160 pounds of bread (requiring approximately 100 pounds of flour), four batches are mixed by hand. All ingredients for all batches should be weighed before starting the mix, so that the different batches will be mixed at about the same time, in which case they may be placed in the same dough trough for fermentation. This procedure is desirable in order to insure a thorough incorporation of ingredients and development of gluten in flour. The proper hand mixing of larger batches by one individual requires considerable experience and strength.

(2) *Sponge and dough.*

(a) *Machine mix.* Follow the same procedure as for straight dough using only sponge ingredients. A sponge is usually slackier than a straight dough. When fermented sponge is ready for remixing with dough ingredients, proceed as follows:

1. Place fermented sponge in mixer and start mixer on slow speed so as to gradually and gently break up the sponge.

2. **Stop mixer.** Add dough water in which the dry ingredients other than flour (such as the remainder of the sugar, salt, and dry milk) have been dissolved. Start mixer and continue mixing until all ingredients are thoroughly incorporated.

3. **Stop mixer.** Add miscellaneous dough ingredients, such as raisins, prunes, peanut butter, etc.

4. **Add dough flour and dough shortening and continue mixing until sponge and dough are properly mixed.**

(b) **Hand mix.** Procedure is the same as for machine mix, except that the combined weight of fermented sponge and dough ingredients should, when practicable, be limited to 50 pounds in order to insure proper mixing and thorough incorporation of ingredients.

d. **Comparison of methods.** The use of either of the methods given in b above will result in the production of bread of good quality, provided ingredients of good quality are used in the proper proportion and the dough is handled properly throughout the fermentation, make-up, proofing, and baking periods. However, except where a small quantity of one type of bread is being baked, it will be found advantageous to use the sponge and dough process. Especially is this true where a variety of bread products is being baked. Other things being equal, the principal advantages obtained from the use of sponge and dough instead of a straight dough are larger volume and whiter color of crumb. These advantages are gained by reason of better development and expansion of gluten caused by slackness of dough in the sponge and by withholding from the fermenting sponge those ingredients which would have a tendency to retard or lessen effectiveness of fermentation.

e. **Effects of over and under mixing.** Too much emphasis cannot be placed on the importance of the proper mixing of each dough. The determination of proper mix is by "feel" of the dough. The proper "feel" is determined only as the result of experience, therefore no definite mixing time can be stated; it varies considerably, depending upon whether it is a hand mix or a machine mix and, in the latter case, whether a high-, medium-, or low-speed mixing machine is used. The weight of the dough batch also considerably affects the time required to obtain a proper mix. In the sponge and dough method, neither the sponge nor the sponge and dough is mixed as long as a straight dough; as there are two mixings in the sponge and dough process, obviously less mixing of each is necessary. Any grittiness, hardness, or dry flour feeling to the dough is evidence of undermixing; an undermixed dough will result in irregular fermentation and the finished loaf will invariably have a streaky crumb and an uneven, coarse cell structure. If dough is overmixed, it weakens and tears the gluten as a result of rapid excessive stretching. This condition is reflected in the finished loaf by poor volume and inferior grain and texture.

30. **Dough temperature.** Except in emergencies or when it is desired to materially lengthen or shorten the regular fermentation period of a dough, every effort should be made to obtain a mixed-dough temperature of between 78° and 82° F., as this is the best temperature for normal fermentation. The procedure to obtain this temperature is explained in paragraph 29. The continuation of the mixing of a dough until it has reached the desired temperature and notation of results obtained in the finished product will be a good guide in making subsequent adjustments in either length of time for mixing or degrees of friction allowed.

31. **Fermentation of a dough.** a. **Definition.** Fermentation may be defined as the chemical action that takes place in a dough, causing it to expand or increase in volume. Chief among the chemical actions that take place during fermentation are formation, expansion, and mellowing of the gluten content of the dough; the breaking down of sugar within a dough into carbon dioxide and alcohol, caused by yeast activity. The gluten develops a rubber-like tenacity and tends to hold within and between the starch cells the carbon dioxide formed by the yeast, thereby causing an expansion but not a rupture of the cell structure.

b. **Requirements for proper fermentation.** After a dough is mixed, it is placed in a lightly greased dough trough for fermentation. Generally the space available in a dough trough should be four times as large as the volume of the freshly mixed dough. If the dough trough is considerably larger than four times the volume of the mixed dough, the dough should be confined to the required space by use of dam boards. If the available space in a dough trough is insufficient,

the dough, on rising, will overflow. If too much dough space is allowed, the dough will spread out horizontally instead of rising vertically. A vertical rising of fermenting dough is desired. The control of temperature and humidity in the cabinet or room where dough is fermenting is extremely important. If the air is dry, a crust will form on top of a fermenting dough, resulting in bread of poor quality. Applying heat to a pan or pans of water placed in the immediate vicinity of the fermenting dough will help to provide the necessary humid condition if a water spray fan is not available. Frequent punchings of the dough will tend to prevent crusting. The ideal temperature of a fermenting room or cabinet is 80° F. Every effort should be made to secure and maintain a temperature approximating 80° F. during fermentation unless lower or higher temperatures are expressly desired to purposely retard or hasten fermentation.

32. Fermentation periods. Fermentation starts immediately when yeast is incorporated into a bread dough and continues until all yeast activity is killed by the action of excessive heat, which is usually about 5 minutes after the dough is placed in the oven or when the temperature of the dough exceeds 120° F. Although fermentation is constantly going on during the period stated, it is customary to divide this total time into various periods known as fermentation period; make-up period; proofing period; and baking period. In the sponge and dough process, it is customary to refer to the sponge fermentation period; sponge and dough fermentation period; make-up period; proofing period; and baking period.

a. Fermentation period for straight doughs. The fermentation period is the period elapsing between the time at which the yeast is incorporated and the time when the dough is ready to be divided into individual loaf weights. This length of time will vary, depending upon the percentage of yeast and sugar in the dough, temperature of the mixed dough, and temperature and humidity of the fermentation room. The fermentation period is subdivided into time of first punch; time of second punch; and time of dividing. When normal quantities of yeast (1 to 2 per cent), normal quantities of sugar (2 to 4 per cent), and normal temperature of mixed dough (78° to 82° F.) obtain, the time when the first punch is made is calculated as 60 per cent of the total fermentation period and the time at which the dough is to be divided is at the expiration of the remaining 40 per cent. The punching of the dough at least once between the time of first punch and the time of dividing is desirable, but not essential. When dough is punched more than once, an arbitrary time is set between the time of first punch and the time of dividing and is known as "second punch time."

Example:

Time of mix 9 A.M.
Time of first punch 11 A.M.

Total time elapsing 2 hours or 120 minutes.
120 minutes equals 60 per cent of fermentation period.

1 per cent is $\frac{120}{60}$ or 2 minutes.

100 per cent is, therefore, 200 minutes, or 3 hours and 20 minutes.

Time consumed to first punch equals 60 per cent or 120 minutes.

Remainder of time for the fermentation period equals 40 per cent or 80 minutes.

Time when dough is to be divided is 11 A.M. (time of first punch) plus 80 minutes, or 12:20 P.M.

The time for making the second punch is arbitrarily set at any convenient period, generally halfway between the first punch and the time for dividing; in the foregoing example, at 11:35 A.M.

(1) *Determination of time for first punch.* The time to make the first punch is the only part of the fermentation period which depends almost entirely upon personal judgment. Under ordinary circumstances, the first punch will be made at from 1½ to 3 hours after the time of mixing. The exact time for making the punch may be determined by inserting the fingers gently into the top of the dough to a depth of from 1 to 2 inches and closely observing the dough when the fingers are withdrawn. If the surface of the dough falls rapidly, the time to make the first punch has passed and the dough should be punched without further de-

lay. If the indentation of the dough caused by the fingers tends to come back, the dough is not yet ready for the first punch. When the proper fermentation stage has been reached, the dough will neither collapse nor come back, but immediately around the depression, cracks will form and the surface near the depression will be seen to sink slightly. This condition can be determined readily with a little experience. Carefully note the time when the first punch is made, and, by following the procedure as outlined in the example, the proper time at which the dough is to be given additional punches and the time when it should be divided into individual loaf weights may be readily determined.

(2) *Reasons for punching.* While it is not considered essential to punch a dough during the fermentation period, it is advisable to do so for the following reasons:

(a) During the process of punching, the dough at the bottom of the trough is brought to the top and that at the top is changed to a bottom or center position, thereby equalizing temperature throughout the dough, resulting in more thorough and uniform fermentation.

(b) Yeast food is brought in contact with yeast cells, which might not have happened if the dough had not been punched.

(c) Some of the carbon dioxide that has been formed is expelled. Excessive amounts of carbon dioxide have a retarding effect on yeast activity.

(d) Additional air is incorporated into the dough, thus accelerating yeast activity.

(e) Development of gluten is aided, thus creating desired tensility.

b. *Make-up period.* The term "make-up period" in bakery parlance includes the operations of dividing and scaling the dough, rounding it, giving it an intermediate proof, and molding and panning it.

(1) *Dividing and scaling.* When a dough has had its fermentation period, it is removed from the fermentation trough and sent to the mechanical dividing machine or to the workbench, as the case may be, for dividing and scaling. If a machine is used for this purpose, care should be taken to insure that it is properly adjusted so as to divide the dough into exact desired weights. Frequent check should be made by weighing pieces cut by machine to insure accuracy. If dividing is accomplished by hand, a dough cutter and counter scale are used. The purpose of dividing is to cut the mass of fermented dough into individual pieces of desired weights. As there is a loss in weight of from 10 to 12 per cent during baking, this loss must be taken into consideration when dividing dough. In general, 18 ounces of dough will produce one pound of finished bread.

(2) *Rounding and short proof.* The scaled dough pieces may be molded into loaves immediately, but it is customary in bakery operation to first round the individual pieces and allow them to remain on the bench or in a so-called "short-proof" cabinet for a period of 15 to 20 minutes in order to loosen up the dough. This operation is generally referred to as the "short" or "intermediate" proof.

(3) *Molding.* Upon completion of the intermediate proof, the individual dough pieces are molded into the shape desired for the finished loaf. Molding is not a difficult operation but requires some experience to attain proficiency in the work. There is no hard and fast rule to follow in molding bread. Different individuals may mold in different ways and yet secure the same result. In general, the piece of dough should be pounded flat into a rectangular shape; be free from large gas pockets; folded in two from top to bottom; the sides stretched slightly, then folded toward center, so as to have the desired pan length. The dough is then rolled from top to bottom, care being taken to close up all seams, using either the knuckles or the heel of the hand to obtain a good seal.

(4) *Panning.* The molded loaves are immediately placed in bakepans with the sealed edge down. The bakepan should be lightly and uniformly greased on the interior, sides, and bottom. The number and arrangement of the loaves in the pans depend upon the size and shape of the pans. In the majority of Army bakeries the 1-pound individual-loaf pan is now used for the baking of all varieties of bread and it is proposed to discontinue entirely the use of the 2-pound pans. The 1-pound pans are strapped in sets of four for convenience in handling.

c. *Proofing period.*

(1) The panned molded dough is placed in a proofroom or cabinet for proofing. In the larger bakeries, iron racks mounted on rollers are provided to receive the pans as they are made ready for the proofroom. The proofroom,

which should be free from drafts and heated to a temperature of about 90° F. or higher by free steam, is made ready to receive the racks which are wheeled into it. It has already been noted that, up to a certain temperature, proofing or fermentation is accelerated by heat. The temperature of the proofroom or cabinet being greater from the floor toward the ceiling, the pans first filled should be placed on the bottom shelf of the proof rack and the others on the next higher shelves as they are filled.

(2) These facilities are not found in smaller bakeries and proof boxes are provided instead. The boxes should be practically airtight and, if proof racks are provided, of proper size to receive them. If proof racks are not provided, boxes should be made with shelves of narrow slats to permit free circulation of such steam as may be provided. Often a pan of water is placed on the bottom shelf, and when the proof box is filled, hot bricks are dropped into the pan of water to create steam, which should be present during the proofing of the loaves.

(3) If gas is provided, a better method is to let the jet play upon the bottom of the pan which is conveniently exposed beneath the box. If steam is not provided, the tops of the loaves should be lightly greased to prevent the formation of a crust.

(4) If proper size pans are used and dough is properly molded, the loaves should generally occupy about one-half the depth of the pan. When the loaves have about doubled in size, that is, when they are about on a level with the top of the pan, or slightly higher, they are ready for the oven. The proofing period generally lasts from about 30 to 60 minutes, depending upon size of loaf and the temperature and humidity of the proof cabinet. Proofing may be delayed or accelerated by decreasing or increasing the temperature of the proof box but, except in emergencies, bread should be given a normal proof period.

d. Baking period.

(1) Care must be exercised to have the oven ready at the proper time. The proper temperature for baking bread is from 400° to 450° F. In order to insure uniform baking of all loaves, the pans of dough must be properly spaced so as to insure a uniform distribution of heat to sides and ends of each pan. If pans are permitted to come in contact with each other, the sides of the loaf where contact is made will be underbaked when the other portions are properly baked.

(2) Care must be exercised not to jar the pans when placing them in the oven, as this might cause the proofed loaves to fall. They will not have time to rise again before the yeast is killed by oven heat and the resulting bread will be small in volume and of poor texture.

(3) During the fermentation, make-up, and proofing periods, the yeast has been working continuously and the carbon dioxide gas has produced the increased size and porous structure of the dough. During the first few minutes of baking, the yeast functions more vigorously and more rapidly than at any previous stage in the bread-making process. However, when the temperature of the dough, due to heat of the oven, reaches above 120° F., the yeast is killed and further fermentation ceases. The carbon dioxide gas present within the dough is greatly expanded, due to oven heat, causing a further very rapid rise in the dough. This rapid rise of dough in the oven is known as "oven spring." The alcohol produced by the action of yeast on sugary constituents of the dough is quickly evaporated by the heat of the oven and escapes from the dough into the oven in the form of vapor.

(4) After a dough has attained its oven spring, its pliability gradually lessens and the dough becomes "set." There is a gradual conversion from dough to bread. This conversion is due to the fact that some of the moisture is driven off, the starch becomes gelatinized and more digestible, and the gluten and other proteins become coagulated.

(5) Following the "setting" of the loaf, the crust is formed. The forming of a crust is due to the intense heat to which the outside of the loaf has been subjected and its consequent drying out. The brown color is due to the drying out of the exposed surface and to a certain chemical change in the starch and sugar, known as "caramelization." Within the loaf the conditions are slightly different. The crumb near the crust is subjected to a temperature as high as 300° F. or more, being bathed in superheated steam. The temperature gradually decreases toward the center, where it never rises above 212° F. Under the action of this temperature, the gluten becomes sufficiently stiff to give permanent shape

and form to the loaf and to retain the cellular structure even after the gas which has produced it escapes. From the foregoing, it is easy to understand why the crumb of the bread presents such a uniform appearance throughout, instead of being baked to different degrees of hardness from the crust toward the center as one might very naturally expect.

(6) The browning of the crust should start in from 10 to 20 minutes after the loaves are placed in the oven. If the oven is too hot, the crust will become dark and thick before there has been sufficient time for the dough within to become properly baked. If the oven is not hot enough, a rubbery, pale crust may be formed. In addition to temperature of the oven, the color of crust obtained depends upon the quantity of unfermented sugars present in the dough. The high heat of the oven caramelizes these sugars, imparting a golden brown color to the crust. If an excessive quantity of unfermented sugar is present in the dough being baked, a very dark brown crust may be expected.

(7) The time of baking in a temperature of from 400° to 450° F. may be assumed to be about 30 to 35 minutes for a 1-pound loaf in individual pans.

33. Steam in oven. Every effort should be made to provide steam to be used in the oven during baking. If steam is used, it will tend to prevent too rapid formation of crust and excessive loss of moisture, and will cause the formation of a gloss or desirable shiny surface. In lieu of steam, tops of individual loaves may be slightly moistened with water or liquid shortening before being placed in oven. When the amount of steam entering the oven can be controlled, it should be turned "on" while loading the oven and "off" about 5 minutes after completion of loading. For hearth products, such as rye and Vienna bread, it is practically essential that steam be used in the oven if "wild breaks" are to be avoided and the glossy crust, so desirable in such products, is to be obtained.

34. Cooling bread. It is essential that bread be properly cooled immediately after it is taken from the oven and before it is issued or sold, in order to prevent possible mold or rope growth. After bread has been subjected to the heat of the oven for a period of ½ hour or more, it is practically sterile and every precaution should be taken to keep it so. The bread should be removed from the pans and placed on cooling racks sufficiently apart to insure free circulation of air on all sides of each loaf. If cooling racks are not available, place the bread on a slatted table. Under ordinary conditions, 2 hours of cooling in a room the temperature of which does not exceed 85° F. will suffice. When conditions require it, clean cloths of porous material should be spread over the loaves to keep off dust and prevent insect infestation.

35. Storage of bread. When a bread room is provided, the loaded bread racks may be wheeled directly into it. Good ventilation should be provided. If movable bread racks are not available, a rack should be built of slatted shelving. Bread boxes, unless slatted on sides and top, should not be used. They are difficult to ventilate and may be the cause of early moldiness in bread.

SECTION V

BREAD FORMULAS

36. Percentage method. The percentage method for bread formulas is based on the assumption that the weight of flour used in any formula equals 100 per cent. The weight of the other ingredients to be used in the bread dough is expressed in percentage form, based on the weight of the flour used.

37. Garrison bread. a. Formula and procedure.

(1) Using compressed yeast.

(a) Straight-dough method.

1. Formula (to produce about 160 pounds of baked bread).

	Per cent	Pounds
Flour	100.00	100
Water (tempered)	65.00	65
Yeast	2.50	2½
Salt	2.50	2½
Sugar	4.00	4

	Per cent	Pounds
Malt (optional)	1.00	1
Shortening	5.00	5
Milk, dry skim, powdered	4.50	4½
Mineral yeast food (optional)	.25	¼

Note. Water absorption may vary. Use the necessary quantity (more or less than 65 pounds) to get desired dough consistency.

2. Procedure.

(a) For machine mixing.

(1) Weigh accurately all large and small ingredients.

(2) Temper the water to get a dough temperature of 78° to 80° F.

Friction of machine is a factor.

(3) Suspend the yeast in sufficient water.

(4) Pour the remaining water into the mixer and add sugar, malt, milk, salt, and yeast food.

(5) Let the mixer revolve a few times to dissolve the ingredients.

(6) With the machine in motion, add approximately one-half of the total flour.

(7) When a batter is formed, add the yeast solution.

(8) Add remainder of flour.

(9) While the mixture is still lumpy, add shortening.

(10) Continue mixing until dough is of proper consistency.

Note 1. Malt extract may be added to the yeast solution if necessary. Do not permit yeast and malt to remain in contact more than 5 or 10 minutes.

Note 2. If dry milk is used, recondition about 30 minutes before using.

(b) For hand mixing. Proceed the same as for machine mixing, except that each batch of dough mixed by hand should contain not more than 30 pounds of flour (the other ingredients being present in proper proportion). For example, if it is desired to produce 160 pounds of baked bread requiring 100 pounds of flour, four batches are mixed by hand. All ingredients for all batches should be weighed before starting to mix so that the different batches will be mixed at about the same time, in which case they may be placed in the same dough trough for fermentation.

(c) Fermenting the dough.

(1) If the dough made from the formula comes out of the mixer at a temperature between 78° and 82° F. and is fermented at the same temperature, the fermentation time should be calculated on the first rise 80/20 fermentation ratio. If no yeast food is used, rise 60/40 fermentation ratio should be used. (Dough should be kept on the young side. Fermentation ratio should be varied until the best result is obtained.)

(2) At the end of the fermentation period, divide (scale) into 18-ounce pieces, round up, give short proof (12 minutes), pan, proof, and bake. Proofing time should be about 50 minutes.

(b) Sponge and dough method.

1. Formula.

(a) For the sponge.

	Per cent	Weight
Flour	60.00	60 lb.
Water	39.00	39 lb.
Yeast	2.50	2½ lb.
Salt	.3125	5 oz.
Malt	.25	4 oz.
Shortening	4.00	4 oz.
Yeast food	.25	4 lb.

(b) For the dough.

Flour	40.00	40 lb.
Water	26.00	26 lb.
Salt	2.1875	2 lb. 3 oz.
Sugar	4.00	4 lb.
Malt	0.75	¾ lb.
Milk, dry skim, powdered	4.50	4½ lb.
Shortening	1.00	1 lb.

2. Procedure.

(a) *Mixing the sponge.* Proceed same for straight dough procedure (a) 2 above, using the sponge ingredients. Dough should be very slack but not sticky and should come out at 76° to 78°.

(b) *Fermenting the sponge.* Allow the sponge to rise once and fall once. When it has risen again and almost doubled its volume for the second time, bubbles will break on the surface of the sponge and it is nearly ready to fall for the second time. Then is the time to mix it with the other ingredients to make the dough. The total time for the sponge to ferment as described should be about 3½ hours.

(c) *Mixing the dough.*

(1) Place the remainder of the water (dough portion) tempered to get a temperature of 78° to 80° in the mixer. (Temperature of the sponge is a factor in tempering the water.)

(2) Add all the ingredients of the dough except shortening and flour. Dissolve by a few turns of the mixer.

(3) Add the fermented sponge and mix thoroughly into a thin batter or until the sponge is well broken up and no stringy portions remain. The addition of a small quantity of dry flour taken from the flour reserved for the dough will keep down splashing and whirling of the sponge.

(4) Add the remainder of the flour and add the shortening when the mass becomes lumpy.

(d) *Fermenting the dough.* Allow the dough to stand in a dough trough for about 30 minutes, or if speed is desired, it may be placed directly on the bench, covering with a damp cloth to prevent crusting, and let rest about 15 or 20 minutes. Then divide, round up, give short proof, mold, pan, proof, and bake as for straight dough.

(e) *Hand mixing.* Proceed same as if mixing by machine, except that each batch of dough mixed by hand should contain not over 30 pounds of flour.

(c) *Quality of bread produced.* On account of the percentages of sugar, malt, milk, and shortening, bread made from this formula has a golden brown (not pale) crust, a creamy white crumb color, a velvety texture, and excellent flavor. If it does not have these characteristics, it was not properly made in the bakery. It will retain its moisture for several days after baking, if not cut, and does not dry out as readily as bread made with no milk or malt and less sugar and shortening. Bread produced by this formula, when properly made, is of excellent quality, entirely satisfactory for sale to individuals as well as to organizations, and eliminates the necessity for mixing a separate dough for white sales bread.

(2) *Using dried yeast (100-pound flour basis).*(a) *Straight dough method.*

1. Formula.

	Per cent	Weight
Flour	100.00	100 lb.
Water	66.00	66 lb.
Yeast (dried)	.80	13 oz.
Salt	2.00	2 lb.
Sugar	5.00	5 lb.
Shortening	4.50	4½ lb.

2. Procedure. Dissolve 13 ounces of dried yeast in about 8 pounds of water tempered to 80° F., for 1 hour. Mix the other ingredients and finish mixing with the dissolved yeast. Allow the mixed dough to ferment for 10 hours at a temperature of 80° F. Punch the dough and give an additional 45 minutes of fermentation. Scale or divide into pieces of desired weight, round up, give 15 minutes intermediate proof, mold, and proof for approximately 1 hour. Allow to bake in 450° oven from 35 to 45 minutes.

(b) *Sponge and dough method.*

1. Formula.

(a) *For the sponge.*

	Per cent	Weight
Flour	30.00	30 lb.
Water	25.00	25 lb.
Yeast (dried)	.80	13 oz.

(b) *For the dough.*

	Per cent	Pounds
Flour	70.00	70 lb.
Water	41.00	41 lb.
Salt	2.00	2 lb.
Sugar	5.00	5 lb.
Shortening	4.50	4½ lb.

2. *Procedure.* Dissolve the yeast in about 10 pounds of the sponge water tempered to 80° F., for 1 hour, then add the remainder of the sponge water at the same temperature. To this liquid solution add the sponge flour and mix so as to obtain a soft sponge. Let the sponge stand at a temperature of 78° F. for about 8 hours. At the end of the sponge fermentation period, mix the fermented sponge with the dough ingredients and allow the sponge and dough to ferment for 2½ to 3½ hours. Give the dough a punch and let rise again for another hour. Scale the dough into pieces of desired weight, round up, give short intermediate proof, and mold. Proof at 85° to 90° F. for from 50 to 80 minutes. Bake in 450° oven for from 35 to 50 minutes, depending upon weight of the loaves.

Note. The foregoing formulas are considered maximum requirements for the production of satisfactory bread. When necessary, they may be modified to meet local conditions.

b. *Variety of shapes.*

(1) *Round top loaf.* The commonly used shape of garrison bread is referred to as "round top" shape. Round top bread conforms to the shape of the pan in which it is baked with the top crust having a rounded shape, caused by the unhindered expansion in all directions of the carbon dioxide gas contained in the dough. This shape may be altered in many ways, three of which are described in (2), (3), and (4) below.

(2) *Split top loaf.* Formula and procedure are the same as in *a* above up to molding. Instead of scaling the dough into 18-ounce pieces for a 1-pound loaf, scale into 9-ounce pieces. Mold each 9-ounce piece the same as an 18-ounce piece. Place two 9-ounce molded dough pieces side by side in the bake pan, care being taken to have both pieces molded to the same size and shape and to place the seams of the molded pieces to the bottom of the pan. Proof and bake in the manner described in *a* above. During proofing, the two molded pieces will rise simultaneously but will show a depression along the center where the two pieces join. In the finished product there will be a "break and shred" along the center of the loaf which adds to its attractiveness.

(3) *Twist loaf.* Formula and procedure are the same as in *a* above, up to molding. Instead of scaling the dough into 18-ounce pieces for a 1-pound loaf, scale into 9-ounce pieces. Mold each 9-ounce piece in the same manner as an 18-ounce piece. The services of two men are advisable to twist the molded pieces. Each man grasps one end of each of two molded pieces and, by overlapping the hands, twists them until four to six twists are made. The ends are then pressed together and the twisted dough placed in the bake pan. Proofing and baking are the same as in *a* above. The finished product will show the characteristic twist on the top crust of the loaf. The twist loaf not only provides for variety in shape but also improves the grain of the loaf, reduces the probability of holes in the bread, and gives the finished loaf a firmer texture.

(4) *Pullman bread.* Pullman or sandwich bread may be made by the formula and procedure described in *a* above. It is called Pullman or sandwich bread because the molded loaf is proofed and baked in a so-called Pullman pan. The pan differs from that ordinarily used in that it is rectangular in shape, with vertical sides, and is provided with a slip-top flap cover. The dough is molded, panned, and proofed the same as for round top bread. When the proofing dough has risen to within ½ to ¼ of an inch from the top of the pan, the slip cover is inserted and the pans placed in the oven. The "oven spring," caused by the rapid expansion of the carbon dioxide gas within the dough, forces the top crust of the dough against the pan cover, which prevents further rising and results in a flat-top, square-cornered, finished loaf. Care should be taken to lightly grease the inner side of the cover as well as the sides and bottom of the pan before placing dough therein, as failure to do so will cause the top crust to stick to the cover, making it difficult to remove the baked loaf from the pan.

38. Whole wheat bread. United States Government standards require that the entire flour content of a loaf of bread which is to be labeled and sold as "whole wheat bread" shall be whole wheat flour. If a blend of whole wheat flour and some other flour (such as patent or straight, etc.) is used, it must be labeled "imitation whole wheat bread," "partial whole wheat bread," or some similar designation which will readily indicate that at least part of the flour content used in making the bread is other than whole wheat flour. Good palatable bread may be made by using 100 per cent whole wheat flour and is very desirable for use when such articles as fresh fruits and leafy vegetables are not available for the diet. The whole wheat flour helps to supply the mineral and roughage requirements so essential to a properly balanced diet. When roughage and mineral requirements of the diet may be readily supplied from other sources, it is advisable to use part whole wheat flour and part straight or patent flour in making partial whole wheat bread in order to secure better volume and improve the grain and texture of the finished loaf. The use of all whole wheat flour tends to produce a very crumbly interior, resulting in difficulty in properly slicing and spreading with butter, etc. The characteristic color and flavor of whole wheat bread may be obtained by using from 40 to 60 per cent whole wheat flour and the remainder straight or patent flour.

a. *Straight dough method* (50 per cent).

(1) *Formula.*

	Per cent	Pounds
Whole wheat flour	50.00	50
Issue flour	50.00	50
Water (variable)	62.00	62
Malt	2.00	2
Salt	2.00	2
Sugar	3.00	3
Milk, dry skim, powdered	3.00	3
Shortening	5.00	5
Yeast	3.00	3
	180.00	180

(2) *Procedure.* Dough out of mixer at 80° F.; medium consistency; fermentation, normal, 60/40 basis; intermediate proof 10 minutes. Proof, normal (may be cut down somewhat if bread is too crumbly or gets too old).

b. *Sponge and dough method* (50 per cent).

(1) *Formula.*

(a) *For the sponge.*

	Percent	Pounds	Ounces
Flour, whole wheat	30.00	30	
Flour, issue	30.00	30	
Water	60.00	36	
Yeast	2.50	2	8
Malt	2.00	2	
Yeast food	0.25		4

(b) *For the Dough.*

Flour, issue	20.00	20	
Flour, whole wheat	20.00	20	
Water (variable)	60.00	24	
Salt	2.50	2	8
Milk	3.00	3	
Shortening	5.00	5	
Sugar	4.00	4	

(2) *Procedure.* Mix sponge ingredients thoroughly and allow to ferment for from 3 to 3½ hours. Mix fermented sponge and dough ingredients thoroughly and give an additional half hour of fermentation. Scale dough into pieces of desired weight, round up, give 15-minute intermediate proof, mold, and proof until dough is even with, or slightly higher than top of pan (approximately 45 to 55 minutes for 1-pound loaf). Bake in 400° to 450° F. oven for from 30 to 35 minutes. Do not expect the same volume or "oven spring" from whole wheat bread as from the same weight or size of sales or garrison bread. Whole wheat flour, being comparatively weak in gluten content as compared to patent or straight flour, tends to produce a more compact loaf.

Notes.—These formulas are considered maximum requirements for the production of satisfactory bread. When necessary, they may be modified to meet local conditions.

If other than dry skim milk is used such as milk, evaporated, or whole milk, use table of equivalent. It should be remembered that water content of milk, evaporated, or whole milk should be considered and reduction in water content made accordingly.

It is important that whole wheat flour and other flour used be thoroughly blended so as to prevent alternate dark and light streaks in crumb. Dough in which whole wheat flour is used should be mixed slightly longer than dough containing only white flour.

39. Rye bread. Rye bread is made by using a blend of rye flour and wheat flour with the other ingredients generally used in making bread. Although there is no limitation as to the quantity of rye or wheat flour to be used in the blend, best results for volume, characteristic taste, and good texture are obtained by using approximately 30 per cent rye flour and 70 per cent wheat flour. If dark rye flour is used, the resultant product will have a dark rye color; if white rye flour is used, the resultant product will have the characteristic rye taste but will be rather light in color. A rye blend, composed of part dark and part white rye flour, is used commercially to a considerable extent and is known as medium rye flour. Rye bread may be baked in the pans used for garrison bread. The making of rye bread should be encouraged as it provides variety in the bread component of the diet and is well liked by a majority of people. Furthermore, every Army baker should be thoroughly familiar with the making of rye bread for the reason that, in times of emergency (especially when a shortage of wheat flour exists), it may become necessary to substitute large quantities of rye bread for wheat bread.

a. Suggestions for making.

(1) A dough containing rye flour should receive much less mixing than a 100 per cent wheat flour dough as the gluten is not as strong and will not stand as much stretching without being considerably weakened. For all practical purposes, as soon as the dough feels smooth and tends to pull away from the sides of the mixing bowl, it may be considered as sufficiently mixed. Overmixing of rye dough will result in poor volume and the presence of a considerable number of large and small holes in the crumb, and will invariably result in bursting or splitting the sides of the loaf, due to overstretching of the gluten. Likewise, due to inferior quality of gluten, rye dough should receive a shorter fermentation period than wheat flour dough. As the kind and quantity of rye flour, temperatures used, and other local conditions will vary considerably, no set fermentation period can be given. Rye doughs always have a much denser or heavier feel than wheat doughs and for this reason the tendency will be to consider rye doughs as not fully fermented when, in fact, they may be over fermented. As slightly under fermented rye doughs will produce better results than an over fermented dough, the tendency should be to take them on the young side, that is, to scale the dough preparatory to molding while the dough is still slightly under fermented.

(2) Similarly, the proofing of rye doughs requires less time, under the same temperature and humidity conditions, than wheat doughs. In comparison, if an 18-ounce wheat flour dough requires 50 minutes for proper proofing, the rye flour dough will require only 30 to 35 minutes.

b. Pan type (straight dough method).

(1) Formula.

	Per cent Pounds	
Rye flour (dark)	20.00	20
Issue flour	80.00	80
Water (variable)	58.00	58
Malt	2.50	2½
Salt	2.00	2
Shortening	2.50	2½
Yeast	3.00	3
	168.00	168

Caraway seed (optional).

(2) *Procedure.* Thoroughly mix or blend the wheat and rye flours. When the blended flour is added to other ingredients in the mixer, avoid overmixing. A rye dough requires only about half as much mixing as a white bread dough. Dough out of mixer at 76° to 78° F.; medium consistency; fermentation, let rise until ready for first punch; punch or turn dough, then give 30 minutes more. Fermenting on

the 75/25 basis is about right. Intermediate proof 10 minutes. Give bread a full proofing in the proof box. Care must be taken to see that the dough is taken on the young side. For pan type, rye bread dough is molded the same as garrison bread. Place the molded loaves in lightly greased pans and allow to proof. When the dough has doubled in volume or the top is even with or slightly under the top level of the pan, it is ready for the oven. Brush the top of loaves with rye wash (if steam for the oven is not available) and bake at 400° to 450° F. from 30 to 45 minutes, depending on temperature of the oven and weight of the loaf. As temperature of the oven decreases or weight of the loaf increases, the baking time increases.

40. Raisin bread. The addition of raisins to the ingredients of bread lends attractive variety, adds nutritive value to the loaf, and is an excellent way of providing a fruit component in the diet. Federal standards require that, to be labeled and sold as "raisin bread," each pound of bread must contain not less than 3 ounces of raisins. Stated in percentage based on weight of flour, this means that the formula for raisin bread should show the incorporation of at least 35 per cent raisins; that is, for every 100 pounds of flour used in the dough, not less than 35 pounds of raisins should be used. The same proportion should be used for greater or lesser amounts. As much as 65 per cent of raisins may be incorporated in a dough without lessening the quality of the bread. When more than 65 per cent is used, the tendency is to produce a loaf of small, compact volume, rather heavy to the feel, and unattractive to the average person. Raisins used in bread should be of the seedless variety.

a. Incorporation of raisins in dough. Raisins to be used in a dough should be soaked in water for from 30 to 45 minutes prior to the time they are added to the dough. Drain off all excess water before incorporating into the dough and do not add until the last 2 minutes of mixing, especially if a high-speed mixer is used. Too long or too rapid mixing of raisins in a dough tends to tear the raisins apart, causing the finished product to be blotchy or discolored in places.

b. Formula (straight dough method).

	Per cent	Pounds
Flour (patent)	100.00	100
Water	65.00	65
Sugar	4.00	4
Salt	2.50	2½
Malt	1.00	1
Yeast	4.00	4
Shortening	5.00	5
Milk, dry skim, powdered	4.50	4½
Raisins	65.00	65

c. Procedure. One hour and 30 minutes first punch; take to bench in 30 minutes; scale at 22 ounces; proof on bench 15 minutes; pan and proof in proof box about 50 minutes; bake at 425° with no steam for 30 minutes. Ice with vanilla icing when cool.

Note. This formula is considered maximum requirements for the production of satisfactory bread. When necessary, it may be modified to meet local conditions.

41. Hard and soft rolls. As will be noted from the formulas given below, a hard roll dough differs from a garrison bread dough in that the quantities of sugar and shortening used in the hard roll dough are decreased and, conversely, in a soft roll dough the quantities of sugar and shortening are considerably increased. It will be readily seen, therefore, that the hardness or softness of the finished product, especially the crust, depends to a large extent upon the quantity or percentage of sugar and shortening used in the dough. Under the same fermentation and mixed-dough temperatures, hard roll dough should be given a longer fermentation than soft roll dough.

a. Hard rolls.

(1) *Formula.*

	Per cent	Pounds
Flour	100	100
Water	58	58
Yeast	2	2
Salt	2	2
Sugar	1	1
Shortening	1	1
Milk, dry skim	3	3

(2) *Procedure.* Same as for garrison bread up to and including completion of fermentation period, except that the dough should be taken on the old side (slightly over fermented). Scale into 1½- or 2-ounce pieces, round, give 15 to 20 minutes intermediate proof. Proof in cake pans (18" by 25"). Just before placing in the oven, give one diagonal slash across the top of each piece and if the oven is not equipped for steam, wash with cornstarch solution. If steam is available, it should be turned into the oven until the crust of the dough becomes set and has a glossy appearance.

(3) *Variations.* Hard rolls may be made into various shapes. Two of the more commonly used shapes being round, with a diagonal slash across the top crust; and rectangular, made by cutting a long molded piece of dough into pieces about 2 inches in diameter and 3 inches long.

b. Soft rolls.

(1) *Formula.*

	Per cent Pounds	
Flour	100	100
Water	62	62
Yeast	2	2
Salt	2	2
Sugar	8	8
Shortening	8	8
Milk, dry skim	5	5

(2) *Procedure.* Endeavor to obtain mixed-dough temperature of 78° to 80°. Ferment as for garrison bread but take slightly on the young side. Scale the dough into 1½- to 2-ounce pieces, round up each piece and allow to intermediate proof for from 15 to 20 minutes. Mold into shape desired, place in cakepan and proof until individual molds are about double in size. If steam is available for oven, it should be left on about 2 minutes after loading the oven. If steam is not available, brush the surface of each molded piece lightly with cornstarch wash. Bake in a 375° to 425° oven for from 20 to 25 minutes.

(3) *Variations.* Soft rolls may be made into various shapes, those more commonly used being described below.

(a) *Parker House rolls.* Scale dough into 1½-ounce pieces. Round into neat balls and allow to rest on the table, first sprinkling some dusting flour to prevent sticking to the table; by the time the last of the dough has been rounded, the first pieces will be ready for working into rolls. Place four of these pieces in a row. Use a small rolling-pin (a piece cut from a household size broomstick is the proper size) and put a crease or dent in the middle of each piece. Then brush across the creases with melted butter or a mixture of melted butter and lard; then fold over, so that the top fold is one-third shorter than bottom fold. Seal the two folds together by pressing the top lip but do not apply enough pressure to knock down. Place in well-greased bake pans about 2 inches apart. Proof for about 40 to 50 minutes at 90°F. Bake from 15 to 20 minutes in 375° to 425° oven. If the bottom surface tends to burn before the top surface is properly baked, insert an empty cakepan under the one containing the proof rolls before placing it in the oven. This is called "double panning" for baking. Brush the baked product with melted butter or shortening while still hot.

(b) *Frankfurter rolls.* Roll out rounded dough pieces with the fingers and palm of hand until they have assumed a "finger" shape. Place molded pieces in a cakepan, allowing sufficient room for the rolls to bake individually.

(c) *Hamburger rolls.* Place twenty-four 2-ounce pieces of rounded dough, evenly spaced, in a cakepan to proof. When fully proofed, press down with tray or similar object with flat bottom surface until each piece is only about ½-inch thick. Bake in a 375° to 425° oven from 15 to 20 minutes.

(d) *Crescent rolls.* Roll out fermented dough with rolling-pin until it is about ⅜- to ¼-inch thick. Cut rolled dough with a dough cutter into triangular pieces having 5- to 6-inch sides. With fingers and palm of one hand, roll toward the point of the triangle. While this is being done, pull or stretch the point of the triangle with fingers of the other hand. This method insures a tight roll. Turn ends of the rolled piece inward to form a crescent shape and place in bake pan. If desired, molded pieces may be lightly sprinkled with poppy seed. Give full proof and bake in 375° to 425° oven for from 15 to 20 minutes.

42. Short- and long-time doughs. Occasionally, due to unforeseen emergencies, it becomes necessary either to shorten or lengthen the average time required to complete bakery operations. In other words it may become necessary, due to arrival of unexpected troops, to produce in 4 hours bread of the same quality and quantity as is ordinarily produced in 7 hours. Conversely, due to necessity for conservation of yeast supply, it may be necessary to lengthen the time required to complete a particular batch of bread from 7 hours to 10, or even 12 hours. Under such conditions, and under such conditions only, should the expedients listed below be used. Ordinarily, the kind and percentage of ingredients, temperature of dough and fermentation and proof cabinets, etc., as heretofore given for respective kinds of bread should be used. The use of expedients to shorten or lengthen the time required to produce bakery products usually adds materially to the cost; and, unless expertly handled throughout, operations will result in products of inferior quality.

a. Expedients to shorten time required to complete a batch of bread. The use of any one of the expedients given below, other than an increase in yeast, will decrease the length of time required in fermentation and proof by from one-half to 1 hour. Using a combination of two or more of these expedients, or merely doubling the percentage of yeast used, will considerably decrease fermentation and proof periods.

- (1) Increase temperature of the mixed dough to not in excess of 86° F.
- (2) Increase temperature of the proofroom or cabinet to not in excess of 100° F.
- (3) Increase percentage of yeast used to not in excess of 5 per cent.
- (4) Incorporate into dough not to exceed $\frac{1}{2}$ of 1 per cent mineral yeast food.

b. Expedients to lengthen time required to complete a batch of bread.

- (1) Decrease temperature of the mixed dough to not less than 75° F.
- (2) Decrease percentage of yeast used to not less than 2 per cent.
- (3) Increase percentage of sugar used to not more than 6 per cent.
- (4) Increase percentage of salt used to not in excess of 3 per cent.
- (8) Use a stiffer dough (decrease per cent of water used by 2 to 4 per cent).

c. Short-time garrison bread (straight dough method).

(1) Formula,	Per cent	Pounds
Flour	100.00	100
Water	62-64.00	62-64
Salt	2.00	2
Sugar	4.00	4
Yeast	4.00	4
Milk, dry, skim	4.50	4½
Shortening	5.00	5

(2) *Procedure.* Endeavor to secure mixed dough temperature of 83° to 85° F. Allow to ferment for from 20 to 30 minutes with fermentation room or cabinet temperature of 90°. Scale, round, and give intermediate proof for 15 minutes. Proof at 95° F. Bake in a 450° oven.

d. Overnight garrison bread (sponge and dough method).

(1) *Formula (100-pound flour basis).*

(a) For the sponge.	Per cent	Pounds
Flour	50	50
Water	26	26
Salt	1	1
Sugar	1	1
Yeast	$\frac{1}{2}$ of 1	$\frac{1}{2}$

(b) For the dough.	Per cent	Pounds
Flour	50	50
Water	30-32	30-32
Salt	1	1
Sugar	1	1
Yeast	1	1
Milk, skim, dry	3	3
Shortening	2	2

(2) *Procedure.* Mix sponge ingredients so as to obtain mixed dough of approximately 70° F. Ferment for a period of from 7 to 9 hours during night,

at from 55° to 70° F. At the end of sponge fermentation period, mix sponge with dough ingredients and give additional 45-minute to 1-hour fermentation time. Subsequent procedure the same as for normal time garrison bread.

43. Field bread (straight dough method). The formula and procedure for field bread are placed in this section for the reason that all Army bakers should be required to familiarize themselves with them. Army bakers should also be required to make a small batch of field bread occasionally, even when serving in garrison, so as to gain the experience necessary to avoid confusion and delay when it becomes necessary to bake field bread on a large-scale production basis.

a. Formula (100-pound flour basis).

	Per cent	Pounds
Flour	100	100
Water	53-55	53-55
Yeast	$\frac{3}{4}$ of 1	$\frac{3}{4}$
Salt	2	2
Sugar	3	3
Shortening	$\frac{1}{2}$ of 1	$\frac{1}{2}$

b. Procedure. Mix ingredients thoroughly and endeavor to secure a mixed dough temperature of 78° to 80° F. Dough should be ready for first punch in from 4 to 4½ hours, and fermentation completed 1 to 1½ hours later. Scale dough into 4½-pound pieces. Round the dough and then flatten out into circular loaves about 10 inches in diameter and 1½ inches thick. Allow only approximately 15 minutes proof. Just before baking, dock the top surface of the dough in three places by inserting the thumb or stick into the dough for a depth of about 1 inch. Bake either in regulation bake pan (two loaves to pan) or in commercial cakepan (18" by 25") (three to pan). Give long, slow bake or from 1½ to 1¾ hours with oven at temperature of 450° F. The result is a circular loaf from about 11 inches in diameter and 4 to 5 inches thick, with a thick, hard crust. This hard crust, if unbroken, minimizes the probability of mold development, permits rough handling and stacking in transportation without injury, and will keep the bread fresh and palatable for a period of from 2 to 4 weeks.

SECTION VI

BREAD FAULTS; THEIR CAUSES AND CORRECTIONS

44. Scoring factors. *a.* Factors to be considered in scoring or judging bread together with their relative weights, are as follows:

<i>External appearance</i>		<i>Internal appearance</i>	
Volume	10	Grain	10
Color of crust	8	Color of crumb	10
Symmetry of form	3	Aroma	15
Evenness of bake	3	Taste	20
Character of crust	3	Texture	15
Break and shred	3		
Subtotal	30	Subtotal	70
		Grand total	100

b. A loaf of bread perfect in every particular would score 100. However, it is practically impossible to produce a loaf of bread that is absolutely perfect; relative values are therefore assigned to each factor and the loaf graded down from one to a number of points on each factor, depending upon how far the loaf deviates from perfection. In awarding points under each factor, the following characteristics should be considered:

(1) *Volume.* The volume of a loaf is its length, breadth, and depth considered from the standpoint of the weight of dough used to make the loaf. Volume may be described as excellent, good, satisfactory, too large, or too small. A loaf of excessive volume will generally be found to possess open grain and weak texture. A loaf of too little volume generally will be found to possess inferior grain and texture.

(2) *Color of crust.* Color of crust, sometimes called "bloom," refers to the top crust of a loaf of bread. The most desirable color is described as golden brown. The obtaining of a satisfactory shade is dependent mainly upon the

amount of sugar and milk present in the dough when baked and temperature at which baking takes place. Colors inferior to and other than golden brown may be described as too dark, foxy, reddish brown, grayish, pale, or straw.

(3) *Symmetry of form.* By symmetry of form is meant the extent to which the various exterior conditions of the loaf blend to make an attractive product. Some factors which detract from symmetry are too sharp or excessively rounded corners, protruding sides, sunken sides, flat top, excess or lack of width in comparison with length, low ends, and humpbacked top. The chief factors affecting symmetry of form are shape and size of the pan used for baking and the care exercised in molding the dough.

(4) *Evenness of bake.* This means the extent to which the same color or shade is obtained on all sides of the loaf. Excessive top heat in the oven or very young dough will result in dark top and pale sides and bottom. Insufficient or excessive use of grease in pans will be reflected in the color of sides and bottom of the loaf. Excessive bottom heat will cause the bottom of the loaf to burn before the top crust has attained the desired color.

(5) *Character of crust.* This may be described as the physical condition of the crust; such as tender, tough, thick, thin, smooth-surfaced, rough-surfaced, brittle, rubbery. Except in field bread, it is usually desired to obtain a tender, thin, smooth-surfaced crust. Character of crust is usually determined by pressing it with the thumb to determine thickness and rubbery or brittle texture, and tasting to determine tenderness or toughness.

(6) *Break and shred.* By break and shred is meant the extent to which the sides and ends are separated from the top crust and the presence or absence of shred in the break. The ideal condition is an even, well-shredded break on the sides and ends of the loaf. Conditions detracting from the ideal are uneven break, wild break, break on one side only, shell crust, break without shred.

(7) *Grain.* The term "grain" and "texture" are often confused. Grain is the condition of the crumb or interior of the loaf and defines the character of the cell structure and the size of the cell. The ideal grain is moderately close and firm with small, elongated, thinwalled cells. The cells should be uniform in size, evenly distributed throughout the loaf, and not larger than small bird shot. Their greatest diameter is vertical rather than horizontal. Conditions detracting from the ideal are open and loose grain; large, thickwalled cells; large holes in loaf; and nonuniformity in size of cells.

(8) *Color of crumb.* While whiteness is desirable and denotes the use of high-grade flours, the color of the ideal loaf is described as creamy white. Color is determined by examining the interior surface of a slice of bread. Colors inferior to the ideal creamy white may be described as chalky white, yellow, grey, dark, streaked, or spotted.

(9) *Aroma.* Aroma is often confused with flavor. Aroma may be described as the reaction obtained by the organ of smell, while flavor is the reaction obtained by the organs of taste. Desirable aromas obtained from bread may be described as sweet, nutty, rich, and fresh. Undesirable aromas may be described as musty, ropy, yeasty, cheesy, metallic, or sour.

(10) *Taste.* The most important attribute of good bread is a pleasing and satisfying taste. If the taste pleases, other deficiencies are minimized. If the taste is unpleasant, other desirable qualities are nullified. Taste may be best described as the reaction obtained by the taste organs of the tongue and palate. Ordinarily, desirable tastes are nutty, sweet, pleasing, and fresh. Unless specifically characteristic of the particular type of bread, tastes which detract from desirability are sour, yeasty, doughy, moldy, and ropy.

(11) *Texture.* Texture is determined by the sense of touch. It depends upon the physical condition of the crumb and, to a minor degree, is influenced by the grain. It comprises the elasticity, softness, or pliability, and smoothness or silkiness of the crumb. The texture of bread may be determined by running lightly over the surface of a slice with the tips of the fingers or by rubbing the cut surface gently along the cheek. The ideal texture is soft and velvety without weakness or doughiness. Conditions detracting from the ideal are crumblieness, roughness, lack of elasticity, and inability to resume original shape when sides or top are pressed.

45. *Common faults and causes.* Below are listed the more common faults in bread and their probable causes. In striving to eliminate faults, the baker should

not attempt to change formula, temperature, time, and other conditions simultaneously, as the fault may be due to one condition only, and the change of more than one condition may nullify the improvement. By changing one condition at a time, keeping all other conditions the same, comparative results of one change are readily determined.

a. Lack of volume.

- (1) Bread pans too large for size or weight of dough.
- (2) Insufficient yeast.
- (3) Unbalanced formula.
- (4) Insufficient or excessive mixing of ingredients.
- (5) Too much salt.
- (6) Underfermented or underproofed dough.
- (7) Extremely overfermented or overproofed dough.
- (8) Oven temperature too high to permit normal oven spring.

b. Too much volume.

- (1) Bread pans too small for size or weight of dough.
- (2) Insufficient salt.
- (3) Excessive proofing.
- (4) Oven temperature too low to stop "oven spring" at desired volume.
- (5) Slightly overfermented dough.

c. Crust color too pale.

- (1) Insufficient sugar or milk.
- (2) Dough too old.
- (3) Crusting of dough in proof box.
- (4) Lack of steam in oven.
- (5) Oven temperature, especially top heat, too low.

d. Crust color too dark.

- (1) Excessive quantities of sugar and/or milk.
- (2) Oven temperature too high, especially top heat.
- (3) Underfermented dough.

e. Crust blisters.

- (1) Careless molding.
- (2) Condensation of steam in proof box or oven.
- (3) Underfermented dough overproofed.

f. Crust too thick.

- (1) Baking period too long.
- (2) Oven temperature too low.
- (3) Deficiency of sugar.
- (4) Overfermentation or overproofing.

g. Shelling of top crust.

- (1) Use of new or green flour.
- (2) Dough too stiff.
- (3) Dough underfermented.
- (4) Lack of binder, such as malt, honey, etc.
- (5) Crusting of dough in proofing.
- (6) Underproofing.

h. Grey color crumb.

- (1) Inferior grade of flour.
- (2) Fermentation and proof temperatures too high.
- (3) Overfermentation or overproofing.

i. Streaky crumb.

- (1) Poor blending of flour.
- (2) Improper or insufficient mixing of ingredients.
- (3) Too much dusting flour in machine or molding bench.
- (4) Poor molding.
- (5) Excessive quantity or improper incorporation of shortening.
- (6) Inclusion of small pieces of scrap dough.

j. Coarse grain.

- (1) Overfermentation.
- (2) Dough too slack.
- (3) Overproofing.
- (4) Too low oven temperature.

(5) Excessive mixing.

(6) Pans too large for dough.

k. Crumbly bread.

(1) Overfermentation.

(2) Mixed dough, fermentation, or proof temperature too high.

(3) Overproofing.

(4) Oven temperature too low.

(5) Insufficient shortening.

(6) Dough too stiff.

l. Poor aroma and taste.

(1) Inferior ingredients.

(2) Improperly balanced formula.

(3) Insufficient salt.

(4) Sour dough; overfermentation, overproofing, or excessive temperatures.

(5) Unsanitary conditions in bakery.

(6) Pans not properly cleaned.

(7) Use of rancid shortening.

(8) Improper storage of ingredients.

(9) Under or over baking.

m. Poor keeping qualities.

(1) Insufficient shortening.

(2) Improper cooling of bread.

(3) Too stiff or too slack a dough.

(4) Oven temperatures too low.

(5) Poor molding.

(6) Overproofing.

(7) Unsanitary storage conditions.

(8) Excessive temperature and humidity in storage.

(9) Breaks or cracks in crust.

(10) Exposure to air of the uncrusted sides of garrison bread.

46. Faults in grain. Opinions differ as to the proper grain for bread. Some prefer a very close grain while others prefer an open, fluffy grain. For Army baking, especially for garrison bread, a grain midway between the very close and the open grain is desired. Too open a grain is generally due to incorrect fermentation. In the case of too short a fermentation period, the open grain is due to the presence of rather thick cell walls caused by the dough not being sufficiently matured to form thin cell walls. In the case of a dough that is given too long a fermentation, the open grain is due to ruptured cell walls causing two or more cells to combine and form a large cell. The way to correct a too open grain, therefore, is to correct the fermentation period. Too close a grain is generally due to underproofing or using too much dough for the size of the bakepan. The obvious correction is to give the dough a longer proofing or to cut down the weight to accord with the size of the pans in use.

47. Faults in color of crumb. The desirable crumb color of a loaf of bread is creamy white. A chalky or dead white crumb is generally the result of using either a soft flour or a flour that has been too heavily bleached. A streaked crumb results from faulty mixing, especially when incorporating the shortening content, the use of too much dusting flour, or crusting of the dough during fermentation. By carefully watching the dough throughout the various stages of the baking operations, the exact cause of "off" color in crumb may be detected and proper corrective measures taken.

48. Faults in aroma and taste. *a.* These two qualities are closely related and together make up what is commonly called the flavor of the bread. There are only four qualities that can be detected by taste alone; sweetness, sourness, saltiness, and bitterness. All others are combinations of these and are influenced by the aroma or sense of smell. The desirable flavor of a loaf of bread may be described as a wheaty taste, slightly sweet and pleasant. An acetic or sour flavor is the result of too long fermentation or fermenting at too high a temperature. When there is no longer active fermentation in a dough, or the temperature is high enough to nullify yeast activity and encourage bacteria activity, the bacteria become more active and convert part of the alcohol formed by the yeast into acetic acid which imparts the sour flavor to bread.

b. A "cheesy" flavor is due to either the use of inferior milk or too slow fermentation of a dough that contains milk. A musty, moldy, or ropy aroma is a condition due principally to unsanitary conditions.

c. A rancid flavor can be caused only by the use of a fatty ingredient that was rancid at the time of incorporation in a dough. The use of only a slight quantity of rancid shortening will cause the rancid flavor to permeate the entire dough and the finished bread. The utmost care should be taken, therefore, to prevent the incorporation of rancid ingredients in bread dough.

d. Too salty or too flat a taste is obviously due to the use of incorrect quantities of salt in the dough. Doughiness in the crumb may result from underbaking, baking in too hot an oven, or using an improperly proportioned formula. By correcting one of these conditions at a time, the exact cause for doughiness may be determined and corrective measures applied.

SECTION VII

SWEET DOUGH, CAKES, AND PASTRY PRODUCTS

49. General. A sweet dough is, as the name implies, an ordinary flour dough made rich and sweet by using larger quantities of sugar and shortening, and by the addition of milk, eggs, spices, and occasionally fruits. The use of sweet dough provides the mess officer with a means of serving a large variety of rolls, buns, form cakes, etc., not only as a substitute for bread but also as a dessert, at a moderate cost. It is possible, by judicious use of sweet dough products, to substitute them for the more expensive foods, such as meats and expensive desserts, without sacrificing variety or necessary nutrients in the diet, and at considerably less cost.

50. Basic sweet dough. *a. Formula.* The formula given below is based on using one gallon of liquid (water, milk, or a combination of water and milk). This formula will produce approximately 33 pounds of dough which may be made up in any desired form and produce sufficient baked product to provide 4 to 5 ounces for each of approximately 100 men. The formula may be decreased to one-half, one-third, one-fourth, etc., or increased by one-half, doubled, trebled, etc., without affecting the quality of the finished product. It is called a basic sweet dough for the reason that a great variety of products may be made either from the dough itself or by using a piece of this dough as the basis for the formula of the desired product.

Ingredients

Weight

Sugar	2 lb. 8 oz.
Salt	3 oz.
Shortening	2 lb. 8 oz.
Mace	$\frac{1}{2}$ oz.
Eggs	2 lb.
Lemon extract	$\frac{1}{2}$ teaspoonful.
Water and milk (1 gallon)	8 lb. 5 oz.
Flour (bread)	13 lb.
Yeast	1 lb.
Flour (pastry)	4 lb.

(1) Ingredients must be added in the order shown in b below to secure satisfactory results.

(2) When the weather is extremely warm or bench work takes more than one hour, the salt content should be slightly increased.

(3) It is advisable to use half butter and half lard or lard substitute as the shortening ingredient. However, all lard or lard substitute may be used.

(4) An egg, minus shell, weighs approximately 2 ounces. This formula, therefore, requires the use of 16 eggs.

(5) If other than whole milk is used, use conversion table in paragraph 8, Appendix II.

(6) Although it is desirable to use both bread and pastry flour in proportions as shown, all bread flour may be used.

b. Procedure.

(1) Cream or mix the sugar, salt, shortening and mace.

REFERENCE TABLE OF INGREDIENTS

[illegible]

¹ The ordinary number of broken eggs to 1 pint is 10. This number should be increased or decreased according to size of the eggs.

² Cream sugar, salt, shortening, butter, flour, vanilla; add and cream slowly whole eggs; add milk; add and mix in flour and baking powder.

* Beat stiff egg whites, granulated sugar, cream of tartar, salt; add vanilla or flavor blend; fold in lightly. After sitting three times, powdered sugar, flour, cornstarch. Scale at 8 or 9 ounces to tin. Bake at about 300° F.

- (2) Add the eggs gradually and mix in. Add lemon extract.
- (3) Dissolve yeast in one-fourth of the liquid to be used in the dough and set aside temporarily.
- (4) Add remainder of liquid and continue mixing until a soft batter is obtained.
- (5) Add the 13 pounds of flour (bread) and continue mixing until thoroughly incorporated.
- (6) Add the yeast solution ((3) above).
- (7) Add the pastry flour and mix only sufficiently to thoroughly incorporate flour and yeast solution.
- (8) When accurate temperature control is not available, effort should be made, by tempering the liquid content of the dough, to secure a mixed dough temperature of about 78° F. in summer and 82° F. in cold weather.
- (9) When mixed, this dough will appear to be quite slack. However, due to action of the eggs and malt, it will stiffen during fermentation and will roll out readily.

c. *Fermentation.* If the temperature of the mixed dough and fermentation room or cabinet is 80° F. and the dough can be scaled and made up in desired shapes within ½ hour, fermentation time allowed should be between 1½ and 2 hours. By taking the dough on a two-thirds rise, that is, in from ¾ to 1¼ hours, the bench time for dividing and shaping dough may be increased from 1¼ to 1¾ hours.

51. Products from basic sweet dough. The variety of products that may be made from the basic sweet dough depends primarily upon the ingenuity of the baker in concocting new shapes and his ability to incorporate additional flavors, ingredients, etc., to enhance flavor and attractiveness. Varieties that are easily made and better adapted for use in Army organization messes are described below. Formulas for fillings, toppings, and icings, mentioned in the description of several products, are listed in paragraph 53.

a. *Cinnamon buns.* Scale fermented sweet dough into 5½-pound pieces. Mold each piece in the same manner as for pan bread. Let the molded piece rest on the bench for about 10 to 15 minutes. Roll out with rolling-pin so as to obtain a rectangular shape ¾ to ¾ inch thick and 15 to 18 inches wide. Wash the top surface of the rolled-out dough lightly with melted butter or shortening and then sprinkle liberally with cinnamon sugar. It is desirable, but not essential, to spread a handful of seedless raisins over the cinnamon sugared surface. Starting at the top of the rectangular surface, make a tight roll and keep on rolling toward the bottom, care being taken to insure that the roll is of the same diameter throughout its length. To assist in securing proper seal, the bottom edge of the dough should be washed or dampened with water or melted butter. Seal the dough by use of the knuckles. The dough is now in the form of a snake. Using a sharp knife or dough cutter, cut the snake into 2-ounce pieces. Place the cut pieces in a cakepan which has been lightly greased, so spaced as to evenly distribute 48 of the pieces to a pan (8 along length of the pan by 6 along the width). Place in a proof box, the temperature of which should be about 85° or 90° F. and allow to proof for from 35 to 50 minutes. When about half proofed, wash with egg wash. Bake in a 425° to 450° oven for about 15 minutes. The buns may be finished with a water icing or apricot shine. Icing or shine should be added while the finished product is still hot.

b. *Butterfly buns.* Same procedures as for cinnamon buns up to and including cutting of the snake into 2-ounce pieces. Press a circular piece of wood about ¼ to ½ inch in diameter down through the center of the uncut surface of each piece. This action will cause the cut surfaces to curl up and form a characteristic butterfly shape. Proof, bake, and finish the same as for cinnamon buns.

c. *Hot cross buns.* To each 5 pounds of fermented sweet dough add one pound of seedless raisins or mixed fruit such as raisins, citron, candied orange peel, etc., and mix thoroughly. Scale the dough into 1½-ounce pieces. Round up each piece and allow to intermediate proof on the workbench for from 15 to 20 minutes. With a sharp knife or dough cutter, make a cross on the top surface of each rounded piece. Set in cakepan (48 to 56 to a pan) and proof. When half proofed, wash lightly with egg wash. Bake in a 425° to 450° oven for about 15 minutes. Finish by filling in the cross with vanilla icing.

d. *Parker House rolls.* Using sweet dough instead of soft roll dough, follow procedure described for Parker House rolls in paragraph 42.

e. *Coffee cake* (butter-topped or streusel-topped). Roll out a 5-pound piece

of fermented basic sweet dough and place in a cakepan (18" by 25") or make individual cakes in round or square layer cakepans. Roll lightly toward sides of the pan until the whole pan is evenly covered. Dock the dough with a docker or the prongs of a fork, wash lightly with water or melted butter, and spread with butter topping or sprinkle liberally with streusel topping. Proof until doubled in depth. Bake at 350° to 400° F. from 15 to 20 minutes. After baking, cut into pieces of desired size.

f. Doughnuts. Take fully fermented basic sweet dough to floured bench. Dough should be allowed to ferment about 20 minutes longer than for usual pieces to produce a more tender article, then rolled out with rolling-pin until the dough is about ½-inch thick. Cut into doughnut shape by use of doughnut cutter. Allow to proof for about 30 minutes in a cakepan which has been floured but not greased. Fry in hot fat at a temperature of 365° to 370° F. If the dough is of proper consistency and sufficiently proofed, it will sink only about halfway into the hot fat. As soon as the submerged side is fried, it should be turned over and the other side fried to the same extent. Doughnuts may be served plain, or they may be dusted with powdered sugar to which a little cinnamon has been added for flavor, or slightly brushed with a plain or vanilla icing.

g. Fruit top coffee cake. Scale off 2½ pounds of basic sweet dough and roll out sufficiently to cover the bottom and sides of a cakepan (18" by 25"). Be sure to bring the edges of the dough up around sides of the pan. Round or square layer cakepans may be used also with good results, using 5, 6, or 7 ounces of dough to the pan, depending upon the diameter. Let proof a short time, sprinkle with cake or bread crumbs or with cornstarch and cover with any desired fresh or canned fruit. Bake in a 350° to 400° F. oven.

h. Lattice top fruit coffee cake. Made as described for fruit top coffee cake, except the top is covered with either a very thin layer, or narrow strips, of pastry sweet dough.

52. Fillings, toppings, and icings for sweet doughs.

a. Streusel topping.

Butter (soft but not melted)	1 lb. 8 oz.
Sugar, powdered	1 lb. 8 oz.
Flour	2 lb.
Mace or cinnamon to suit taste.	

Rub the mixture with the fingers until crumbly, then dry out; this may be used either as fine particles or in lumpy form.

b. Butter topping for coffee cake.

Cream together:

Sugar, powdered	2 lb.
Butter	1 lb.
Egg yolks	8 oz.

Add:

Flour	1½ lb.
Vanilla to suit taste.	
Water to make a smooth paste.	

c. Fruit filling for fruit and lattice top fruit coffee cake:

Mix thoroughly:

Sliced apples	6 lb.
Sugar, granulated	1½ lb.
Raisins	1 lb.
Ground nuts	1 lb.
Sliced or chopped citron	2 to 4 oz.
Cake crumbs	1 lb.

d. Pastry sweet dough (for strips on top of lattice top fruit cake).

Cream together:

Butter	½ lb.
Sugar, powdered	½ lb.
Whole egg	3 each
Baking powder	¼ oz.
Vanilla	½ oz.

Mix in:

Pastry flour	1 lb.
--------------------	-------

Let the dough rest in a cool place for about 1 hour. Roll out into a thin sheet and cut into $\frac{1}{8}$ to $\frac{1}{4}$ inch strips and place in latticework effect across the fruit filling in lattice top fruit coffee cakes.

e. Apricot shine.

Cook to a thick sirup:

Apricot pulp	1 qt.
Sugar	2 lb.

Brush lightly over finished products such as cinnamon buns, butterfiles, etc., while both product and sirup are still hot.

f. Soft icing for doughnuts.

Mix:

Sugar, powdered	5 lb.
Warm water (variable)	1½ lb.
Melted butter	1 oz.
Vanilla extract	¼ oz.

Bring the mixture to a boil (mixture should be quite thin). Dip doughnuts in the hot mixture and then place on screens to dry.

g. Cream icing.

Shortening	2½ lb.
Salt	½ oz.
Water	1½ lb.
Powdered skim milk	½ lb.
Vanilla extract	1 oz.
Powdered sugar	10 lb.

Thoroughly mix shortening, water, and salt. Add flavor gradually. Sift sugar and milk together and add to the mixture. Whip all together until light.

h. Cocoa icing. To 15 pounds of cream icing add 1 pound of cocoa and 1 pound of water and whip until light.

i. Royal icing. Sift together 5 pounds of powdered sugar and ½ pound of meringue powder. Add 1 pound of water and beat thoroughly. Add coloring as desired.

j. Glossy icing.

Sugar, granulated	5 lb.
Water	1 qt.
Powdered skim milk	12 oz.
Butter	4 oz.
Shortening	¾ lb.
Sugar, powdered	5 lb.

Boil granulated sugar, shortening, butter, and water to 230° F. Sift together the milk and powdered sugar and add slowly to the boiled mixture, incorporating the entire mass.

k. Cinnamon sugar topping.

Mix together:

Sugar	5 lb.
Cinnamon	1 oz.

This formula may also be used on the inside of cinnamon buns.

53. Cakes. a. General.

(1) By the term "cake" is meant a sweetened mixture of flour, liquid, and other ingredients. To the Army baker, a sound knowledge of bread production is all-important. However, in order to broaden his general baking knowledge, he should not fail to study and absorb some facts about the art of cake baking. The Army baker who supplements his bread-making knowledge with that of cake baking is indeed a great asset to the military personnel with whom he is associated.

(2) The question invariably arises as to what constitutes a good cake. Unfortunately, there are no set rules of description or specifications which may be followed; however, there are some factors which may be studied in order to produce a tasty cake.

(3) Much about the success of a cake may be derived from a study of its volume. It is almost an axiom that a good volume means a good cake. The volume should be large in proportion to the amount of batter used. Cake may be con-

sidered good when the finished product is three times the volume of the batter originally put into the pan. A good volume usually indicates a good grain and texture. It must be remembered, however, that the volume will vary with the kind of cake being produced. For instance, the volume of a heavy fruit cake cannot be judged by comparison with the volume of a light plain layer cake. In a good cake, volume must be commensurate with the type of cake being made and the type of pan or mold being used.

(4) A good cake should possess a fine grain and a smooth velvety texture. Often a cake, fine in every respect except texture, will be almost inedible because the texture is coarse and gritty. The crust of a cake should be thin, smooth, and tender. In order to insure a good grain, texture, and crust or skin, careful handling of ingredients and batter is imperative.

(5) The final test of a good cake is in the eating. The cake should have a pleasing odor and flavor. The flavor should be the one the kind of cake is supposed to produce. For instance, a spice cake should produce a pleasing, spicy flavor and not a pungent flavor, as produced by overspicing. A lemon cake should produce a pleasing lemon flavor, not a bitter or sour one. Odor and flavor are lost in many fine cakes by carelessness in handling the flavoring agents. A baker must acquire a skill of securing just the right flavor in a cake just as a cook must acquire the art of seasoning food. Over-flavoring and underflavoring are evils which a good cake baker must overcome.

(6) The Army baker must always keep in mind when making cakes that a cake is more delicate than a loaf of bread. He must, therefore, handle a cake batter more gently than he would a bread dough. A cake batter cannot stand much abuse and still turn out a good baked product.

(7) The following are a few general and simple rules which will help any baker to produce a good cake:

- (a) Use good ingredients.
- (b) Use a good, balanced formula.
- (c) Weigh ingredients carefully.
- (d) Use a good, standard method of procedure.
- (e) Use clean equipment.
- (f) Handle ingredients and batter very gently and carefully.
- (g) Do not hurry mixing; have patience.
- (h) Bake at the proper temperature.
- (i) Finish with toppings or icings that are of pleasing flavor and have eye appeal.

b. *Types.* In general there are two classifications of cakes as to type; cakes containing shortening and cakes without shortening. Among those containing shortening are the white or yellow layer cakes, fudge cakes, and chocolate cakes. These cakes, when finished with the numerous kinds of icing and toppings, are made into the numerous cakes found in recipe books. Cakes without shortening are sponge cake and angel food. Recently many recipes have appeared in print which produce cakes that contain some shortening but are beaten up like a sponge cake.

(1) *Cakes without shortening.*

(a) Cakes without shortening, such as angel food and sponge cakes, are produced by beating air into eggs and then mixing in other ingredients without stirring out the air. This type of cake is very difficult to make. From beginning to end the ingredients, batter, and cake must be handled as gently as possible. The air which is beaten into the eggs must remain, for this air is the sole leavening agent without which the cake will be soggy, tough, and flat.

(b) Angel food differs from sponge cake in that only whites of the eggs are used and in the manner of incorporating ingredients. In angel food cake the ingredients (sugar and flour) are folded into the egg whites, while in sponge cake the beaten eggs are folded into the other ingredients. It must be remembered that after the air is beaten in, the ingredients are never mixed with the beaten eggs but are gently folded together.

(2) *Cakes containing shortening.* The majority of cakes made contain shortening. Cakes of this type are distinctive in that they have a very fine grain and a velvety texture. Success with this type of cake depends mainly upon uniform procedure in incorporating the ingredients and thoroughness of mixing.

*c. Ingredients.**(1) Flour.*

(a) Cakes require a flour somewhat different from that generally used by the Army baker. He is more accustomed to bread flour which has gluten of good quality and quantity. In cakes, however, a soft flour (that is, a flour from soft wheat) must be used. A soft flour has excellent but a rather low quantity of gluten. This type of flour is commonly known as cake or pastry flour.

(b) There are several kinds of cake flour, each having a little different gluten content. The reason for this is that different kinds of cake require flour of different gluten content. Fruit cakes and heavier cakes can take a cake flour of higher gluten content than a sponge cake or layer cake. It is well to remember that the more eggs a cake contains, the lower gluten content the flour should have. Generally, a cake flour containing a gluten content of approximately 8 per cent is very satisfactory.

(c) If it becomes necessary at any time to make a cake from issue flour (straight flour), the flour may be softened by the addition of cornstarch. The addition of about 25 to 30 per cent of cornstarch will produce from the bread flour a soft flour having approximately 8 per cent gluten content.

(2) Shortening.

(a) The fat content of most cakes is butter or a mixture of butter and some other shortening. Butter is no better as a shortening than lard or any hydrogenated vegetable oil, but it is used generally because of its added flavor. Any hydrogenated product will be satisfactory in a cake.

(b) Recently there has come into commercial use a shortening called "high ratio shortening." It is especially prepared for cake use. The use of this shortening permits the use of more sugar in the formula, thereby giving a sweeter product. The Army baker will not come into contact with this product very often, but he should remember that if it is used, the formula must be adjusted.

(3) Eggs. There is a great deal of difference in the size of eggs, so care must be exercised in the number or quantity of eggs used. A formula may call for 10 eggs of medium size which will weigh approximately 50 grams shelled. If 10 eggs of 65 grams weight are used then the formula becomes unbalanced. It is well to weigh the eggs which are on hand and make adjustments accordingly in the formula being used. Most recipes call for medium-sized eggs which as a standard weight and for computation purposes, may be taken to weigh 48 to 50 grams each, shelled, or 56 grams with the shell. Frozen and dried eggs may be used in lieu of fresh eggs.

(4) Sugar. Best results will be obtained in baking a cake if finely granulated sugar is used. Coarsely granulated sugar or powdered sugar does not cream satisfactorily with the shortening. If only coarse granulated sugar is on hand, it should be rolled or pounded to break it down somewhat before using.

(5) Milk. Whenever milk is used in a cake, it should be clean and sweet. A very slight off-flavor or odor in the milk will be detected in the finished cake. Milk of any variety may be used, that is, evaporated, dried, or liquid. It must be remembered, however, that adjustment must be made when using evaporated or dried milk, because most recipes base the quantity of milk to be used on liquid whole milk. When using dried milk, it should be reconstituted (mixed with water) before its incorporation in the mix in order to insure better distribution throughout the batter mass.

(6) Leavening agents.

(a) Cakes are generally leavened by use of baking powder, by whipping air into the batter, or by a combination of the two. Most cakes are made by the use of a combination of the two methods.

(b) Baking powder, when used in a cake, must be handled carefully. It should be weighed exactly and the baker must know how the baking powder he is using acts; that is, whether it is quick acting, slow acting, or double acting.

(c) In cakes such as angel food and some types of sponge cakes, no baking powder need be used. Here the leavening agent is air. Air is beaten into the eggs which act as a seal for holding it in. After the air is sealed into the batter, it must be carefully and gently handled. When heat is applied to the batter, the air cells expand, thus exerting a leavening action.

(d) The creaming method of mixing a cake batter, that is, when the

shortening and sugar are whipped up, brings out the use of a combination of baking powder and air. The air is beaten into the creamed portion of the mix and is then retained when eggs are added. During the baking of a batter made in this manner, the air and carbon dioxide gas expand, giving the leavening effect.

d. Formulas and procedure.

(1) *Cakes containing shortening.* There are many and varied cake formulas in use. However, if one would study them when they are set down in percentage form, little difference would be noted. Rather than be lost in a maze of formulas, the Army baker should select a standard basic cake mix, much the same as the basic sweet dough mix. From this base, by means of additions to the basic formula, a variety of cakes may be made. Additions of fruit, changes in flavoring, and variety of finishings all make for variety of cake productions, even though the same basic mix is used.

It must be borne in mind that no matter how excellent the formula, correct procedure and method must be used. The most universally used and most workable method of procedure in making a cake batter is the creaming process. In this process the shortening, sugar, salt, flavor, and a fraction of the flour are creamed together until a light, fluffy mass, greatly increased in volume, is obtained. The eggs and milk are next creamed in, followed by the mixing in of the remainder of the flour. The last stage of mixing should be long enough only to get the flour in the batter and the batter smooth. It must be remembered that cake formulas may be put into percentage form similar to bread formulas as shown in the percentage formula system.

(a) *Formula for basic yellow cake.* This type of cake is excellent for Army use because the whole egg is used, thereby avoiding loss of egg yolks, as is often the case when only the whites are used.

		Percentage based	
		Weight	on flour as 100
Creamed together:			
Granulated sugar	5 lb.		100
Salt		1¼ oz.	1.5
Shortening	1 lb.	4 oz.	25
Butter		12 oz.	15
Flour	1 lb.		20
Vanilla (may be variable)		1 oz.	1.25
Add and cream slowly:			
Whole eggs	3		60
Add:			
Milk	3 lb.	8 oz.	70
Add and mix in:			
Flour	4 lb.		80
Baking powder		2½ oz.	3.12
Total	18 lb.	12¾ oz.	375.87

Note. Any form of milk may be used, converting it into liquid whole milk equivalent. Variation may be made in the quantities of sugar and milk used. Both may be slightly increased to obtain a different characteristic in the cake.

(b) *Variations.* Using this yellow cake mix as a base, many cakes may be produced. This is accomplished by adding a special mixture to a certain amount of yellow batter.

Following are several cakes easy to make and very adaptable to Army use. These cake remixes may be used for layers, sheets, or cups.

1. Fudge cake.

Sift together:

Sugar	4 oz.
Cocoa	6 oz.
Soda	½ oz.

Add:

Cold water	12 oz.
------------------	--------

Form a paste of the above ingredients. Add 1 pound 6 ounces of paste to 8 pounds of yellow batter and mix thoroughly.

2. *Spice cake.*

Ground raisins	1½ lbs.
Soda	¼ oz.
Sugar	4 oz.
Spice blend	2 oz.
Water	8 oz.

Add 2 pounds 6 ounces of paste to 8 pounds of yellow batter and mix thoroughly.

For spice blend mix thoroughly:

Cinnamon	7 oz.
Nutmeg	2 oz.
Cloves	½ oz.
Ginger	1 oz.
Allspice	½ oz.
Mace	1 oz.

3. *Apple sauce cake.*

Make a paste of the following:

Chopped apples	1 lb. 4 oz.
Chopped raisins	4 oz.
Cinnamon	½ oz.
Nutmeg	¼ oz.
Soda	pinch.

Add the paste to 8 pounds of yellow batter and mix together.

(c) *Panning.* When panning cake batter, great care should be used. Air bubbles or air spaces must be guarded against; however, do not eliminate these by banging the pans on a table or the floor as is often done. They may be removed easily by smoothing out the batter with a spatula. Pans should be thoroughly clean before putting in the batter. They should be wiped with a clean cloth immediately after use and should be washed with soap and water quite frequently. Before panning, the pans should be thoroughly greased and dusted with flour; a mixture of shortening and flour in the ratio of 2 to 1 may be used for greasing. In many cases, especially for cakes requiring a long bake, the pans should be paper-lined. This is especially true of sheet cake. By means of using a paper liner the bottom crust may be almost entirely eliminated. The paper acts as an insulation. In order to prevent the usual thick, hard crust found on the edges of sheet cakes and thereby eliminate much waste a wooden frame may be used. This frame should be made of hardwood and of such size and height that it will fit closely inside the particular sheet pan in use and will allow the cake thickness usually obtained. Wood ¼-inch thick will furnish proper insulation. The ends or corners should be mortised. The size necessary for the common sheet pan is 24½ by 16 by 1¾ inches, outside dimensions.

(d) *Scaling.* In order to obtain a good cake the amount of batter used must be adapted to the type and size of pan employed. Not enough attention is paid to scaling weight. There are scaling weight guides but it is really up to the individual to determine by experience the proper scaling weight for the pans he is using. Moreover the weight of the batter for a certain pan will depend on the type of cake being made. A layer cakepan which will take 12 ounces of basic batter will take perhaps 13 or 14 ounces of applesauce cake batter. The table below gives scaling weight that may be used as a guide.

Layer cakes (deep pans 1½ to 2 inches in depth):

8-inch layers	13 to 14 oz.
7-inch layers	9 to 11 oz.
6-inch layers	7 to 8 oz.

Layer cakes (shallow pans ¾ to 1 inch in depth):

8-inch layers	9 to 11 oz.
7-inch layers	8 to 9 oz.
6-inch layers	6 to 7 oz.
Sheet pan (24½ by 16 by 1¾ inches)	6¼ to 6¾ lb.

(e) *Baking.* It is quite difficult to set a temperature at which, or a length of time for which, cakes are to be baked. Again the individual who is familiar with the oven he is using must determine the proper baking temperature and length of time. As a guide, layer cakes bake best at about 375° F. Temperature for a sheet cake should conform closely to that for the layer cake. Baking time

ranges from 12 to 20 minutes. A cake is baked done when an indentation, made on the surface by a slight pressure of the fingers, immediately springs back to its original shape. Care should be exercised that the cake is not baked too long. This causes toughness and dryness. Upon completion of the baking, cakes should be removed from the pans before they cool entirely. Cooling entirely in the pan causes "sweating" and makes the cake somewhat wet and soggy. Often the hot cakes stick to the pans upon which they are inverted. To avoid this, granulated sugar may be sprinkled over the surface upon which the hot cakes are placed.

(f) *Finishing.* In order to complete a good cake it must be properly iced. Icing should be attractive and look appetizing and above all should be properly flavored. Good icings are often ruined by over-flavoring. Just enough flavoring must appear in the icing to blend with the cake. It must be remembered also that too much icing on a cake, even though it is excellent, will detract from the taste of the cake. The icing must be merely a garnishing to the cake. The cake should be allowed to cool thoroughly before applying icing. Due to the fact that most icings call for the whites of a few eggs, the whites of three or four eggs may be retained when breaking the eggs into the yellow cake mix. Following are two icing recipes:

1. *Butter-cream icing:*

Butter	1 lb.
Sugar, powdered	1 lb.
Egg whites	3 each.
Vanilla (variable)	$\frac{1}{4}$ oz.

Cream the butter thoroughly; add the sugar gradually, and cream until fluffy. Add the egg whites and beat up thoroughly. Add the flavoring just before completion of beating. Cocoa may be added to form a chocolate butter-cream frosting.

2. *Chocolate fudge icing (boiled):*

Brown sugar	4 lb.
Milk	1 qt.
Bitter chocolate, melted	1 lb.
Butter	12 oz.

Combine sugar, cream, and chocolate. Place over a slow fire and stir until sugar is dissolved. Continue heating until mixture boils and continue boiling until the "soft ball" stage is reached (sirup forms a soft ball in cold water). This stage is about 225° F. Add butter and cool. Beat until creaminess desired is obtained. Should be applied to cake immediately.

(2) *Cakes without shortening.* Cakes without shortening, such as sponge and angel food cakes, are more difficult to produce than those containing shortening. Practically all methods of procedure for mixing cakes of this type call for the eggs to be beaten up in a machine; however, they may be beaten by hand with a wire whip, the method depending upon the individual and the equipment available. The general procedure to follow in mixing a sponge or angel food cake is as follows:

(a) The eggs and sugar are first beaten or whipped up until light and fluffy. It is during this stage of mixing that air is incorporated into the mix. The eggs are sufficiently beaten when the emulsion forms a peak on the end of the beater or finger. Care must be exercised not to beat too much, because overbeating breaks down the emulsion. The next step in the mixing process is the addition of the water and flavoring, followed by the folding in of the flour, baking powder (if used), and salt. The flour, baking powder, and salt should be sifted together several times before folding into the egg emulsion. After flour is added, the batter should be mixed only long enough to blend the ingredients.

(b) When panning sponge cake, care should be exercised not to squeeze out or knock out the air which has been incorporated and which is so necessary for a good product. Pans should be lined with greased paper to afford insulation. For angel food cake, however, do not grease pans or use paper liners.

(c) Following are formulas for cakes containing no shortening and for a butter sponge cake:

1. Angel food:

Beat stiff:

Egg whites	2 lb.	
Sugar, granulated	1 lb.	
Cream of tartar		¼ oz.
Salt		¼ oz.

Add:

Vanilla or flavor blend		¼ oz.
-------------------------------	--	-------

Fold in lightly, after sifting together three times:

Sugar, powdered	1 lb.	
Flour		12 oz.
Cornstarch		4 oz.

Total	5 lb.	¾ oz.
-------------	-------	-------

Scale the batter into standard angel food tins. About 8 or 9 ounces to a tin is sufficient. Bake at about 300° F.

2. Sponge:

Beat until firm:

Sugar, granulated	2 lb.	8 oz.
Egg yolks	1 lb.	8 oz.
Water (warm)	1 lb.	
Milk powder		2 oz.
Salt		½ oz.
Flavor (to suit taste)		

Add and beat for one minute:

Hot water (about 180° F.)	1 lb.
---------------------------------	-------

Add the following after sifting together and mix until smooth:

Flour	2 lb.	8 oz.
Cornstarch		8 oz.
Baking powder		1½ oz.

Total	9 lb.	4 oz.
-------------	-------	-------

Bake at approximately 370° F. May be baked in layers.

3. Butter sponge:

Beat:

Sugar (warmed)	3 lb.	4 oz.
Whole eggs	4 lb.	
Egg yolk	1 lb.	
Salt		1 oz.
Flavor		1 oz.
Water		8 oz.

Fold in (by hand):

Flour	2 lb.	12 oz.
Cornstarch		4 oz.

Then fold in carefully:

Butter (melted)	1 lb.	4 oz.
-----------------------	-------	-------

Total	13 lb.	2 oz.
-------------	--------	-------

Put in pans as quickly as possible and bake at about 400° F.

54. Cookies. a. There are many different types of cake which fall under the classification of cookies. The Army baker or cook may very successfully add variety to a messing program by making and serving cookies. Like good cake, good cookies require fine ingredients and careful handling. The method of mixing batter for the majority of cookies is similar to the method of mixing the basic yellow batter—that is, the sugar, shortening, creaming method. The cookie batter must be handled in different ways to obtain variety. Some are dropped on pans from a tube; others are rolled out and cut into numerous shapes.

b. Since sirups have great moisture-retaining properties and aid in preserving

freshness; they are frequently used in cookies. Molasses and malt sirup should be extensively used in cookies by the Army baker.

c. Some recipes for cookies easily prepared and readily adaptable to Army use are given below. There are many cookie formulas available, but this should not deter the baker or cook from using inventiveness or originality in making up formulas. Very often bread crumbs, ground field biscuits, and other left-overs may be readily worked into a cookie formula.

(1) *Oatmeal cookies.*

(a) *Formula.*

Flour	3 lb.	
Baking powder	1 oz.	
Salt	1 oz.	
Cinnamon	$\frac{3}{4}$ oz.	
Oatmeal	2 lb.	
Shortening	1 lb.	8 oz.
Brown sugar (light)	3 lb.	
Soda	$\frac{1}{2}$ oz.	
Currants and raisins	1 lb.	8 oz.
Egg yolks	$\frac{1}{2}$ pt.	
Water	$\frac{1}{2}$ pt.	

(b) *Procedure.* Sift the flour, salt, baking powder, and cinnamon together several times. Cream the shortening and sugar until light. Add the eggs and beat thoroughly. Dissolve the soda in the water, then add flour and oatmeal alternately with the water. Blend after each addition. Add the currants or raisins with the last of the flour. Roll out the batter on the bench and cut with a cookie cutter. Bake on greased sheet and before baking wash the cookies with "egg milk" wash. Bake at about 350° F. for 10 to 12 minutes.

(2) *Molasses cookies.*

(a) *Formula.*

Sugar, brown	5 lb.	
Shortening	2 lb.	8 oz.
Salt	1 oz.	
Soda	$1\frac{1}{2}$ oz.	
Allspice	$\frac{3}{4}$ oz.	
Cinnamon	1 oz.	
Malt	$\frac{1}{4}$ qt.	
Molasses	$\frac{1}{4}$ qt.	
Eggs	1 pt.	
Flour	6 lb.	

(b) *Procedure.* Cream the shortening, sugar, salt, soda, allspice, and cinnamon until light. Add the malt, molasses, and eggs. Mix well and then fold in (by hand) the flour. Drop on greased sheets. Bake at 375° F. for 10 to 12 minutes.

(3) *Sugar cookies.*

(a) *Formula.*

Flour	3 lb.	
Baking powder	1 oz.	
Salt	$\frac{1}{4}$ oz.	
Shortening	$1\frac{1}{2}$ lb.	
Sugar	$1\frac{3}{4}$ lb.	
Egg yolks	$\frac{1}{2}$ pt.	
Vanilla	$\frac{1}{4}$ oz.	
Milk	$\frac{1}{2}$ pt.	

(b) *Procedure.* Same as above for mixing batter. Roll out on the bench very thin, cut with a cookie cutter, and sprinkle with sugar. Bake on greased sheets at 400° F. for 5 to 6 minutes. Cookies may be cut into a variety of shapes.

55. *Pies, baking.* A pie is a combination of two very different food products—the crust and the filling.

a. *Pie crust.* The handling of a pie dough differs considerably from that of a bread dough. A high proportion of fat is used, and the dough is made up quickly, with as little handling as possible. The materials should be kept cold. A good proportion by weight is half as much fat as flour, and half as much water as fat. The old-fashioned home-made pie crust has a rough surface

and flaky texture obtained by mixing all of the fat and all of the flour lightly. Such a mix has free fat lumps present which cause flakiness. A flaky crust is difficult to cut neatly. Factory pies have a short and mealy crust obtained by thorough mixture of the fat and flour. These cut nicely but lack the attractive appearance of the flaky crusts. For Army purposes the best crust is a short-flaky type, being a compromise between the first two. This has the flaky effect which cuts easily. This quality is obtained by first thoroughly mixing all of the flour with one-half of the fat and then lightly mixing in the remainder of the fat. The first mixing obtains a collection of fat particles covered with flour, which gives shortness. The second mixing introduces numerous small free fat lumps which cause flakiness. Just enough water should be added to this mixture to moisten the flour particles. The water should be distributed evenly and the mass mixed gently to a dough-ball which is easy to handle, neither sticky nor crumbly. If too much water is used, it will cause the crust to shrink while baking; however, while this detracts slightly from the appearance of the pie it does no great harm. On the other hand, if too little water is used the crust dough is so stiff that it is difficult to roll and handle and quite likely to break or tear while being lifted from the rolling board to the pie tin. With experience the cook quickly learns to use sufficient water to make a crust which is easily handled. Use of sufficient water to make a sticky or slack dough must be avoided as this makes a tough pie crust. The dough is rolled into a uniform sheet with as little dusting flour as possible and fitted into the pans.

b. *Kinds of pies.* Pies usually take their names from the filling contained, as apple, peach, custard, pumpkin, etc. There are many different fillings. They may be roughly classed as follows:

Fruit fillings, consisting of any kind of fruit, usually alone, but sometimes combined with one or more other fruits. This class is called fruit pies.

Examples: apple, cherry, rhubarb.

Soft filling (see (2) below). Examples: pumpkin, custard, lemon cream.

(1) *Fruit pies.* (a) *How made.* Fruit-filled pies should be made with a top crust as this is the more common practice and they are probably more pleasing made in this way.

(b) *Composition of filling.*

1. The fruit used for filling may be fresh, canned, or dried; of desirability in the order named. Common fruit pies are apple, apricot, berry (all kinds), cherry, peach, mince, raisin, and rhubarb.

2. The fruit filling is usually sweetened with sugar. Spices, usually nutmeg and cinnamon, are added to apple pies and may be added to other fruit fillings but are not usually added to berry, cherry, raisin, or rhubarb pies. A thickener or binder is usually added to fillings made from very juicy fruits.

3. (a) Fruit fillings which are very juicy, especially berries and cherries, may make a pie which is difficult to cut and serve neatly as the filling may run out when the cut pieces of pie are lifted from the pie tin to the plate; or, it may be impossible to lift the pieces of pie without breaking them. To overcome this, a starchy thickener, sometimes called a binder, is added to the filling to give it solidity. Starch, under the influence of moisture and heat, swells and becomes a pasty, gelatinous mass, of great water-absorbing power. The ordinary thickeners used in the Army mess are cornstarch, wheat flour, and tapioca. Tapioca is a form of starch. While satisfactory results can be secured with cornstarch or wheat flour, the best thickener is tapioca, either in granulated or flour form. The granulated form of tapioca is often called quick tapioca. Cornstarch and wheat flour, if too much is used, may impart their flavor to the pie. They may also impart a whitish color to the filling. Tapioca is less likely to do this. However, cornstarch or wheat flour is often used in preference to tapioca for the reason that the tapioca found in Army messes is the pearl type, which requires soaking for about 12 hours so that it will soften and not be visible in the pie. If this long soak is not given, the pearls of tapioca may be visible as small white globes after the pie is baked. Therefore, when using pearl tapioca it is usually necessary to start preparing the fruit filler about 12 hours in advance. On the other hand, cornstarch, wheat flour, or tapioca in granulated or flour form may be mixed and cooked with the juice of the filling in 30 minutes.

(b) Any fruit filling which is sufficiently juicy to require a thickener

will furnish sufficient juice in which to cook the thickener. Drain off the juice. If pearl tapioca is used, this must be done about 12 hours before the pies are to be made. If cornstarch, wheat flour, or tapioca in granulated or flake form is used, the juice should be drained from the filling before starting to make the pie crust, so that the thickener and juice may be cooked together while the crust is being made. Heat the juice (preferably in a double boiler), add the thickener, and simmer about 30 minutes. Great care must be used to avoid lumpiness. When using cornstarch or wheat flour, the best method is first to make a thick paste with the thickener and a little of the juice and then stir this paste into all the juice. When using tapioca in granulated or flour form, it should be dropped slowly into the hot water and whipped vigorously with a wire whip until all the tapioca has been added. Stir frequently while simmering.

(c) Some cooks, especially when pressed for time, add cornstarch or wheat flour directly to the filling while pouring it into the pie crust. Experienced cooks may do this successfully, but those with less experience frequently find that white patches appear in the pie after baking, especially if flour has been used. Often this is due to sprinkling the flour on top of the filling (just under the top crust. When adding cornstarch or wheat flour directly to a pie, it is best to first pour in about half the filling, then sprinkle in a layer of thickener, then add remainder of filling. Granulated or flour tapioca is less likely to cause white patches.

(d) Great care must be used to avoid adding too much thickener to pie filling. If too much is used, the filling may be so thickened as to be gummy or rubbery. In deciding upon the quantity of thickener to be used, remember that acid fruit juices cause starch paste to liquify and become thin; therefore slightly more thickener should be used in such fillings as strawberry, tart apple, or rhubarb, etc., than in a nonacid filling, as peach. A good general rule is one fourth of a standard measuring cup (about 1 ounce) of thickener to each quart of juice. With a little experience the cook will soon learn to regulate the quantity of thickener.

(e) After the thickener and juice are cooked together, mix them with the fruit and then add sugar and spices, if the latter are used, to taste.

(c) Handling and baking.

1. Fruit fillings usually are put into an unbaked (raw) lower crust and covered with a raw upper crust before being put into the oven. After the lower crust is rolled out on the board or table, fold it over once. This makes easier lifting and placing in the pie tin without tearing. Press the crust well down into the corner of the tin and allow an overlap of about one half inch all around the outer edge of the tin. Then crimp or press the crust down on this outer edge. Puncture the lower crust with a fork, especially around the corner of the tin. This allows air to escape and prevents puffing of the lower crust when baking. This should also be done when baking unfilled pie shells. Put in the filling. Then moisten the outer edge of the lower crust. This will cause the outer edges of the lower and upper crusts to stick together. Then add the upper crust. In the upper crust cut several slashes about 1 inch long, or prick it in a number of places with a fork. This is to allow escape of steam while baking. The upper crust is sealed to the lower by crimping the edges with a fork. After the top crust is on, hold the pie plate on one hand and trim off all surplus dough by passing a knife around the edge of the plate. Use a sharp knife.

2. In general, all pies filled into a raw crust are placed in a hot oven (450° to 500° F.—8 counts) in order to bake the lower crust before the filling has had time to soak into it. After a few minutes the temperature should be reduced to that called for in the recipe for the kind of pie being baked. Baked pie shells should be baked in a quick oven (400-450° F.—9 to 12 counts) until they feel firm and dry and the edge of the shell is an even golden brown.

3. The usual practice is to pour soft fillings for pumpkin, squash, and custard pies into an unbaked (raw) crust and bake both together. This gives no trouble in the case of pumpkin and squash but may give trouble with custard pie. If the temperature of the oven is high the custard filling will be tough and have a tendency to weep; if it is low, the filling will soak into the crust and make it soggy. Therefore, many cooks prefer to first cook a custard filling and then pour it into a baked crust (shell). Then the baking required to finish the filling can be done at a temperature which will not injure it.

4. Some cooks prefer to use baked pie crusts (shells) for all soft fillings; others prefer unbaked crusts. The usual practice is to use baked crusts, although these, being dry, tend to absorb liquid from the filling and become soggy.

(2) *Soft fillings.* (a) *Composition.*

1. *Custard pie filling* consists of milk, eggs, sugar, salt, nutmeg, and vanilla. To cut down the cost, cornstarch is sometimes used and the number of eggs reduced, but the resulting product is less desirable.

2. *Cream pie fillings* consist of flour or cornstarch, sugar, milk, eggs, flavoring (extract or chocolate, lemon juice, etc.), and sometimes fruit, as bananas. Excessive use of flour or cornstarch reduces quality. The use of artificially prepared pie fillings should be avoided. They are expensive and make inferior pies.

3. *Pumpkin or squash pie filling* consists of pumpkin or squash, eggs, sugar, salt, milk, and spices. It should be well sweetened and seasoned.

(b) *Used in single-crust pies.* Soft fillings are usually used in pies having no top crust. Meringue (see recipe 254) is often added.

(c) *Handling and baking.* Soft fillings nearly always are given preliminary cooking before being poured into the crust. This preliminary cooking may be for the purpose of cooking out excess water, as for pumpkin and squash, or of cooking the filling until it is stiff and smooth, as for banana cream, lemon, etc. The pie is placed in the oven and baked long enough to set the filling so that it is firm, or to brown the top, especially when meringue is added.

c. *Defects of pies.* (1) *In the crust.* Sticking to pans is caused by moisture from wet pans or from leaking of filler. Shrinking is generally caused by toughness due to too much water, too little shortening, or overworking. Too-high oven temperature tends to increase shrinking. Raw spots on pie bottoms may be due to poor bottom heat in the oven, to dented pans, or to improper mixing or rolling of the dough.

(2) *In the filling.* Thinning of starch-thickened fillings of acid nature as lemon is caused by too slow cooling. Settling or sediment in custard pies is due to insufficient eggs or excess starch. Soaking of bottom crusts may be due to:

(a) Underbaking.

(b) Fillings too soft.

(c) Too much sugar in dough.

(d) Differences in flour.

(e) Sweating in the pan.

Boiling over occurs with some fillings when subjected to too high temperatures before the starch has gelatinized.

56. **Muffins.** A muffin is an unsweetened cake. Muffins are usually baked in small muffin tins or paper liners and are usually served hot. There are many varieties of muffins and there are many products, differently named, which might be classified under the heading "muffins." Some of these products are tea biscuits, scones, corn bread, nut breads, griddle cakes, and waffles. The method of mixing a muffin batter is generally similar to that for mixing a cake batter. However, muffin batters when finished are usually thinner than cake batters. Care should be exercised in mixing a muffin batter not to overmix. It is not necessary to use the sugar, shortening, creaming process in the preparation of muffin batters. The dry ingredients may be mixed well; then the liquid and melted shortening added and stirred in. This method should be followed if the baker or cook finds that he is overmixing the batters. The use of muffins in a mess furnishes a pleasing addition to any meal at a moderate cost. Raisins, figs, corn meal, bran, and even bread crumbs may be utilized in muffins. Muffin tins or paper liners may be used in baking muffins. A small expenditure for the tins will be well repaid.

a. *Muffin base (plain).*

(1) *Formula.*

Shortening	1 lb.
Sugar	2 lb.
Salt	½ oz.
Eggs	8 each
Molasses	8 oz.
Soda	2 oz.
Water	8 oz.
Flour	3½ lb.

(2) *Procedure.* Cream together the shortening, sugar, and salt. Then add the eggs and stir in. Next add the molasses, soda, water, and flour, and mix. Do not overmix. Drop in greased tins or liners and bake at about 400° to 450° F.

b. *Variations.* From the muffin base given in *a* above different kinds of muffins may be made. In order to make oatmeal muffins, for instance, replace 1½ pounds of flour with 1½ pounds of oatmeal. For any other kinds, such as whole wheat, all bran, corn meal, etc., merely replace 1½ pounds of the flour with 1½ pounds of whole wheat flour, all bran, or corn meal. Raisins, figs, or currants may be added to any kind.

57. Griddle cakes.

a. Formula.

Milk	2 lb. (1 qt)
Salt	½ oz.
Sugar	2 oz.
Eggs, whole	2 each
Flour	1 lb.
Baking powder	1 oz.
Melted butter	1 to 2 oz.

b. *Procedure.* Stir together thoroughly the milk, salt, sugar, and eggs. Add the flour. Then add the melted butter and stir in. Fry on griddle.

SECTION VIII

FIELD BAKING EXPEDIENTS

58. *Expedients.* Occasions are sure to arise when it is desirable to bake bread in the field when regular baking equipment is not provided. Under these circumstances, the essential principles to be followed in the construction of earth or clay ovens must be thoroughly understood.

a. Ovens.

(1) *Heat and construction.* The entire principle of baking is based upon the fact that for each ration of bread baked a certain number of heat units must be provided at a temperature from about 385° F. to 450° F., striking the top and bottom of the loaf with about the same intensity. The quantity of the heat available must be such that a baking temperature will be maintained from 30 minutes to 1½ hours, depending upon the depth of the dough to be baked. Such ovens as are constructed in the field must generally be of the simplest type possible; that is, of a single chamber in which the fire is built and withdrawn after sufficient heat has been stored up in the surrounding material to do the necessary baking. Such ovens are generally called "straight-fire" or "draw-fire" ovens, and for temporary use are very satisfactory, though they are more laborious to handle than continuous ovens. In the construction of these ovens, the following points should be kept in mind:

(a) The oven must be built of material suitable for absorbing and retaining the heat required in baking. Brick, rock, adobe, clay, sods, sand, and loamy soil will all do if properly handled.

(b) About 8 inches of earth of any kind is required to take up and radiate sufficient heat for baking even small batches of bread. A greater depth on top of an oven will cause premature breaking down; a lesser amount will not generally retain sufficient heat.

(c) A slow fire must be placed in the oven in order that the heat may be gradually taken up in the surrounding material. A flash heat will quickly heat up the lining of the oven and produce an intense heat for a short time, but to store up a sufficient amount of heat requires a long, slow firing.

(d) The greatest difficulty is in getting a bake on the bottom of the loaves in newly constructed ovens, as the heat from the fire rises from the bottom, which is further protected by the ashes as they accumulate. In damp and loamy soils, a hearth of stone or brick should be provided to overcome this difficulty.

(e) Damp soil cannot take up and radiate sufficient heat between 385° and 480° F. to bake bread. Hence the material immediately surrounding an oven must be thoroughly dried out before any attempt is made to bake. Generally a slow

fire for several hours will be necessary before the first baking can be made, but after a successful baking, not more than 45 minutes to 1 hour will be required for heating the oven and equalizing the temperature by closing the oven tight after the fire is drawn.

(2) *Oven in a steep bank.* A bank from 4 to 6 feet high is the best for the purpose. The roof covering need not exceed $1\frac{1}{2}$ feet. Two men with a spade and a long-handled shovel can build it, in light soil, in 45 minutes. If such tools are not available, it may be constructed with trowel, bayonet, intrenching tools, or even with knives. To build the oven, dig down the bank to a vertical face and excavate at the base a hole from 4 to 5 feet horizontally, care being taken to keep the entrance as small as possible; hollow out the sides of the excavation and arch the roof until the floor is about 2 feet 6 inches in its widest part and the roof is 16 inches high to the center of the arch. Then tap the back end for the flue. A hole from 4 to 6 inches in diameter will furnish a good draft. A piece of tent stovepipe may be utilized for this purpose. When difficult to construct, the flue may be omitted and practically as good results will be obtained. The time required for drying will depend upon the character of the soil; if ordinarily dry, a fire kept up for an hour will suffice. After the oven has been heated, the temperature may be regulated by means of the door and flue, opening or closing them as may be necessary. This is recommended as a very good and convenient oven.

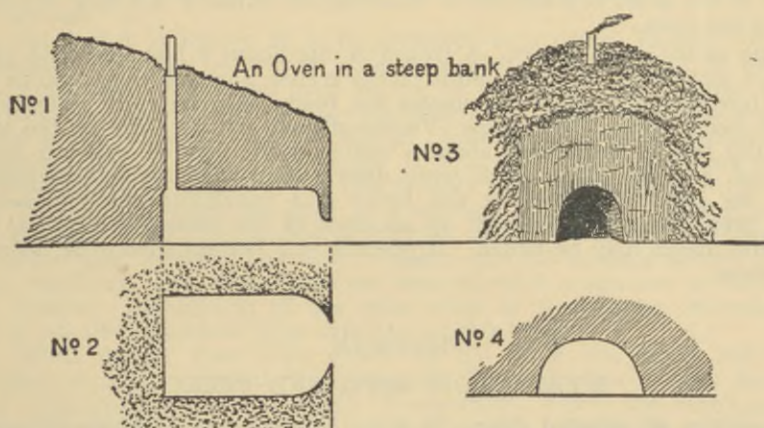


Plate 1. Extemporary oven built in a bank. No. 1, longitudinal section; No. 2, plan; No. 3, front view (Not on the scale); No. 4, transverse section of interior.

(3) *Construction and operation of two-barrel clay oven.*

(a) Select a piece of level ground 5 feet by 9 feet. Take two salt or sugar barrels, knock top and bottom from one and a small section from the bottom of the other. Place the two barrels together, end on, the barrel with bottom intact to the rear.

(b) Cover both barrels completely with moist sand; the sand should be about 2 inches deep on top and splay outward at the bottom to about 4 inches. In placing the sand about the form, care must be exercised not to use too much force.

(c) Make a good stiff mixture of clay and grass or hay. Cover the sand, beginning at the bottom and working upward, using the hands. Clay should be 12 inches thick at the bottom and taper to 6 inches at the top. Make a shoulder at each side on the front end of the trench to hold the sheet iron door. This shoulder should extend to the front of the oven proper so that the sheet iron will fit flat against the oven chamber.

(d) After the form is completed, allow to stand for 48 hours and then burn out the barrels. Use just enough wood to set fire to the barrels. When the barrels are burned out, scrape out the sand from the top and sides and the oven is complete.

(e) If material is available, before constructing the walls of the oven lay

a brick floor 3 feet by 8 feet. Set the barrels on the floor and then proceed as before indicated, the clay walls resting outside the brick floor.

(f) Metal oil drums may be used in similar manner to offset need of use of wooden barrels.

(g) To obtain the best results with this type of oven, it is best to start the fire as soon as the dough is set; keep up a moderate brisk fire for about 2 hours; as soon as the dough is punched down, spread the coals evenly over the floor of the oven and close up tight. This is to equalize the temperature at all parts of the oven. As soon as the bread is in the pan, draw all the coals from the oven and close for about $\frac{1}{2}$ hour, then take the count; 7 counts is the proper heat. If less than 7, the oven is too hot; if more than 9, the oven is too cold and will not bake issue bread.

(h) The oven is the right temperature when the hand may be held for 7-second counts parallel to the bottom of the trench and 1 inch from it. Or, if a little flour is scattered on the bottom of the trench, it should brown in about 2 minutes.

(i) This oven will hold 5 pans, each 12 by 24 inches, and if properly handled, will bake as good bread as any oven made.

(j) To make a second run, put in another fire for about 45 minutes, draw the coals, and close up the oven for about 15 minutes, and the oven is ready for a second run.

(k) It is a great convenience in handling the bread if a 2-foot trench is dug in front of the oven.

b. Baking in the open trench. A trench is dug about 6 feet long and 15 inches wide and 1 foot deep. A fire is built in the trench about 2 hours before time to bake. A few minutes before the loaves are ready, the coals are withdrawn and the trench swept clean. The loaves (Vienna-shaped and very dry on the exterior) are carefully laid in the trench about 3 inches apart, covered with an iron sheet of any kind, and the coals which were drawn from the trench distributed over the top. By carefully watching the bread and regulating the top heat, most excellent bread may be produced. In an oven of the dimensions given, twenty-five 1-pound loaves may be baked. If possible, the bottom should be floored with brick or stone.

SECTION IX

INFESTATION, ROPE, AND MOLD

59. Disposition of infested flour. If flour becomes only slightly infested with beetles (commonly referred to as weevils), it is not materially harmed. Beetles may be removed by sifting flour through a fine mesh sieve. Badly infested flour should be surveyed with a view to disposition for purposes other than human consumption.

60. Rats and mice. While rats and mice cannot be classed as insects, they are pests that should be kept out of the bakery. The most effective preventive method is to "build them out"; that is, to be sure that there are no cracks, holes, etc., in either the floor or the walls of the bakery. Traps are considered the best means of extermination. The bait in traps should consist of a type of food not otherwise available in the immediate vicinity, such as meat for traps in the bakery and bread or cheese for traps in the butcher shop. The use of rat poison is very dangerous because, either through carelessness or by being carried by the rats and mice, it may come in contact with ingredients which will subsequently be used in making bread. Furthermore, poisons often cause the rats to die while underneath the floors or between the walls of the building, making it difficult to effect their removal and resulting in an objectionable, unsanitary condition.

61. Rope. *a. Description.* Rope is a bacterial disease of bread and is one of the worst troubles of the baker, for, when once started, it is very difficult to eradicate. It first appears in about 24 hours after baking, but in hot climates may appear much sooner. The first symptoms is an odor resembling ripe cantaloupe. This is followed by the formation of yellow or brown spots in the crumb, these spots having soft and sticky centers. The spots increase in size until, in about 36 to 48 hours, the entire crumb of the loaf is changed into a strong smelling,

brownish, soft, and sticky mass which can be pulled into strings or ropes. Such bread is entirely unfit for food.

b. *Cause.* Rope is caused by the growth of certain kinds of bacteria. These bacteria may occur in nature on the surfaces of grains, potatoes, and other vegetables, and in the soil. Flour milled from infected wheat will contain them. The lower-grade flours, which contain more of the outer portions of the wheat kernel, will contain more than the better patent flours. Storage of flour in a warm, damp place will cause a great increase in the number of these bacteria. The bacteria causing rope are resistant to heat, and any spores present in the center of the loaf are not killed at the baking temperature. Moist, warm conditions favor the development of rope, which may be considered as a hot-weather bread disease. The bacteria causing rope cannot grow in an acid medium, so the development of an acid fermentation or the addition of acid will prevent ropy bread.

c. *Sources.* The chief source of rope infection is the flour. Most ropy flours are the inferior grades of flour, or better grades that have been stored in a warm, moist atmosphere, such as the hold of a transport. Potatoes are another common source, the organism causing rope being sometimes called the potato bacillus. Storage of flour near potatoes or the use of potato yeast may be a cause of ropy bread. Lack of cleanliness in the bakery and imperfect cleaning of troughs, buckets, and other utensils will favor the development of rope and prevent its eradication. Forcing of doughs too much in warm weather and long storage of flour and bread in warm, moist climates will favor the growth of rope.

d. *To combat.*

(1) Flour that is known to have produced ropy bread should not be used. The presence of a large number of rope organisms in a flour can be detected by laboratory methods. Suspected flour should be examined and if found unsuitable for use, steps should be taken for its condemnation. Unless there has been trouble with ropy bread, caution must be used in condemning a flour because any flour may contain a few of the rope bacteria. A flour that may cause ropy bread in a warm climate may be used without this trouble in a cold climate or in winter.

(2) The bakery should be kept in a sanitary condition. On the appearance of rope, the shop should be thoroughly cleaned and all dust, dirt, old bread, dough, etc., removed and burned. The floor, troughs, and all utensils should be cleaned and then sterilized with live steam and washed with a solution of boric acid or boiling vinegar. Fumigation of the bake shop or tentage by formaldehyde or sulphur is practically useless in an infection of this kind.

(3) When danger from rope exists, do not force the dough but keep the temperature as cool as possible (not over 80° F.) and allow a slow fermentation with an extra punching of the dough if necessary. Favor the development of a slight acid fermentation, as rope will not develop in a sour dough.

(4) Add vinegar to each dough; mix in the proportion of 1 quart of vinegar to each 100 pounds of flour. This is an absolute preventive. Other acids may be used, but vinegar is the most convenient and satisfactory acid substance available. A 5 per cent solution of acetic acid may be substituted for vinegar. Use one quart of this solution to each 100 pounds of flour.

(5) Bread should be cooled promptly, the bread room should be well ventilated and the loaves separated so that the bread will dry out well.

62. Mold. a. Molds are microscopic organisms which grow under suitable conditions of food, warmth, and moisture. There are many kinds of molds. Many of them develop different colors during growth and give unpleasant flavors to the product upon which they grow. Not all are harmful to health, but their appearance is objectionable and indicates spoilage of the food upon which they are growing. There is no particular mold confined to bread, but under suitable conditions any mold may appear. Mold growth starts on the outside of the loaf and proceeds to the interior. A heavy crust is unfavorable to its development. Mold generally requires several days to develop in bread.

b. The source of molds in bread is from the air or from things with which the bread comes in contact. The spores of molds are present to a greater or less extent in air and on the surfaces of all objects. Unclean surroundings favor an increase in their number. The temperature of baking is sufficient to kill all molds and their spores present in the loaf, so any infection takes place after the bread leaves the oven. Infection of the bread comes from the air, hands of the bakers, bread racks, and other points of contact with sources of mold.

c. Growth of mold is favored by moisture in the air and in the bread, warmth, and darkness, and by increased quantities of sugar in the bread.

d. To prevent moldy bread:

(1) Be sure that the bread is thoroughly baked. A hard, thick crust will hinder penetration of mold into the loaf and is desirable for bread intended for long keeping.

(2) The cooling room should be clean, cool, and dry, and the loaves should be separated so as to allow thorough drying. Sunlight is an important factor in keeping down molds.

(3) Observe proper sanitary conditions, such as:

(a) Daily scrubbing of floors.

(b) Frequent washing of walls and ceiling with antiseptic solutions.

(c) Cleaning and steaming of utensils.

(d) Clean clothes and clean personal condition of bakers.

(4) Do not permit stale bread to contact freshly baked bread.

(5) When mold is found, take prompt and thorough steps to remove it and clean and sterilize the places infected.

(6) Do not attempt to eliminate mold by the use of vinegar. Unlike rope, mold thrives in an acid medium; therefore, the use of vinegar would encourage, rather than hinder, its development.

CHAPTER 6

FOODS

1. General. All mess personnel should have a working knowledge of the raw materials of their profession. This Chapter and Chapter 7 will give mess personnel a smattering of information about the more important foods that are prepared in Army messes. Chapter 8 will go into more detail concerning the inspection of these foods.

2. Baking powder. Baking powder is used to leaven cakes, pastry, and biscuits. It can be used to leaven bread, but it is seldom so used, as bread is usually leavened with yeast.

a. Types. There are three main types on the market:

(1) *Quick-acting* contains phosphoric acid, or cream of tartar, or cream of tartar and tartaric acid.

(2) *Slow-acting* contains sodium aluminum sulphate (alum).

(3) *Double-acting* contains both sodium aluminum sulphate (alum) and phosphate (or calcium phosphate). The type is indicated by the label which always shows the ingredients.

b. Rules for using baking powder. (1) Quick-acting baking powder acts while the batter is cold, so it must be placed in the oven quickly; otherwise part of the gas will be lost before baking.

(2) Double-acting baking powder acts slowly until placed in the oven. In other words, heat is required to make it act. Therefore, when using double-acting baking powder, the cake, etc., need not be placed in the oven immediately. For example, when using this type of powder, a hot cake batter may be made up, kept overnight in the refrigerator, and cooked the next morning with little or no loss of leavening power.

(3) The same rule as in (2) above applies when using a slow-acting powder, as it acts very slowly until heat is applied.

(4) When quick-acting baking powder is used, twice as much is required as when double-acting powder is used. In other words, quick-acting baking powder is only one-half as strong as the double-acting type.

(5) A good general rule is two level teaspoons of quick-acting, or one level teaspoon of double-acting, baking powder to each cup of sifted flour.

(6) When making hot cakes, if they do not appear light, additional baking powder may be stirred into the batter.

(7) Quick-acting baking powder requires a hot oven, about 425° F.—9 to 12 counts. A double-acting powder requires a medium oven, about 350° F.—12 to 16 counts at the start and a gradual increase in the temperature to about 425° F.—9 to 12 counts.

(8) Exact measurement to obtain proper quantities of baking powder for different recipes is important. Many failures in cake making are caused by use of too much baking powder. This tends to make the cake fall or have a coarse texture, or to give biscuits a yellow color and disagreeable taste. Quantities called for in recipes should be followed exactly, neither adding nor subtracting any amount.

c. Storage. If kept perfectly dry, baking powder will keep in good condition for several years. The can should be kept tightly closed and in a dry place.

3. Baking soda. Many cooks do not understand how to use baking soda advantageously in cooking, and for this reason it is not extensively used. It can be used to advantage in certain cooking operations. When used with sour milk, the biscuits are considered by many to have a flavor superior to baking-powder biscuits; further, this provides a means of utilizing sour milk and saves the cost of baking powder. The sour milk neutralizes the odor and taste of the baking soda which may be objectionable in many products when baking soda is used alone. A little baking soda is added to cream soups (especially cream of tomato) to prevent curdling.

4. Beans, dry. *a.* (1) There are a number of types of dry beans. For Army messes, the following types may be purchased:

Type A, white beans
Type B, kidney beans
Type C, lima beans

Type D, colored beans
Type E, black-eye beans

In time of peace any of these types can be secured, but in time of war, type A will usually be furnished.

(2) Each type has a number of different varieties with the exception of the black-eye which has only one. For example, if a quartermaster has type A (commonly known as "Navy" beans) on hand, he may have any one of the following varieties:

<i>Official name</i>	<i>Common name</i>
Small white	Small white or California small white
Pea	Pea or Michigan pea
Medium white	Medium white or medium
Large white	Large white
Great northern	Great northern

b. (1) Kidney beans may be carried by a quartermaster as either red kidney beans, dark red kidney beans, or western red kidney beans. Western red and red kidney beans are light red in color, while dark red kidney beans are dark red to mahogany. There is no difference in eating quality.

(2) Lima beans may be carried as either lima beans or baby lima beans; the first being large, the second small in size. There is little or no difference in eating quality.

(3) Colored beans may be one of the following: Pinto (a mottled buff or tan-colored bean), pink, or small red. There is no difference in eating quality. Army messes located on the Pacific coast will often receive pink or small red while those located east of the Rocky Mountains will often receive pinto.

(4) Black-eye beans usually are of only one kind—a white bean with a black eye. They are often called black-eyes or black-eyed peas.

c. (1) White beans are best for baking while colored beans, lima beans, or black-eye beans are usually simmered. White beans usually are baked and are very popular cooked in this manner although they sometimes are simmered. They are usually served as the main dish of the meal whereas colored beans are usually served as a vegetable and not as the main dish.

(2) Of the white beans, some cooks prefer the small sizes (small white or pea) while others prefer the large sizes (large white or great northern). There is little choice although the great northern appears to be the best cooking bean; that is, it cooks soft with a minimum of broken or tough skins. It is important to avoid cooking two sizes of beans together as this may result in the small beans becoming overcooked and mushy before the larger beans are thoroughly cooked. Old crop beans are dry and hard and require longer soaking and cooking than beans of the latest crop.

(3) Lima beans and baby lima beans have a distinctive flavor and provide variety in the mess. Usually they are simmered with a seasoning of ham scraps or salt pork but are palatable when baked, provided dryness is prevented by adding beef stock or milk.

(4) Black-eye beans, having a flavor of their own, are very popular with men from the Southern States where these beans are chiefly grown. They also are well liked by men from other States. Usually they are simmered with ham scraps. Sliced onion cooked with them or served raw with them adds to the palatability. Hot corn bread goes especially well with black-eye beans.

d. Dry beans are one of the most valuable foods for Army messes and deserve to be served rather frequently. When properly cooked and served, they are appetizing and popular. In addition to being baked or simmered and served hot, beans which have been baked or simmered can be used cold in appetizing salads. Left-over baked Navy beans are palatable when reheated.

e. There is little difference in nutritive value between the various types of dry beans. They all are high in protein, about equal to meat in this respect, and have been called the "poor man's meat" because while they have about as much protein as meat, they are much lower in cost. Dry beans do not provide any roughage. They are a good source of vitamin B but do not furnish any other vitamin.

f. Dry beans sometimes become insect infested. This condition occurs more frequently in the Tropics and Southern States. The kidney and colored types appear to be more liable to attack by insects than the other types. Usually the first indication of insect infestation is the small holes made by the larvae (worms) which have been inside the beans and have eaten their way out. If a few beans

are placed in water, those containing larvae, if any, will float. If the beans which float are cut in two with a knife, the larvae will be disclosed; however, the mere fact that some of the beans float does not prove that larvae are present.

5. Cereals, breakfast. *a.* There are three main types of breakfast cereals on the market:

(1) Uncooked—corn meal, farina, cracked whole wheat, etc.

(2) Quick cooking—cereals that have been partially cooked before packing and require but 3 to 5 minutes for preparation.

(3) Ready-to-eat—cereals which can be served without further preparation. Ready-to-eat cereals are of various types: flaked, puffed, malted, and shredded.

b. The uncooked and the quick cooking cereals are the lowest in cost and those made from whole grains give the greatest food value. They are of especial value in the mess on cold days or at times when considerable time elapses between the morning meal and noon meal, as this type of cereal seems to stave off hunger for a longer period.

c. The ready-to-eat cereals have their advantage in that they can be served without preparation by the cook. There is a wide variety on the market, most of which are packed in individual packages. The individual package is the most satisfactory unit for use in Army messes. A variety can be placed on the table and the soldier can choose the cereal he prefers. There are no open packages left to protect against dust and insects or left-overs to worry about.

d. Both uncooked and ready-to-eat cereals should be used to give variety to the menu. During hot weather the soldier may prefer the ready-to-eat cereals. However, many prefer the uncooked cereals when fresh milk is not available.

6. Butter. *a.* Butter has a fine characteristic flavor which cannot be duplicated by any other product, and when butter is used as an ingredient in baking and cooking this fine flavor is imparted to the finished product. However, butter is relatively high in cost, and it is sometimes necessary to use substitutes such as vegetable shortening and lard substitute. While these substitutes are fairly satisfactory as shortening for many kinds of cakes, it cannot be expected that they will impart as fine a flavor as butter. There is no satisfactory substitute for butter for such dishes as buttered asparagus, beets, cauliflower, or peas.

b. Butter should be kept in the refrigerator when not in use as it loses its flavor when exposed to room temperatures and easily absorbs odors.

7. Canned foods. *a. General.* Canned foods include those foods which have been packed in cans, jars, or bottles to keep them in sound condition. While, in general, fresh foods are preferred, there are long periods throughout the year, mainly in winter and spring, when the fresh items cannot be bought at reasonable cost, and canned foods are splendid substitutes. They make possible a wide variety of foods in the mess and are ready for use, requiring only heating or chilling.

(1) *Canned meats.* Canned meats include corned beef, roast beef, corned beef hash, sausage, ham, bacon, potted meats, and veal loaf. All canned meats except bacon, have been thoroughly cooked at the time of canning and may be eaten without cooking in the mess. Most of them are more palatable if heated; however, canned corned beef, if served alone, and potted meat, etc., are more palatable cold, and should be chilled before serving. Canned meats are included in the field ration and are issued when it is impracticable to furnish fresh meat. Canned meats are an excellent source of protein and have very good keeping qualities. As they are more expensive than fresh meat, their use should be primarily for emergency conditions when cooked fresh meats cannot be obtained.

(2) *Canned sea food.* (a) While many kinds of fish are canned, the most satisfactory for Army mess use is canned salmon as it can be used in many ways, served cold alone or in salmon salad or other salads, fried in hash, creamed, baked, etc. It has recently been discovered that canned salmon is a very valuable health-protective food, especially the oil, because it furnishes vitamins A and D; therefore, this oil should be carefully saved and added to the salmon which is served. Canned salmon also is a good source of protein and fat.

(b) Canned sardines and other canned fish, as tuna fish, are occasionally used in the Army mess. The sardines may be used for sandwiches and are best for this purpose if mashed into a paste. Canned tuna fish is used cold in salad or creamed.

(c) Canned oysters and clams are occasionally used but are rather expensive. Canned crab and lobster are very expensive. As an occasional special treat, canned crab may be mixed with chopped lettuce, canned peas, and salad dressing, and served thoroughly chilled. Most of this dish consists of the lettuce and peas; fifteen ½-pound cans of crab are sufficient for 100 men.

(3) *Canned evaporated milk.* See paragraph 28.

(4) *Canned fruits and vegetables.* (a) These articles are a very important part of the Army ration. When fruits are canned, a sugar sirup is added to make the fruit sweeter and help preserve it. When vegetables are canned, a brine which is made of salt and water or sometimes sugar, salt, and water is added to the can. After the can is sealed, much food value goes from the fruit or vegetable into the sirup or brine. Too often this liquor (sirup or brine) is thrown away. It has high food value and should always be saved and used. Following are some of the uses for sirups from canned fruits and liquor from canned vegetables:

1. *Sirups from fruits.*

Beverages and coloring.

Flavoring and coloring gelatin and other desserts.

Flavoring and coloring some salads.

As a substitute for milk on cereals.

Added to stewed dried fruits.

Flavoring and coloring sweet sauces.

2. *Liquor from vegetables.*

Added to soups for flavor.

Flavoring and coloring salads, especially when made with gelatin.

Added to gravies and sauces for flavor.

(b) Canned fruits and vegetables are equal, or nearly so, to fresh fruits and vegetables in nutritive (health-protecting) value. Troops can be kept in good health even when no fresh fruits and vegetables are available, if they are furnished canned fruits and vegetables. Canned tomatoes are especially valuable for health protection as they are very rich in vitamins.

(c) Canned fruits and vegetables as well as other kinds of canned food have been thoroughly cooked in the canning process at the factory and, therefore, do not require cooking in the mess. If desired to serve canned foods hot, it is necessary to heat them for only a few minutes to make them ready for serving. Canned foods, especially canned fruits and vegetables, should never be boiled or heated longer than necessary to get them hot for serving as boiling or prolonged heating tends to destroy their health-protecting vitamins.

(d) Canned fruits are served as a table dessert, alone or in combination with other fruits, in fruit salad, and in puddings, pies, and other cooked and baked dishes. A single canned fruit is sometimes served as a dessert; for example, canned peaches or canned pineapple. A much more appetizing fruit dessert can be made by using several different kinds of canned fruit and making a fruit salad or fruit cup. This requires no more fruit and costs little, if any more. The large pieces should be diced or chopped. A topping of a little ice cream, shredded coconut, or whipped cream adds greatly to the appearance and palatability of fruit cup.

(e) Palatability of canned fruit is greatly increased if chilled before serving.

(f) Two types of canned fruits are packed.

1. Those which are packed in a sugar sirup, and

2. Those which have had no sugar added (water-packed—pie fruit).

They are usually used for pie and require the addition of sugar.

(5) *Canned specialties.* This covers such foods as combination of fruits or vegetables for salads, canned spaghetti, prepared chocolate milks, and similar items. Their cost is high, and generally the same foods may be prepared in the mess at less expense. However, canned tomato and pineapple juice have vitamin value and are inviting drinks for breakfast from time to time in lieu of fruit. Cost will govern the frequency of serving.

b. *Inspection of canned foods.* The most important feature in the inspection of canned foods when received in the mess is the detection of any which are spoiled. Spoiled cans are usually swelled; that is, the ends are bulged out. Some times spoilage is indicated by the fact that the cans are leakers, and

some of the juice or brine has escaped and soiled the exterior. Swells, leakers, and badly rusted cans should not be accepted. The contents of cans which are swells or leakers should never be used as spoiled canned food may be very poisonous. Slight rusting or denting or soiled labels do not affect the quality of the food and are no cause for rejection.

c. Storage of canned foods. (1) *General.* Canned foods should not be stored in high temperatures as this hastens spoilage. A dry storage place with an even temperature not over 50° F. is best. If canned foods freeze, the seams may burst and the cans become leakers. This permits air to enter and the contents to spoil. Canned foods which have become frozen should be carefully examined, and any which show signs of being leakers should be used at once before the contents have had time to spoil. Frozen canned foods should be thawed slowly and never in a hot room unless the food is to be used at once.

(2) *Keeping qualities of various canned foods.* (a) Canned fruits and vegetables of the acid type (cherries, berries, pineapple, plums, sauerkraut) spoil rather rapidly in the warm temperatures often prevailing in kitchens or mess storerooms and should not be kept on hand in the mess more than 3 months. One exception is tomatoes, which keep well for at least 6 months. Spoilage in this type of canned food is always indicated by swelled cans.

(b) Canned fruits and vegetables of the nonacid type (apricots, peaches, pears, beans, corn, peas, pumpkins, etc.) keep comparatively well and may be stored in the mess for 6 months to 1 year with safety. Spoilage of the nonacid fruits is indicated by swelled cans; starchy canned vegetables such as baked beans, corn, peas, pumpkin, and squash often spoil without swelling and, when spoiled, are called flat sours. On opening a flat sour a sour odor is noticeable, and the contents are usually sloppy or mushy and have a sour taste. Tasting of any canned food to detect spoilage should be done with caution, food tasted should never be swallowed, and the mouth should be immediately rinsed out.

(c) Canned meats are good keepers and may be kept on hand in the mess for at least 1 year with safety.

(d) Canned sea food does not keep as well as canned meats, and frequent inspection for the detection of spoilage is necessary. Canned salmon may be kept on hand in the mess for at least 1 year with safety.

(e) Canned milk is not a very good keeper and should not be kept on hand in the mess longer than 6 months.

(f) All canned foods in storage in the mess should be inspected frequently to detect signs of spoilage and to insure that they are used within the safe storage limits as explained above. Dented and battered cans should be carefully inspected and, if not leaking, used first as the can may have been weakened and may become a leaker within a few days.

8. Cereals, breakfast. See paragraph 5.

9. *Cheese.* *a. Varieties.* There are many varieties of cheese. The principal varieties made in the United States are:

(1) Cheddar (cheddars, flats, daisies, young Americas, longhorns, prints, and squares).

(2) Swiss (or Ementhaler).

(3) Brick.

(4) Limburger.

(5) Cottage.

b. Types. There are two types of cheese, the natural cheese and the processed or pasteurized cheese. The natural cheese is made from either raw or pasteurized milk which has been inoculated with a specific bacteria and seasoned to give it its characteristic flavor. Processed cheese is the natural cheese pasteurized and sold as "Processed Cheddar," "Processed Swiss," etc. The consumption of the two types is about equal. The processed cheese has a milder flavor than the natural cheese. It is usually packed in brick shapes of various weights and wrapped with specially treated paper. Both types of cheese have the same nutritive value. Processed cheese is usually higher priced than natural cheese. However, since there is no rind, and it is much easier to cut into economical servings, it may be as cheap to serve as natural cheese.

c. Food value. With the exception of cottage cheese, all the varieties men-

tioned above contain about one-third fat and one-third protein. They, therefore, have high food value as the protein is rich in body-building substances and the fat furnishes large amounts of heat and energy. Cottage cheese is made from skim milk and contains no fat. Cheese is rich in vitamins and minerals.

d. *Uses.* Cheese is used as a substitute for and a supplement to meat, and for flavoring a great number of dishes. Due to its great food value, it should be served often. By using the various kinds of cheese and by cooking with other foods, much variety can be given the diet. Cheese, preferably two or more varieties, should be served when cold meats are served.

10. **Chocolate.** a. Chocolate is sold as:

- (1) Plain (also called bitter or cooking) chocolate.
- (2) Sweet chocolate.
- (3) Sweet milk chocolate.

b. Chocolate in storage sometimes develops a white bloom or discoloration on the surface. This is merely cacao fat and does not harm or lessen the eating qualities of the chocolate in any way.

c. Chocolate is used in several ways. It may be used in lieu of cocoa to make a beverage, or in icings, chocolate cake, puddings, etc. When melting it, use a double boiler; otherwise it may scorch.

11. **Cocoa.** a. There are two kinds of cocoa—breakfast cocoa and cocoa. Breakfast cocoa is better; it contains not less than 22 per cent of cocoa fat and makes a richer and more pleasing beverage. There are on the market mixtures of cocoa and sugar, or cocoa and starch, etc., sometimes flavored with vanilla. These are not cocoa—they are merely cocoa preparations. On account of the added sugar or starch, they are usually very light in color and do not make a beverage of the same strength as that made from pure cocoa.

b. Low-grade cocoa is gritty and of poor flavor. Light or dark color in cocoa is not necessarily an indication of quality as dark color may be due to heavy roasting of the cocoa in manufacture. However, a very light color may indicate an imitation or adulterated cocoa.

c. The frequent serving of cocoa is desirable. It affords a change from coffee at meals. Many men who do not like milk will drink cocoa and in that way obtain the benefits others get from drinking milk. If served at breakfast, coffee should also be served as many do not desire cocoa as a breakfast drink.

d. Cocoa is rich in starch, therefore cocoa boiled for 5 minutes has a much better flavor than that made by simply adding it to scalding milk.

12. **Coffee.** a. Coffee is used most as a beverage, but it may also be used to flavor ice cream, puddings, sauces, etc. It is naturally served hot but may be served iced in hot weather, although when so used it lacks some of the stimulating effect of hot coffee.

b. The coffee furnished to Army messes is of good quality and will make an excellent beverage, provided it has not lost its strength and the beverage is properly made. Coffee loses its strength rapidly after roasting, and the loss of strength is hastened if the roasted coffee is ground, due to the greater surface exposed to the air. Loss of strength is retarded if roasted and ground coffee is kept in tightly closed containers. When practicable, coffee should be ground just before using in order to get the maximum strength from it. When this is done, a smaller quantity will make a beverage of suitable strength; on the other hand, if the mess purchases coffee which has been roasted and ground for some time, or purchases more than can be used within a week, it is necessary to use larger quantities in order to make a satisfactory beverage. In making coffee by any one of the methods given in this manual, the detailed instructions for the method used must be carefully followed to produce a good beverage. Nothing adds more to the satisfaction of a meal than a cup of good coffee; and nothing detracts more from a meal than coffee which is weak or bitter, or of poor flavor.

Coffee should never be boiled; the utensils should be cleaned immediately after use.

13. **Corn meal.** a. Corn meal is ground white or yellow corn with the hull removed and the fine corn flour sifted out.

b. About the only difference between hominy grits and corn meal is that the corn meal is of finer size. Both are made by sifting the same cracked corn.

c. Corn meal has a high calorific value. It has many uses in the menu, but especially as fried mush or in corn bread.

d. Corn meal in sacks is especially subject to insect infestation and should not be kept on hand for more than 3 months.

14. Cornstarch. a. Cornstarch is a pure carbohydrate and has a high energy value. It provides no vitamins, minerals or roughage. It is inexpensive and provides energy at low cost but must be properly prepared to be palatable. For example, a plain cornstarch pudding is not very palatable. Many soldiers will not eat it. Such a dish should be made by adding fruits, coconut, etc., and served with a sauce or whipped cream.

b. Cornstarch is used for puddings or as a thickener for gravies, pies, and sweet sauces. Cornstarch is not as desirable as flour for thickening gravies but may be used for this purpose if flour is not on hand. It may also be used to tone down a hard flour, or as a flour substitute (see par. 18).

15. Dressings, salad. a. Mayonnaise dressing is made of edible oil, egg yolk, lemon juice or vinegar, and seasoning (salt, pepper, etc.). Mayonnaise may be made in the kitchen at a considerable saving. A variety of dressings can be made using mayonnaise as a base. Russian dressing can be made by adding lemon juice, chili sauce, and Worcestershire sauce to taste. Tartare sauce can be made by adding chopped green olives and pickles to mayonnaise.

b. Salad dressing might be thought of as a diluted mayonnaise. It is made of oil, egg yolk, lemon juice or vinegar, and cornstarch as a filler. A good salad dressing should contain at least 35 percent oil. However, many brands are on the market with as low as 9 percent oil. For this reason there is a great variation in price. The same variety of dressings may be made as with mayonnaise using salad dressing as a base.

c. French dressing is a mixture of oil, lemon juice or vinegar, salt, mustard, and other spices, if desired. The oil will separate from the liquid and spices and care should be taken to see that the ingredients are well mixed before using. French dressings are now on the market containing a carrier that prevents separation.

d. The common salad oils used are refined cottonseed and corn oil. Olive oil is also used but is usually too expensive for use in the mess. Soya bean oil is used to some extent but does not have the keeping qualities of the other oils. Any of these oils may be used for making the various dressings in the troop mess.

16. Eggs. a. The term "eggs" unqualified, means hens' eggs. Hens' eggs average when fresh, approximately 2 ounces each, of which weight the yolk represents 32 percent, the white 57 percent, and the shell 11 percent. The food value or flavor of the egg is in no way influenced by the color of the shell. The general color of the yolk varies with the feed. Green feed and yellow corn produce dark-colored yolks, while small grain and white corn produce light-colored yolks. The albumen (egg white) is held together by a very fine network of fibrous material radiating through it from the shell membranes. It is this network that enmeshes and holds the air when an egg is whipped. With age these fibers become weaker and do not retain the air so well. Consequently, an old egg does not whip satisfactorily.

b. (1) The market value of eggs is determined by age, size, weight, shape, cleanliness, and condition. In some localities it is also influenced by color of shell, but this is merely a matter of personal preference as the color of shell makes no difference in the food value.

(2) Grades of eggs are based on weight and condition (clean, sound shell, sweet, free from mold, foreign flavors, and odor). Army specifications permit a certain percentage of checked and dirty eggs in each case but do not permit any eggs which are inedible on account of internal condition.

c. Eggs should never be washed unless they are to be used at once as the shell of an egg is porous and washing opens the pores and allows bacteria to enter the egg, and spoilage follows rapidly.

d. Small white spots at either end of the yolk have no meaning as they are only parts of the fiber which holds the yolk in place before the shell is broken. There is a small (germinal) spot found in the yolk of every egg, whether fertile or not. This spot is of no importance while small, but if the egg is fertile and germination begins, the germinal spot becomes larger and soon makes the egg

unfit for eating. This will happen within 10 days after laying during the warm season unless the egg is kept in cool storage.

e. (1) Eggs are used in the mess in many ways, as boiled, poached, fried or scrambled, or in cooked or baked dishes. They are used in custards, meat loaf, croquettes, French toast, etc. Aside from food value and flavor, eggs serve the following additional purposes:

(a) *Binding.* To avoid crumbling of muffins, cookies, croquettes.

(b) *Clarifying.* In soups. The loose floating particles of other ingredients are caught in the egg particles and thus are held together. The white of egg is used for this purpose.

(c) *Coating.* To give an attractive cover to chops, cutlets, and other meats.

(d) *Coloring.* Give desirable yellow (yolk) or white (albumin) color to product.

(e) *Decorating.* Sliced hard-boiled eggs. To serve with cold meats, salads, fish, etc. They present an attractive appearance if cut across the yolk.

(f) *Leavening.* To give lightness to hot cakes and pastries.

(g) *Separation of oils.* In mayonnaise the eggs surround particles of oil, thus keeping them from coalescing (joining). This makes the mixture a smooth one.

(h) *Texture improving.* Avoids lumping of frozen mixtures.

(i) *Thickening* for sauces, pie fillings, custards.

(2) If the egg whites are to be whipped, none of the yolk should be allowed to get into the dish as it keeps the whites from becoming fluffy. If eggs are not reasonably sound, the whites cannot be beaten into a light mass.

f. If many eggs are to be broken into a dish, they should be first broken and dropped into a saucer, one by one, so that any bad eggs may be thrown out without spoiling a whole batch.

g. *Dried eggs.* (1) There are three classes of dried egg products: dried whole egg, dried yolk, and dried albumen (whites).

(2) A good dried egg made from strictly fresh whole eggs has excellent keeping qualities, flavor, and aroma. It does not require refrigeration and can be stored at ordinary temperatures for several months. It is a product that will lend itself to field conditions where it is difficult to issue fresh eggs or where refrigeration is lacking. It is also adaptable to cold climates as freezing will not injure the product.

(3) It is not necessary to reconstitute the powdered egg for baking. The best method is to add it dry and incorporate it by creaming with the shortening in the formula.

17. Extracts, flavoring. Flavoring extracts are derived from two sources: plants known as "true extracts," and chemical compounds that produce the desired flavor and aroma for which the extract is named. Such flavors are called "synthetic" or "imitation" flavors. The true extracts have a more delicate flavor and aroma than the synthetic flavors. Most Army messes use only vanilla and lemon flavors. There are many more on the market and much interest can be added to the food by using a variety of flavors.

18. Flour. a. This is one of the cheapest and one of the most useful items of the ration. While most breads, with the exception of hot breads such as biscuits, rolls, etc., are baked in the post bakery or in small posts are purchased under contract, there are many uses for flour in connection with the making of hundreds of inviting dishes as well as for pastries and similar uses.

(1) *Bread flour (hard wheat flour, issue flour)* is used most extensively for bread and other yeast-leavened baked products and is suitable for the making of gravies, hot cakes, etc. It is not a good pastry flour as it is too hard and tends to make a tough cake or pastry. If no soft wheat (pastry) flour (see (3) below) is on hand, and it is necessary to use bread flour for pastries, the latter can be toned down by mixing in 10 per cent of cornstarch or other flour substitutes (see (7) below).

(2) *Family flour.* Family flour is a mixture of hard and soft wheat flours. It is intended for general use; bread baking as well as cake baking. It is not as satisfactory for bread as hard wheat flour nor as satisfactory for cakes as soft wheat flour, but is a good all-purpose flour intended more for the home than for the mess.

(3) *Soft wheat flour (pastry flour)*. This type is intended mainly for cake and pastry making and is most suitable in batters where baking powder is used instead of yeast. It is soft to the touch and, when yeast is used, requires considerably less time for fermentation than hard wheat (bread) flour.

(4) *Graham flour (whole wheat or entire wheat flour)*. This is a flour containing most or all of the bran of the wheat kernel as well as the lighter colored starchy part of the grain which makes up the ordinary wheat flour. It is used for whole wheat bread, muffins, etc.

(5) *Rye flour*. This is either light or dark in color, depending on the method of milling used. In a dark flour more of the bran particles are included, and while they contribute some small additional minerals to the diet, there is no particular advantage in the use of either color except for the purpose of producing a lighter or darker colored baked product.

(6) *Self-rising flour*. This is composed of flour and baking powder or baking soda and phosphate in proper proportions to leaven, or raise, the mixture when baked. The cost of this product is usually too high for use in the mess and since its ingredients are available to every cook, its purchase is not warranted in the service.

(7) *Corn, barley, rice, and potato flours*. The use of these flours in the Army mess is seldom necessary. They can be used, if necessary, as a flour substitute by mixing with wheat flour. Cornstarch also can be used for this purpose. The proportion should be 90 per cent wheat flour and 10 per cent substitute. If one of these substitutes is mixed with a bread flour, the effect is to weaken the flour; that is, to change it to a soft or pastry flour, but pastries made from such a mixture will be inferior to those made from a soft flour.

b. Flour has a high calorific (energy or fuel) value, but it contains little vitamin or roughage value. While bread is called the staff of life and is an important and necessary part of our diet, the body cannot be kept in a state of health by eating bread alone to the exclusion of a variety of other essential foods such as meats, fruits, and vegetables.

c. When flour becomes old it is also likely to become insect infested, and it may be necessary to remove insects by sifting. If there are many insects, the flour should be discarded. However, it should not be necessary to keep any considerable quantity of flour in the mess.

19. Fruits. a. *Fresh*. Fresh fruits should be served daily in organization messes. Advantage should be taken of fruits that are in season for they are of the best quality and lowest price. With the present cold storage facilities, citrus fruits are in season the entire year. They are of especial value for their vitamin content and should be included in the menu at frequent intervals. The vitamin content of fruit is utilized to best advantage when served raw, however, a variety of desserts can be made by the cooking of fresh fruits. This may be especially desirable when green apples are on the market for use in pie, cobbler, and sauces. Underripe or green fruits have a high starch content and should be cooked to make them digestible.

b. *Dried*. (1) *General*. There are several terms used to designate dried fruits: dehydrated, evaporated, sun-dried, and dried. These terms refer to the methods used for drying. "Dried" refers to all dried food regardless of the means used for extracting the moisture. Considerable progress has been made in the dehydration of fruits and when properly prepared they will make a very tasty dish. There are two classes of dehydrated fruits on the market. The flake and powder form does not rehydrate to its original form and is used for jellies, desserts, bakery products, ice cream, ices, and sherbets. The other form is the fruit dehydrated in the original form or in pieces, and when rehydrated, can be used the same as fresh fruits.

(2) *Storage*. During an emergency it may be necessary to use dried fruits to conserve storage and transportation space. Much of the vitamin and mineral content is lost during the dehydration process but those fruits are otherwise of the same nutritional value as canned fruits. Dried fruits, such as raisins, prunes, and apricots, are subject to insect infestation and should be kept in well-ventilated storage not over 50° F. Others are dried to a very low moisture content and do not require as low a storage temperature. These products take up moisture from the air very rapidly and should be stored in a dry place and kept well covered at all times.

20. Gelatin. *a. General.* Gelatin is a protein food substance. It is very easily digested. Plain gelatin is found on the market in coarse powder. There are also many commercial preparations of gelatin combined, for the purpose of flavoring, coloring, or both, with fruit juices, artificial flavoring, sugar, artificial coloring matter, or a combination of such products. These are not recommended for Army use. For the mess it is more economical to procure the pure, dry, plain gelatin in large containers, rather than the small 2 or 3 ounce packages in which flavored gelatin is sold. To use gelatin, it must be dissolved in a liquid, usually about 1 pint of liquid to 1 ounce of gelatin, and then chilled to cause it to jell (become firm). Pure gelatin, properly jelled, produces a firm, clear, jellylike mass, without odor, flavor, or color.

b. Uses. The use of gelatin in frozen desserts prevents ice crystallization or a grainy texture. In the mess, gelatin may be used to make a variety of salads, puddings, and desserts, as a binder in meat loaf, croquettes, etc., and in cake icings and salad dressings. Added to milk or cream, especially evaporated milk in the proper proportions, it makes whipping easier. Pure gelatin blends well with most foods and provides a means of using leftovers in a great number of ways. Meat, fish, eggs, fresh or canned fruits and vegetables, fruit juices, cold soups, and even cooked cereals, such as rice, combined with gelatin make attractive salads, puddings, and desserts. One pound of pure dry gelatin will make 24 quarts of gelatin jelly or more than 300 liberal servings, when fruits, etc., are added.

c. Suggestions for using. (1) Always soak (soften) gelatin in cold water, then dissolve in hot liquid or in a double boiler. Hot fruit juices or hot milk may be substituted for hot water to dissolve the soaked gelatin. The liquid used to dissolve most commercial colored and flavored gelatin, after soaking, must be boiling and should be stirred until the preparation is thoroughly dissolved. A little gelatin added to a thin soup will make it thicker and richer. Soften the gelatin in a small quantity of cold stock, and dissolve it in the hot stock.

(2) Gelatin becomes firm in a shorter time when placed in metal molds than in enamel, glass, or earthenware. Gelatin hardens much more rapidly if put in several small molds than in one large one. To hasten the stiffening of gelatin, place the mold in a pan of cracked ice to which coarse salt has been added, or use the freezing trays of a mechanical refrigerator as molds. At the temperature of the average refrigerator (50° to 52° F.), a pint mold of gelatin should become firm in about 2 hours. Always cool gelatin before placing in the ice box; hot foods raise the temperature and waste ice or refrigeration.

(3) Molds should be rinsed in cold water before gelatin is placed in them to stiffen. To unmold gelatin products, dip each mold all the way to its top edge in warm, not hot, water for a second; slightly loosen the jelly at the edges with a silver knife; withdraw the mold from the water and wipe it dry; then place the serving dish on top of the mold, invert them holding the serving dish tightly against the mold, and then carefully lift off the mold.

(4) Leftover broths from cooking meats may be congealed with gelatin to make an aspic jelly to which leftover meat or vegetables may be added.

(5) Make gelatin jellies of excess fruit juices. Cubes and other shapes of colored gelatin jelly are attractive for serving with or garnishing salads and cold meat dishes.

(6) Leftover coffee may be used to make coffee jelly, coffee spanish cream, or mocha sponge. Cocoa may be used in a similar manner.

(7) Melted ice cream should never be thrown away. Stiffen it with gelatin, stirring in a level tablespoonful of gelatin to a pint of ice cream. Chocolate, strawberry, or coffee flavor, and chopped nuts, dates, raisins, or cherries may be added to this mixture to provide an excellent chilled or frozen pudding or dessert.

(8) Ices and sherbets may be chilled or frozen more satisfactorily in the trays of the mechanical refrigerator if gelatin is used in their preparation.

(9) When cream will not whip satisfactorily, add the white of an egg or an equal quantity of dissolved gelatin to it and it will whip easily. The cream and egg or gelatin must be thoroughly chilled before whipping. To whip evaporated milk, first place the can in boiling water for 10 minutes, open the can, and stir the soaked gelatin into the hot milk until dissolved. Turn this mixture into a chilled dish and allow it to become thoroughly cold, when it may be whipped readily. For a heavy whipped cream, use two teaspoonfuls of gelatin soaked in two tablespoonfuls of cold water to the standard 14½-ounce can of milk.

(10) Gelatin should more than double its bulk when whipped and have a light spongy texture. Before starting to whip the dissolved gelatin, test its consistency with a tablespoon. If it is slightly thickened and falls from the spoon in heavy drops like sirup, it is ready to whip. Set the bowl of sirupy gelatin in a pan of cracked ice while whipping it. It should become light and fluffy in about 8 minutes. During the whipping, stir occasionally with the beater to break up any large air bubbles.

(11) In making mayonnaise or cooked dressing which is to be kept for several days, stir in a little gelatin which has first been softened in cold water and then dissolved over hot water. This keeps the dressing firm.

(12) When making croquettes, add a little gelatin which has been softened in cold water and dissolved over hot water. Use only enough cold water to reduce the gelatin to a liquid. Stir the gelatin into the croquette mixture and set aside until it stiffens. Croquettes may then be shaped easily, and the heat of frying will dissolve the gelatin, leaving them soft and creamy on the inside.

(13) Gelatin cannot be successfully combined with fresh pineapple, fruit or juice, without first scalding the pineapple. This does not apply to canned pineapple, which has already been cooked.

(14) Gelatin desserts may be topped with whipped cream, sprinkled with chopped nuts, dates, raisins, candied fruit, or toasted, tinted, or plain coconut, and garnished with lettuce, celery, or cheese.

(15) Gelatin desserts and salads may be prepared hours before needed or even the day before at convenient times.

(16) Gelatin is not recommended for use in pies made in Army messes.

21. Grits, hominy. This is very similar to granulated corn meal except that it is coarser. It may be prepared the same as corn-meal mush.

22. Ice cream, ices, and sherbets. *a.* Ice cream is a very satisfactory dessert, either summer or winter. Ices should not be confused with ice cream as they are usually made from water, fruit juices, and sugar. Sherbets are similar to ices but contain some egg white. Both ices and sherbets make a satisfactory dessert after a heavy meal, especially on a hot summer's day. Ice cream can be purchased from commercial concerns at reasonable prices, and conveniently wrapped for individual servings, usually six or seven servings to the quart. If the equipment is available, ice cream, ices, and sherbets can be made in the mess at a considerable saving.

b. Ice cream can be served in the mess in many ways other than plain and on pies. It may be added to a fruit cup in the form of topping. It may be served as a sundae using sirup from canned fruits previously opened and with left-over sliced fruits.

23. Jams, jellies, preserves, and fruit butters. *a.* Pure jams, jellies, preserves, and fruit butters are made from fruit or fruit juice and sugar. Imitations are made chiefly from glucose (corn sirup) and coloring, contain little or no fruit or fruit juice, and are inferior in flavor and food value. The label must state whether the product is an imitation.

b. Preserves and jam are very similar, the difference being that in preserves the fruit is whole or in relatively large pieces while in jam it is cooked down into a mush consistency. Jelly does not contain the fruit itself, only the juice of the fruit and sugar. Fruit butters are made from fruit which has been cooked and then strained to remove all fiber, seeds, etc., and to produce a smooth paste, to which sugar is added.

c. Jams, jellies, preserves, and fruit butters make good substitutes for butter. This gives variety to the mess. They go well with coffee, cake, biscuits, rolls, etc. They may be used in jelly rolls and pastries.

d. As the sugar content of jams, jellies, and preserves is high and sugar is a source of energy, the calorific value of these foods is high.

24. Lard and lard substitute. *a.* Lard is rendered hog fat. Lard substitute is made in two forms:

(1) *Compound*, composed of a vegetable oil to which is added sufficient hard fat (such as beef starine) to give the hardness and appearance of lard, and

(2) *Vegetable shortening*, a hardened vegetable oil (such as cottonseed or corn oil).

b. The cost of lard and the compound type of lard substitute is usually nearly

the same. Lard may sometimes be a little higher and sometimes a little lower in cost than compound. Vegetable shortenings often cost more than either lard or compound. This is especially true of the nationally advertised brands. Preference between shortenings is mostly a matter of comparative cost. All are used for the same purposes except that lard substitute (either compound or vegetable shortening) is superior to lard as a cake ingredient, as lard is likely to impart its characteristic flavor to the cake. The food value of lard and lard substitute is about equal. They are almost pure fats and, therefore, have a very high energy value. They furnish no vitamins, minerals, or bulk.

c. Lard and lard substitute are used for frying, for greasing bread and cake pans, and for shortening in breads, sweet dough, pie crust, cakes, and other pastry. Either may be used as a substitute for butter in cooking and baking; however, this will not give the color, richness, and delicate flavor imparted by butter.

25. Lard replaced by rendered or other fats. While it frequently is necessary to purchase a lard or lard substitute for the mess, it is possible to make considerable savings by using other fats for frying. The following fats can be used but should be strained and clarified:

Excess fat cut from fresh beef or pork and rendered.

Drippings from roasted beef or pork.

Fat skimmed from soup stock.

Drippings from fried meats, especially bacon.

26. Macaroni, noodles, spaghetti, etc. a. The different forms and sizes of these pastes are merely a matter of different molds in the machinery and cutting to desired size. Noodles are made from the same kind of paste as macaroni and spaghetti except that eggs are sometimes included in noodles which are then called egg noodles.

b. Boiled macaroni is simple to prepare (see recipe 181). It may be made more attractive for serving by the addition of a sprinkling of ground boiled ham, paprika, and a bit of parsley. A more tasty way of serving it is baked (see recipe 181).

c. Noodles may be added to soup or cooked like macaroni. A little butter added to noodles just before serving improves flavor and appearance. Macaroni, spaghetti, and noodles are subject to insect attack. A few packages should be opened when received and inspected for insect infestation.

27. Mayonnaise. See paragraph 15.

28. Milk, condensed or evaporated. a. General. Evaporated or condensed milk is marketed in two forms:

(1) *Unsweetened* evaporated milk is milk that was reduced to less than one-half of its original volume by the evaporation of water. It is marketed in 8-ounce, 14½-ounce, and no. 10 cans. The cans are labeled **STERILIZED UNSWEETENED EVAPORATED MILK**, and it is commonly referred to as evaporated milk. Evaporated milk keeps well if not exposed to high temperatures. It should be stored in a cool place, away from steam coils and radiators. At no time should a mess have on hand more than a 3 months' supply. If more than one lot of milk is on hand, the oldest should be used first. It should be turned often in storage to keep the cream from separating.

(2) *Sweetened* condensed milk is milk that has been condensed to a greater extent than evaporated milk, and to which sugar has been added to preserve it. The canned product has approximately 40 per cent of sugar. It is marketed in 14-ounce and 15-ounce cans, and is labeled **SWEETENED CONDENSED MILK**. It is preserved by its sugar content. It should be stored in a cool place. It should be turned often in storage to keep the cream from separating.

b. *Food value.* Evaporated milk after being diluted with an equal quantity of water has a food value equal to that of fresh milk, except that a little of the vitamin value which is present in the fresh milk is destroyed by heat in making evaporated milk. Sweetened condensed milk has a high calorific (energy) value because of its high sugar content, and also provides some vitamin and mineral value.

c. *Uses.* Evaporated milk, undiluted, may be used the same as cream; when diluted with an equal amount of water, it may be used the same as fresh milk. Because it is sterilized in the can, it has a cooked taste and is less palatable than fresh milk for drinking or cream for desserts. After dilution it may be used for

cooking and baking in any way that fresh milk can be used. When placed on the table, it has more appeal served in a pitcher than in a can. Sweetened condensed milk is rarely used in the mess as it is not as satisfactory for ordinary use and it costs too much. Because of its high sugar content, it has limited uses for cooking.

29. Milk, fresh and buttermilk. Fresh whole milk should be served in the mess daily. Great care is exercised to insure that only wholesome milk is delivered to the mess. This same care must be exercised by the mess personnel after it is received at the mess. The milk is pasteurized to destroy disease micro-organisms. Fresh milk is an excellent medium for the growth of bacteria and is easily contaminated. Milk should never be delivered to the mess in bulk as continued dipping and mixing of air in the milk again introduces disease organisms. For this reason, milk should be delivered in half-pint bottles and issued to the soldier in the same bottle as received. Fresh pasteurized milk should be used in every mess whenever available, especially for breakfast, as the men prefer it for their cereal or for drinking. Buttermilk should be handled in the same manner as described above for fresh milk.

30. Milk, dry. (a) There are two principal forms of dry milk. One is the dry milk containing all the butterfat and is known as "dry whole milk." The other is the product from which has been removed all fat which it is possible to remove. This product is sold as "dry milk solids not over 1½ percent fat," "dried skimmed milk," "skim milk powder," or "powdered skim milk." The dry whole milk is fresh, sweet whole milk, from which the water has been removed. It is a cream-colored powder, containing 26 to 27 percent butterfat. "Dry milk solids not over 1½ percent fat" is fresh, sweet milk from which both fat and water have been removed.

(b) Because of the fat content, dry whole milk is subject to development of rancidity. When packed in vacuum or an inert gas, the oxidation of the butterfat is retarded and it may be stored for several months. Since the fat content of dry milk solids (skim milk) is very low, the milk does not easily deteriorate and can be kept for at least 6 months under ordinary conditions. Because dried milk readily absorbs moisture it should be kept in an airtight receptacle. If dry milk should become lumpy, the lumps should be broken with a rolling pin and sifted through a sieve.

(c) Dry milk may be used in dry form in almost any food. Remixing with water is not necessary unless it is used as a beverage or other dish containing a great deal of liquid. If it is desired to reconstitute dry milk, the best procedure is to place the necessary quantity of dry product on top of the water and stir until dissolved. Lukewarm water is usually best for this purpose—never hot water. Another method is to add a small quantity of water to the dry milk product, mix to a paste consistency, and then add the remainder of the water slowly.

31. Oils, cooking. a. Cooking oils are made from refined and deodorized vegetable oils, principally cottonseed. They have practically the same uses and food value as lard and lard substitute. If kept on hand too long, they become rancid.

b. Cooking oil, either cottonseed or corn oil, is the best form of fat for deep frying as the smoking point is high (about 450° F.). An oil or fat should not be allowed to smoke when frying as this develops an unpleasant flavor.

32. Oils, salad. a. Salad oils are vegetable oils that may or may not have been refined. The most expensive is olive oil. Salad oils made of cottonseed oil, peanut oil, etc., are generally refined oils and are quite satisfactory. Salad oils are used on salad either alone, or with vinegar, or as an ingredient in salad dressing. Salad oils become rancid if kept on hand too long.

b. Salad oils may be used for the same purpose as cooking oil. However, they are more expensive than cooking oils, have a better flavor, and are chiefly used on salads or for the preparation of salad dressings.

33. Oleomargarine. During recent years, the following provision has been included in War Department appropriation acts: "Provided, that none of the money appropriated in this Act shall be used for the purchase of oleomargarine or butter substitutes for other than cooking purposes, except to supply an expressed preference therefor or for use where climatic or other conditions render the use of butter impracticable." This provision has precluded the use of oleomargarine in Army messes.

34. Olives. Olives are either ripe (black) or unripe (green). The ripe olives are not pitted and are usually served in a side dish as an appetizer with celery, pickles, etc. They are rarely cut up for incorporation in salads as green-colored olives are preferred for this purpose, having more appeal to the eye and harmonizing better with the other ingredients of the salad. As olives are high in price, they are rarely served in the mess except on special occasions, as with Thanksgiving or Christmas turkey, or on Sundays when cold meats are served. When green olives are cut up in cabbage salad, they contribute much to desirable flavor, and the quantity used depends upon the cost and quantity available—a few go a long way. As they are not used in large quantities, the small calorific and vitamin value is not important.

35. Onions, dry. See paragraph 50.

36. Pickles. *a. General.* The term "pickles" means cucumber pickles, although many fruits and vegetables are pickled, such as tomatoes, cauliflower, onions, pears, celery, crab apples, watermelon rind, and combinations of finely chopped vegetables, as pickled relish. Cucumber pickles are whole or sliced crosswise or lengthwise. They are sweet, sour, or dill. The dills are genuine, imitation, kosher, or sweet. The pickles included in the ration are sour cucumber pickles.

b. Uses. The frequent inclusion of pickles in the menu adds to the attractiveness of the meals and appeals to the appetite. Whenever cold meats are served, pickles should be served with them. They add zest to the appetite and pleasing appearance to the food with which they are served. Cucumber pickles are cut into small pieces for inclusion in cabbage salad; they are cut into long strips or sliced to make plates of cold meat more attractive; they are chopped fine or made into a relish for serving with hot meats.

c. Food value. Pickles are a good source of vitamin B. They supply roughage. Sour or dill pickles have a very low calorific value as they contain little or no sugar. Sweet pickles contain some calorific value due to their sugar content.

37. Potatoes, irish. See paragraph 50.

38. Potatoes, sweet. *a.* Sweet potatoes are classed as dry-meated, medium moist-meated, and moist-meated. The moist-meated type is often called yam. Sweet potatoes are baked, boiled, fried, candied, and made into custard and pie. Sweet potato pie resembles pumpkin pie both in flavor and appearance.

b. The sweet potato is a starchy food with high energy value, and is a good source of vitamins and minerals but does not furnish much roughage. Fresh sweet potatoes are very poor keepers. They should be stored in a dry and fairly warm place.

39. Rice. *a. General.* Rice is supplied to the Army mostly in the milled (white) form, but regulations require that brown (unpolished) rice be issued to native Filipino troops as it contains vitamin B which polished rice does not contain. Since the diet of the Filipino troops is more limited in variety than that prescribed for the balance of the Army, it is essential that it contain as much health protection as the more varied ration. Besides its vitamin value, brown rice also contains mineral matter and some bulk not to be found in the white rice. The calorific (heat and energy) value of all rice is high. Brown rice should be tried in messes where it is available. Since the flavor is different, it is best to order in small quantities until it is certain the men will eat it.

b. Uses. Rice is used in many ways. It may be boiled and served hot or cold with milk. The addition of raisins or currants to the boiled rice, when used as a dessert, makes it more tasty. It may be made into puddings, or the boiled rice may be fried in cakes and served with sirup. Rice may also be added to soups, especially those containing vegetables or meats. Boiled rice and gravy are sometimes served as a substitute for potatoes. If served in this way, the gravy should be in separate bowls so that the men may add it to meet their individual desires.

40. Salad dressings. See paragraph 15.

41. Salt. The moderate use of salt lends flavor to most dishes. If cabbage, lettuce, or celery is put in cold salt water overnight it makes those vegetables crisp. Since salt has the same appearance as sugar, it sometimes happens that it is erroneously used for sugar. The best prevention is to plainly mark containers, and, if not sure, taste before using.

42. Sauerkraut. *a.* Sauerkraut is considered one of the best bulk foods. It

is an excellent source of vitamins and minerals particularly when served uncooked. Sauerkraut juice has a laxative effect.

b. Sauerkraut may be baked, boiled, fried, or in small quantities, eaten raw as a salad. It is especially adapted to serving in combination with certain meats such as frankfurters, fresh spareribs, salt pork, or fresh or cured ham. Care should be taken not to overcook it as, when it becomes too soft, it loses much of its flavor and desirable taste.

43. Sirup. a. (1) There are many kinds of sirup. They differ in body and flavor. If the sirup on hand is not popular on account of its flavor, it may be given a different flavor by adding sugar (white or brown) and flavoring extract and then heating. Maple flavoring (maple sugar or maple extract) is good for this purpose. If the sirup is too thick, it may be thinned by adding water. When this is done, the thinned sirup should be heated in order to thoroughly mix the sirup and added water.

(2) A sugar sirup may be made by boiling 1 pound of white sugar, 1 pound of brown sugar, and 1 pint of water, or quantities similar in proportion. Flavor to taste with maple or vanilla extract. Corn sirup is not so sweet as sugar sirup but costs less. It is also of thicker consistency. Pure maple sirup is usually much more expensive than other sirups and, unless it can be obtained at a low price, it is not used in the mess. A maple-flavored sirup is a good substitute. Sirup, on account of its high sugar content, has much calorific (fuel) value.

b. Sirup has many uses. A kitchen-made (sugar and water) sirup may be added to baked apples to give them a better flavor and appearance. If molasses is not available, sirup may be substituted in baked beans, although the molasses is better for this purpose. Sirup may be used as a substitute for sugar in many recipes if the batch mixture does not become too liquid as a result. A little sirup added to a fruit cup improves the flavor where fruit juices are lacking. Hot baking-powder biscuits and sirup are a desirable breakfast combination.

c. Sirups will ferment (become sour) and mold if left in an open can or kept on hand too long. It is not necessary to keep a large supply on hand in the mess as sirup can be made quickly at any time from sugar and water.

44. Spices. a. Spices are aromatic seeds, buds, bark, roots, leaves, etc., which are used to season foods. They are used in ground form as ground pepper, ground cloves, ground cinnamon, etc.; or whole as whole cloves, stick cinnamon, bay leaves, etc.

b. (1) Skillful cooks depend on spices to bring out and intensify the natural flavors of foods as well as to obtain the flavor of the spices. To obtain these results, spices are added in sufficient quantities, but care is used not to add so much that the natural food flavors are destroyed. Each dish should be tasted carefully to determine whether it is seasoned just right.

(2) Salt and pepper must be added to many foods to make them palatable; without salt and pepper they are flat to the taste. All spices are not liked by all men and only those which are liked should be used. For example, some men are fond of breads and cookies containing caraway seed, others are not.

(3) The cook should not hesitate to use quantities and kinds of spices differing from the recipe if this will result in improved flavor. Many cooks use spices too sparingly for proper seasoning. The common spices are reasonable in cost considering the small quantity needed to flavor a large quantity of food.

c. There are several different kinds of pepper. Whole pepper is used in some recipes. Ground pepper is black, white, and red. Ground black pepper is the kind most used in Army messes. It is lower in cost and has more strength than white pepper. White pepper is used chiefly to give a pepper flavor without being seen, as in mashed potatoes. Some red pepper (cayenne) is hot and is used in dishes where a hot taste is desired, as chili con carne. Some red pepper (paprika) has little strength and is used chiefly for its red color, as in macaroni, spaghetti, salads, etc., to improve the appearance.

d. A few of the other commonly used spices are listed below:

(1) *Allspice* has a flavor resembling a blend of cinnamon, nutmeg, and cloves. It may be used in spice cake, pickles, and soup.

(2) *Cinnamon* is relished by almost everyone. Sweet doughs, pies, puddings, and cakes containing it should appear frequently on the menu. Stick or ground cinnamon added to stewed dried fruits improves flavor.

(3) *Cloves* are used as a seasoning for such products as meat dressings, spice cake, and pickles. Whole cloves are used in baking ham.

(4) *Cumin seed* is used in curry powder and soups.

(5) *Curry powder* is a highly seasoned combination of spices varying slightly in ingredients according to brand or method of preparation. It usually contains black and cayenne pepper, nutmeg, cinnamon, cloves, tumeric, coriander, cumin, and ginger. It is used for seasoning stews, meats, fish, rice, etc.

(6) *Ginger* is sold in three forms—whole, whole preserved, and ground. Ground ginger is used in making ginger bread, ginger cookies, dark fruit cake, and pumpkin and squash pie. There is little use in the Army mess for whole dry ginger, but whole preserved ginger has a limited use in fruit cakes and preserves and may be used in stewed dried fruits.

(7) *Mustard* is sold in two forms—ground mustard or mustard flour which is a powder, and prepared or wet mustard. There are two types of mustard—light and dark. The dark mustard is often called German mustard. It has a sharper taste than the light mustard and for this reason it is often thought that less is required; however, the light mustard is preferred by many. Mustard may be used to increase the palatability of many foods. It should be placed on the mess table when boiled or cold meats, baked beans, frankfurters, hamburger, etc., are served. It is often used in cooking baked beans, meat loaf, and other ground meat dishes. It is also used in some salads, cheese dishes, and sour cream dishes. A small quantity of mustard may be added to mayonnaise or mayonnaise type dressing to improve flavor.

(8) *Nutmeg* may be used to advantage in the same manner as cinnamon.

(9) *Poppy seed* is used principally in baking breads and buns as a topping for flavor and appearance.

(10) *Sage* is used principally in stuffing, bread dressing, or in soups.

(11) *Sweet herbs* such as marjoram, savory, thyme, mint, etc., are used in making sauces to be served with meats. They are especially desirable with mutton or fowl.

45. Starch. a. Starch is one of the most important sources of human food. It is a pure carbohydrate and has a high energy value but no vitamins, minerals, or roughage.

b. Starch is present in all plants or parts of plants used for food. Potatoes, turnips, pumpkin, squash, corn, beans, and cereals are all rich in starch. From some of these plants, starch is extracted by manufacture. The most important kind of cornstarch (see par. 18). Potato starch is used to some extent in bread-making as a substitute for flour. Cornstarch and rice starch may also be thus used. Tapioca is a starch (see par. 47).

46. Sugar. a. Sugar is made from sugar beets or sugarcane. There is no difference between cane and beet sugar as far as cooking or baking is concerned. Starch (corn) sugar is made from cornstarch. It is not as sweet as cane or beet sugar and is not often used for general cooking purposes. Sugar has high calorific (fuel) value. In normal times it is reasonable in price and should be used extensively. Pastries, puddings, and other sweet dishes are popular in the mess and should contain enough sugar to make them of proper sweetness.

b. The term "granulated" simply means that the sugar is in crystals of a certain size. The Army uses the size "fine granulated" or "medium fine granulated." Berry sugar, sometimes called "fruit powdered," is a little finer, being used in preserving, etc. It is not necessary to use a special size in the Army mess except that powdered sugar is used for icings, etc. There are two main types of powdered sugar—ordinary and icing. The icing type has a little cornstarch added so that the icing will be smooth.

c. Brown sugar is brown because it still retains a little molasses, and this gives it a flavor of its own. It is used where its flavor and color are desired as in some types of cookies, cakes, puddings, etc. It is inclined to cake, and when this occurs it must be broken up to get best cooking results, so that it may be well mixed with the other ingredients. A good method is to break it up with a rolling pin. It will not cake readily if kept in a closed jar with a whole lemon.

47. Tapioca. a. Tapioca is a starch manufactured from the cassava root. It is made in the following forms:

Small pearl tapioca.
Medium pearl tapioca.

Flake tapioca.
Granulated tapioca.

All these have the power of swelling and becoming jellylike when cooked. Pearl tapioca is used chiefly for puddings; the flake and granulated forms are valuable as binders for juicy pies.

b. Plain tapioca pudding is not very popular; fruits, eggs, milk, etc., should be added, and the pudding should be served with a sauce or garnished with whipped cream or bright-colored pieces of fruit such as cherries. A very good combination is to add diced pineapple; the contrast between the rather flat tapioca flavor and the acid flavor of the pineapple greatly improves the dish.

48. **Tea.** There are three general classes of tea: green (unfermented), black (fermented), and oolong (semifermented). Black tea is usually furnished for Army messes and is an excellent beverage if properly prepared. (Pour freshly boiling water on the required amount of leaves in an earthen pot. Allow it to brew for 3 to 5 minutes, then remove the tea leaves and serve. Iced tea should be made in the same manner, except doubly strong and poured over cracked ice. The ice will melt and dilute the tea to its regular strength. If the hot tea is permitted to cool before the ice is added it will have a cloudy appearance. Tea will absorb moisture and odors, and the volatile oil will evaporate. Store tea in tightly covered cans and in a cool place.

49. **Vegetables, dehydrated** (sometimes known as desiccated vegetables). Dehydrated vegetables will keep for long periods if protected from air and insects. They are valuable when it is absolutely necessary to save space and transportation as they are very light and have little bulk in comparison with the fresh product. They are not popular because of lack of knowledge of proper methods of preparation and at best are not as tasty as the fresh product, although great improvements have been made in drying processes in the past year. They should be soaked 10 to 12 hours or over night in cold water, then given a long, slow cooking at simmering heat. Potatoes and onions should be cooked for at least 4 hours or until tender. In warm weather the soaking should be shortened to prevent fermentation (souring), and the time of cooking should be lengthened. This will be governed by experience with the temperatures encountered. Dehydrated vegetables have a reduced vitamin value, but the other food value, after soaking, is practically the same as fresh vegetables.

50. **Vegetables, fresh. a. General.** (1) Fresh vegetables are of great importance in the diet because of their health-protective value. Most fresh vegetables are best in appearance and flavor and richest in vitamin value when freshly gathered; therefore, they should be eaten as soon after gathering as possible. This applies especially to celery, cauliflower, cucumbers, sweet corn, lettuce, lima beans, radishes, string beans, and tomatoes. Vegetables which can be kept on hand for considerable periods without harm are cabbage, carrots, onions, potatoes, and turnips, but it is necessary to go over the stock carefully at frequent intervals and throw out all which have decayed so that the good vegetables will not be affected by them.

(2) (a) While leafy vegetables, cabbage, lettuce, spinach, etc., are low in calorific (fuel) value, they are rich sources of vitamins, minerals, and bulk, but it must be remembered that some of their vitamin value is lost if they are cooked, and most of it is lost if they are overcooked. Therefore, raw vegetables are better sources of vitamins than cooked vegetables; however, the loss of vitamins can be kept to a minimum if vegetables are not overcooked.

(b) Starchy vegetables as potatoes, squash, turnips, etc., have high calorific (fuel) value. They have some vitamin and roughage value, but are not as rich sources of these as are the leafy vegetables. Starchy vegetables, in general, provide some minerals, and some are very good sources of minerals. However, since starchy vegetables are usually cooked, part of the vitamin and mineral value is lost because heat has a tendency to destroy vitamins and some of the minerals are lost in the cooking water. It is good practice to save the water in which vegetables have been cooked to use in soups.

(c) Leafy vegetables are valued chiefly for their health-protective value, and starchy vegetables, mostly root vegetables, are valued chiefly as an energy food. Leafy vegetables are constantly becoming more popular as their great health value is becoming generally known.

b. *Kinds.* Below are descriptions and uses of the fresh vegetables usually served in the Army mess:

(1) *Asparagus.* Sold both white and green. The white type is tenderer and usually costs more than the green. The green type has a greater vitamin value. There is a distinct difference in flavor. Many prefer the green type. Fresh asparagus accepted for the Army mess must be sound, clean and tender; the green color must extend well down the stalks. It must be free from wilted, crooked, fibrous, or woody stock. Large thick stalks are likely to be tough and bitter.

(2) *Beans, lima, fresh,* are but little superior to canned green lima beans. They may be purchased for the Army mess in two styles—in the pods, or hulled. The pods must be fresh, practically matured and green in color, but not underdeveloped or overripe, not dry or hard; practically clean and free from stems, leaves, sand, and dirt and from mold, decay, or disease. Diseased beans have brownish discolorations on the pod. Hulled beans must be fresh and not shrunk; well developed but not hard and dry; clean and free from mold, disease, or decay.

(3) *Beans, string,* include the green-colored and the wax or yellow types. Many prefer the flavor of fresh string beans to that of the canned kind. Fresh string beans, to be acceptable for the Army mess, must be clean and bright, tender, brittle, and not too large or too small. Old (matured) beans become very stringy.

(4) *Beets, fresh,* may be more economical at times than canned beets, but are little, if any, superior in eating quality. Only red beets (bloods) are acceptable for the Army mess. They must be tender, reasonably smooth, and practically free from dirt. They must not include excessively large beets as these are likely to be filled with tough, fibrous rings.

(5) *Broccoli* is a variety of cauliflower, which it much resembles. In general, inspection of broccoli on receipt is the same as that for cauliflower, and the uses are the same.

(6) *Cabbage,* when raw, is one of the best sources of vitamins, minerals, and bulk. It can be obtained at low cost at all seasons, and should be served often during the winter. It should be served raw oftener than cooked. It is very appetizing when served raw as slaw or cabbage salad if carefully prepared.

There are five distinct types of cabbage on the market—Danish, domestic, pointed, purple (sometimes called red), and Savoy. The Danish (sometimes called Hollander) and the domestic have very solid heads, round in shape. The Danish, domestic, and pointed types are equally satisfactory. The Savoy type has very loose heads resembling lettuce and is not desirable for the mess.

To be acceptable for the Army mess, cabbage must have heads well trimmed, be free from discoloration, solid and mature (not soft, spongy, leafy, split, or burst), and free from decay. The medium-sized heads are the most valuable, and any lot of cabbage which shows that these have been removed, leaving only large or small heads, should not be accepted.

When cooked, cabbage is usually boiled, either alone or with a ham hock or bacon for seasoning, or with corned beef. Left-over cooked cabbage is fried. It is a common fault to overcook cabbage, thus destroying its vitamin C value and also imparting an unattractive brown color and disagreeable flavor. Cook boiled cabbage only until tender; this requires about 20 minutes. There should always be some green color left when cooking is finished, if not, the cabbage is overcooked.

(7) *Carrots* are a rich source of vitamins, especially when served raw. They are palatable when grated raw for salad. They add flavor to meat dishes, especially roasts and stews. Carrots, to be accepted, should be firm and tender and of medium size. Those less than 1 inch in diameter or excessively large or split, broken or shriveled, should not be accepted.

(8) *Cauliflower* is used almost entirely as a boiled vegetable. Served occasionally it is well liked. Fresh cauliflower is in season during the fall and winter, from September to March. To be acceptable for the Army mess the heads must be firm, compact, white to light creamy white in color, medium to large in size; no head to be less than 3½ inches in diameter. The jacket leaves must be fresh, green, and well trimmed. There must be no spreading, discolored, or spotted heads.

(9) *Celery* is a valuable source of vitamins, minerals, and bulk. It should be served occasionally on the table as an appetizer, and used often raw in salads. The tops and leaves should be cut off and used for flavoring soups, stews, and meat dishes. The stalks are sometimes used diced in soups and meat dishes. A little diced celery greatly improves such dishes as meat loaf or braised beef.

When celery is received the leaves should be crisp and a bright green. Wilted yellow leaves indicate poor quality. Celery may be accepted for the Army mess in two styles—trimmed and untrimmed. The trimmed celery must be washed, stripped of the outside coarse and damaged branches, and trimmed of roots. The untrimmed celery need not be washed, stripped, or trimmed of roots. Untrimmed celery costs less than trimmed. Any celery, trimmed or untrimmed, to be accepted for the Army mess must be well bleached (practically pure white), tender and brittle, and free from hollow, slimy, or rusty branches.

(10) *Corn*. There are two types of corn—sweet (sugar) corn and field corn. Either is suitable for corn on the cob if picked while young and tender. When in season, fresh corn is often quite low-priced; out of season it is very expensive and the quality may not be good. When received in the mess, it should be carefully inspected by husking ears selected at random, as many ears may be only partially covered with kernels; however, it cannot be expected that all the ears will be completely covered to the tip end with kernels. If the kernels look withered or have a glazed appearance the corn is old and tough. The kernels which are tender are plump and milky, and when pressed with the thumb nail they are easily punctured and the milk spurts out. Only freshly gathered corn is satisfactory as it does not keep well after being harvested. When inspecting, look for ears that have been injured by worms or have wilted, discolored husks. If only a few ears are like this the corn may be accepted, but if there are too many the corn should be rejected.

Boiling on the cob is the most popular method of preparing fresh corn. Before cooking, the corn should be carefully freed from both husks and silks. Overcooking should be avoided; 12 minutes in boiling water is sufficient. Left-over cooked corn on the cob may be used by cutting away the kernels and using these warmed over in milk as a vegetable, or adding them to soups or stews.

(11) *Cucumbers* are appetizing and nutritious. They are sliced (or cut) for vegetable salads or are sliced in vinegar, or used sliced to garnish other dishes. Good-quality cucumbers are long and dark green. None under 5½ inches long should be accepted.

(12) *Eggplant* is fried in deep or shallow fat or baked. Served occasionally it is popular, and is economical when in season. To be accepted for the Army mess, eggplant must be firm, of good average size, and of good solid color. No eggplant shall be less than 3½ inches nor more than 6 inches in diameter. It must be free from withered, spongy, or spotted stock.

(13) *Endive* furnishes leaves which are used for salad or for flavoring in soups and stews. It may be served occasionally when in season.

(14) *Lettuce* is one of the best sources of vitamins, minerals, and roughage. In these respects it is about equal to cabbage, but is higher in cost. However, it is not necessary to use much lettuce for each portion. One leaf is sufficient as a base for fruit or vegetable salads or as a garnish. Heads of lettuce which have been chilled and crisped by soaking in cold water may be cut into eighths and served as a salad with dressing. To be accepted for the Army mess, lettuce must be fresh, well trimmed, free from excessive rusty or withered outer leaves, and fairly firm; it must not be wilted, decayed, or burst.

(15) *Okra* (often called gumbo) furnishes seed pods, which, when young and tender, are used in soups and meat dishes, being usually sliced across for this purpose. They may also be used in salads. When used in soups and stews, okra has a thickening effect and adds a flavor much liked by many persons. The chief test for quality is to cut for tenderness. Wilted or discolored okra should not be accepted. Canned okra can be obtained when the fresh is not available or high in cost.

(16) *Onions* are used in two forms:

(a) Young green onions which are served in season as a table relish or salad. The tops should be cut off and used to flavor soups and salads.

(b) Mature onions which are used during the entire year in many ways—

sliced in vinegar, raw in salads or sandwiches, cooked with meats and soups, boiled and served with butter or cream sauce, baked, or fried.

Onions have considerable health-protective value. They are good sources of vitamins, minerals, and bulk. They are odorous and should not be stored near foods which take up odors. If sprouts appear on onions, these sprouts should be removed as they quickly spoil the onions.

In inspecting young green onions, see that they are tied in bunches and that the bulbs are clean, firm, white, and small to medium in size. The tops should be fresh and green. There must be no excessively large bulbs and no slimy or discolored stock.

Mature onions must be firm, dry, and well cured, free from doubles, splits, bottlenecks, scallions, or damage from insects or disease. They must be free from excessive adhering dirt. They must not be decayed or discolored.

(17) *Parsley* furnishes curled green leaves valuable as a garnish or for flavoring soups and meat dishes. A little chopped parsley greatly improves the appearance and palatability of many dishes when sprinkled over the top as a garnish just before serving. Only the green tops are to be accepted and these must be curly; there is a variety of smooth parsley which is undesirable. If parsley has a yellowish discoloration it should not be accepted.

(18) *Parsnips* have a distinctive flavor which is not universally popular. However, it is probable that parsnips could become quite popular in the Army mess if prepared by the different methods given in the recipes in this manual. To be accepted for the Army mess they must be firm, reasonably clean, trimmed of tops, and not less than 1 inch in diameter. They must be free from shriveled, discolored, woody, or pithy stock, or stock having secondary roots.

(19) *Peas* (fresh, green, in pods) may be served when in season as they are low in cost at this time and the flavor is preferred by many to that of canned peas. Care should be taken to avoid overcooking—cook only until tender, about 15 minutes. The pods must be of good green color and filled with tender, well-developed green peas of good color and flavor. If the peas are old, tough, and woody they should not be accepted.

(20) *Peppers* (green, sweet) are one of the finest health-protective foods. They should be extensively used in the Army mess, cut or sliced raw in salads or as stuffed peppers. A little sliced or cut green pepper in stewed tomatoes adds a very fine flavor. To be accepted for the Army mess they must be medium to large in size, well shaped, of good green color, firm, bright, and brittle, and free from soft, spotted stock, or stock that is turning in color.

(21) *Potatoes, Irish*, are valued chiefly as an energy food, but also furnish vitamins and minerals. They furnish no roughage if peeled, but do furnish roughage if the skins are eaten. They should be stored in a cool, dark, well-ventilated place. If the storage place is too dry, they will wither; if too warm and moist, they are inclined to decay and sprout. Sprouting robs them of food value and the sprouts should be rubbed off as soon as they appear. Freezing quickly ruins potatoes. Irish potatoes are served in many ways—fried, boiled, creamed, mashed, baked, and in soups. Boiled and then chilled they are used in salad. Leftover mashed potatoes may be added to salads, fish cakes, meat loaf, croquettes, etc., or fried as potato cakes. Irish potatoes received in the Army mess should be inspected to see that they are not badly misshapen, and that they are free from freezing injury and soft rot.

(22) *Potatoes, sweet*. See paragraph 38.

(23) *Pumpkin* (fresh) is baked, steamed, or fried. Fresh pumpkin should be rich yellow with no green showing on the rind as any green portions will have to be trimmed away to prevent a bitter flavor. No pumpkin should be accepted if it has been damaged, or if it shows any rot, mold, or disease. It is more convenient to use canned pumpkin, but it may be more economical to use fresh pumpkin where it can be obtained at low cost.

(24) *Radishes* are valuable for vitamins and roughage. They are popular and should be served often as a table relish or in vegetable salads. When used in salads, they are cut or sliced. When received they must be free from excessive dirt, firm, tender, and crisp and tied in bunches. They must be practically free from pithy or hollow stock. The tops must be fresh and clean. When inspecting, a few should be cut at random to see that the interior is not pithy or hollow and that there are no worms.

(25) *Spinach* is one of the most valuable health-protective foods. It is in season throughout the year in many sections of the country and can be served as a fresh vegetable at reasonable cost, and as a substitute for lettuce when lettuce is high priced. It is palatable served hot with simmered beef, cold meats, fried liver and bacon, or with hard-boiled eggs.

Fresh spinach should be thoroughly washed before cooking. Great care should be taken to avoid overcooking. Boiling for 10 minutes is enough.

Spinach accepted for the Army mess must be tender, of good green color, and reasonably clean. There must be no overgrown (tough, woody) or yellow, withered stock.

(26) *Squash* is sold in two types—summer and winter. The main point of quality in summer squash is tenderness. To be accepted for the Army mess it must not be so matured or hard shelled as to be resistant to the thumb nail, and must be medium to large size, free from spotted and discolored stock, and practically free from dirt, and insect or mechanical injuries. Extra large summer squash is likely to be tough. Summer squash usually has a light green to greenish yellow outer color and a smooth skin. Winter squash has a dark green, lumpy rind. Winter squash must be fully matured, medium to large in size, solid and hard shelled.

Summer squash is boiled, steamed, or fried, while winter squash is boiled, steamed, fried, baked, or used for pie. Squash pie has a flavor similar to pumpkin pie.

(27) *Tomatoes* are one of the best sources of vitamins and are a fair source of minerals and roughage. They should be served often. A great value of fresh tomatoes is for serving raw, sliced or cut, as salads, alone or in combination with other vegetables. If not fully ripe when received, they may be held in storage until ripe. When accepted, fresh tomatoes must be turning pink to full color, firm, normal shape, clean, reasonably smooth, and sound, free from rot and decay. No immature or overripe or soft tomatoes should be accepted. They must average not less than 2 inches in diameter.

(28) *Turnips* are a starchy vegetable with a high energy value. They are rich in minerals and are a fair source of vitamins and roughage. There are several varieties, white and yellow, including rutabagas sometimes called Swedes. There is no difference in food value, but using the white and yellow varieties alternately gives variety in the mess. Turnips may be served boiled and mashed, or boiled and creamed, or cut or sliced and cooked in stew or with roasts. To be accepted for the Army mess they must be firm and solid, no white turnip to be less than 2 inches and no yellow turnip less than 3 inches in diameter. They must be free from hollow, pithy, fibrous, or woody stock.

51. *Vinegar.* a. Vinegar is made from a number of different materials and is sold as cider, malt, distilled, grain, etc. While these different vinegars have different colors, the flavor is about the same, and there is little or no choice between them. Special vinegars are made by addition of certain spices, such as tarragon; these are expensive and have little use in an Army mess.

b. Ordinary vinegar is about 96 per cent water and contains about 4 per cent acetic acid. Concentrated vinegar might be issued in the field. It contains about 10 per cent acetic acid and must be diluted before using as it is so strong that using it undiluted might be dangerous.

52. *Yeast.* Yeast is used chiefly in the mess in compressed (slightly moist) or dried form. Fresh compressed yeast is highly perishable and should only be bought to meet demands from day to day. It should be kept in a refrigerator until used. It will very seldom occur that neither compressed nor dried yeast can be obtained, even in the field, and where not obtainable the use of baking powder for leavening hot cakes, biscuits, or even rolls and bread will be satisfactory for short periods. Dried yeast does not have sufficient strength to produce good results if added direct to a dough, but should be used in a sponge or for making a starter the night before.

CHAPTER 7

MEATS, FISH, AND POULTRY

SECTION I

MEAT CUTTING AND STORAGE

1. Meat. *a. General.* Officers and men who have had years of experience in operating messes agree that the handling of the meat component of the ration can make or break an organization mess. This, the largest and most expensive component of the ration, is the one that is the most perishable, the most easily spoiled in cooking, and the one that with poor management can be the cause of the most wastage in the kitchen. It is also the item whose absence will be most remarked by the men. "Meat makes the meal," is a popular slogan.

Control of the meat component requires knowledge of cuts, the ability to estimate quantities, and close supervision through every step in preparation, in addition to skill in cooking beyond that required for most dishes.

The large packing houses are proud of their ability to utilize everything but the squeal—the successful mess officer, mess sergeant, or cook will do his part not only to utilize all edible portions of the meat but to see that the best possible use is made of them.

The word "meat" is used to indicate those parts of food animals (cattle, calves, sheep, swine, and goats) which may be eaten by man. It includes the muscular tissues (lean meat) and the fat together with the bones to which these are attached. While the organs used for food, such as hearts, livers, spleens, and stomachs, are generally classed as meat, the United States Department of Agriculture requires that these be called meat products.

b. Value in the diet. Meat contains about 20 per cent protein and is the main source of body-building food, as most vegetable foods are comparatively low in protein. Beans and peas are exceptions, as they contain about as much protein as meat; however, meat protein is a better body-building food than the protein furnished by beans, peas, or any vegetable food. The food value of meat is but little affected by its tenderness. While less tender meat is digested more slowly, it has practically the same nutritive (food) value as tender meat. Less tender meat can be made tender by proper cooking. The fuel (energy-producing) value of meat depends on the amount of fat it contains; that is the more fat the greater the fuel value.

Meat is a valuable source of two of the three minerals (calcium, phosphorus, and iron) in which the average diet is most likely to be deficient. Meat, although not a good source of calcium, is the richest source of phosphorus, which is necessary in the utilization of calcium.

Meat is an excellent source of iron which is in a readily utilizable form. Liver of all types has a higher content of iron than any other food, pork liver containing three times as much iron as beef liver, which is higher than calf or lamb liver. Iron is better utilized when even a very small amount of copper is present. Meat supplies copper, too, which aids in the utilization of iron.

Meats (particularly the glandular organs) are important sources of the B vitamins, among which are vitamin B₁ (thiamine), vitamin B₂ (riboflavin or vitamin G), and niacin (nicotinic acid). Lean pork is especially rich in thiamine. Many of the B vitamins are destroyed by heat. Overcooking is, therefore, to be avoided.

d. Canned meat. Canned meats are composed almost wholly of lean meat, as most of the fat is trimmed away in preparation for canning. Canned meat is, therefore, a good source of protein, phosphorus, iron, copper, and the B vitamins, but is comparatively low in fuel value.

2. Meat cutting. *a. General.* (1) Every mess where meats are cut should be equipped with a set of knives for various purposes; however, meat can be satisfactorily cut with a knife and saw if kept sharp. Butcher knives are best for cutting roasts and steaks. Boning knives, including at least one with a short, narrow blade, are best for removing bones. A saw is needed. A good butcher uses a cleaver very little. A hand meathook is an aid in handling and boning

beef. A hook is rather inconvenient to one not accustomed to it, but it becomes indispensable to one skilled or experienced in its use.

(2) A good job of meat cutting cannot be done with dull tools. Saws, knives, and cleavers should be sharp. A butcher's steel is used only to keep the edges of knives straight, not to sharpen them. The sharpening should be done on a grindstone and finished on a smooth whetstone. Saws are sharpened by filing. Frequently the teeth of the saw need setting to give them the proper angle. This requires special equipment. The average person is not competent to set and sharpen meat saws. Retail butchers now rent sharp saw blades from tool supply houses for a nominal charge. As the blades become dull they are exchanged for sharp ones.

b. *Uses of tools.* In cutting meat to the best advantage proper tools are needed. Keep in mind that each piece of cutlery was designed to do a certain job, therefore it is advisable for the cook to study his meat cutting tools and use each piece for the work for which it was intended. For example, the short, narrow, stiff blades of boning knives were designed especially for cutting through joints and for cutting close around bones in order to separate them from the meat. Steak knives with long, wide blades were made to cut steaks and roasts. Knives with thin blades, such as the french slicer and roast beef slicer, are best suited for carving cooked meat.

c. *Kinds of tools.* With few exceptions the following tools will fill just about every meat cutting and carving need:

- 6-inch boning knife (straight).
- 6-inch boning knife (curved).
- 10-inch steak knife (scimitar).
- 10-inch steak knife (straight).
- 12-inch cook's knife (Sabatier type).
- 12-inch roast beef slicer.
- 7-inch cleaver.
- 12-inch steel (smooth or semismooth).
- 22-inch meat saw.
- Hand meathook.
- Steel fork.

(1) *Knives.* Sharp knives are essential for efficient work. One way to keep them sharp is to use them only for the work they were intended to do. For instance, a boning knife has a comparatively narrow bevel along the edge. It will stand much more abuse and hard work than a properly ground steak knife, which has a wide bevel and a thin edge. Rule number one should be: "Never use a steak knife for boning meat."

(a) *Sharpening.* Knives should never be sharpened on a power-driven dry stone since this will remove the temper from the cutting edge. A water stone or carborundum oilstone may be purchased at a reasonable cost. Either of these make good sharpening units. There also are combination units on the market. Some of these contain two stones and some three, each of a different degree of coarseness. The stones are securely fastened together on a revolving shaft. The base of the unit is filled with a light oil.

The knife is first put on a rough stone, then on a smoother one. Use the entire stone for sharpening the knife. In this manner, the stone will not "hollow out" at a particular point. It is best to draw the full blade, from heel to tip, across the full length of the stone in each movement. Turn the knife over and pull back in the same manner from the opposite end of stone. In this fashion the knife is sharpened evenly and smoothly and the stone is worn uniformly. When the knife has sufficient edge, clean the blade and handle thoroughly before using.

(b) *Steeling.* After the knife has been sharpened on a stone, use a smooth or semismooth steel to keep it sharp. Imagine putting a razor on a rough steel and you will realize why a smooth steel is better than a coarse one for keeping a keen edge on a knife blade. The following shows the easiest and most effective method of steeling a knife (Plate 1):

1. The steel is used to true the blade and keep the edge in perfect condition. Although there is a technique to handling the steel, it is easily mastered with practice.

2. Hold the steel firmly in the left hand, thumb on top of the handle, with the point upward and slightly away from body.

3. Place the heel of the blade against the far side of the tip of the steel (fig. 1). The steel and the blade should meet at a slight angle, about 25° .

4. Bring the blade down across the steel toward the left hand with a quick swinging motion of the right wrist and forearm. The entire blade edge should pass lightly over the steel (fig. 2).

5. Bring the knife into position again but with the blade against the near side of the steel (fig. 3). Repeat the same motion, passing the blade over the steel.

6. Alternating from side to side, a dozen strokes will true the edge.

Put the knife on the steel as often as the edge needs it. Aim to have the blade sharp always.

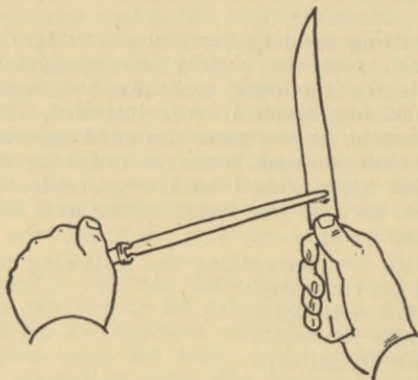


Fig. 1.

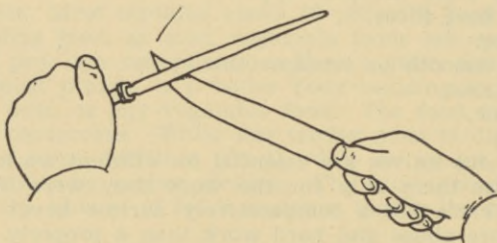


Fig. 2.

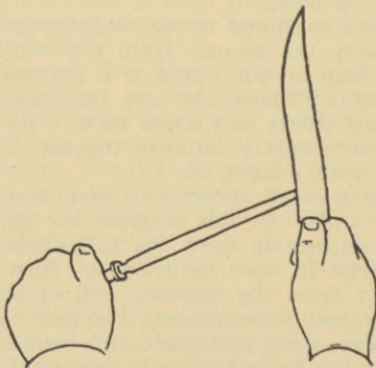


Fig. 3.

Plate 1. Steeling a knife.

(c) *Care of knives.* Every first-class meatman takes a personal interest in keeping his equipment in number one condition at all times. The sharp edge of a knife, like a razor, can be dulled easily. For that reason knives should never be thrown into a drawer with other tools. A wood strip (1 by 2 by 12 to 20 inches long) can be made secure to the bottom of a table drawer, first sawing notches into it at intervals of 2 to 3 inches. These cuts (notches) should be made

about 1¼ inches deep and of such width that a knife blade will fit easily into them. Arranged in order in these notches, the knives are readily available and at the same time the edges are protected. In many instances a knife holder is fastened to the side of the meat block. This may be handier than the drawer arrangement, but to protect the knives as well as the holder the knife handles should not protrude above the edge of the block. Whatever method is followed, it is essential that tools should receive the care and attention they deserve. Government specifications provide good knives. If cared for they will give satisfactory service for a long time.

(d) *Responsibility for knives.* Each cook should have his own tools and the mess sergeant should make him responsible for their care and condition. If this plan is followed the tools are much more likely to be in proper condition at all times. When several men use the same knives there is no incentive for anyone to care for them. As a result they are usually in bad shape. Even though the kitchen has only a limited number of steak and boning knives, they should be divided as equally as possible among the cooks. From the standpoint of getting the work done, one sharp knife is worth more than six dull ones; but until each cook is made responsible for his own tools the Army cannot expect to find sharp knives in its kitchens. At the close of work each man should check his tools with the mess sergeant, who in turn takes charge of them until the cook returns to duty.

(2) *Cleaver.* Use this piece of cutlery as little as possible. Unless it is very sharp and used properly, the cleaver will shatter the bone and fill the surrounding meat with tiny bone splinters. These splinters not only cause inconvenience in eating but they are dangerous. It may become necessary to rush some man to a hospital because a bone splinter has lodged in his throat.

(3) *Meat hand hook.* Although a meathook is inconvenient to one not accustomed to its use, it is in reality a valuable aid in boning meat. It not only saves time but it eliminates most of the danger of cutting fingers in the boning operation.

(4) *Metal mesh glove.* In addition to the meat hook, workers in large packing plants have discovered that a metal mesh finger glove, worn on the left hand, is a good protection against cutting fingers while boning meat. The glove is made of a fine metal mesh which is flexible and interferes in no way with the action of the fingers. It covers the thumb and the first and second fingers. A strap on the wrist holds the glove in place. It is a practical safeguard for anyone who is boning meat.

(5) *Meat saw.* A saw with a dull blade will not do satisfactory work. Three blades should be available at all times for each saw, one in use and two in reserve. When a blade loses its edge and set, it should be replaced with a sharp one. When two blades are dulled they should be exchanged at the commissary for two sharp ones. Saws are sharpened by filing, and the teeth need to be set occasionally to give them the proper angle to prevent dragging. This requires special equipment. The average person is not competent to set and sharpen saw blades. The standard saw with a 20 to 24-inch blade is best for most commercial purposes. However, the small one issued for field duty will answer in an emergency.

d. *Keeping meat tools clean.* (1) Every piece of kitchen equipment, especially that which comes in direct contact with food, must be kept clean. Meat tools are no exception, but as long as wood handles are fastened on metal, as is the case with most knives, cleavers, and saws, the problem of keeping the tools in condition to pass rigid inspection will continue to exist. Regardless of the care exercised in manufacturing the knife, it is impossible to rivet two pieces of wood to a piece of steel and not leave a crack or crevice for dirt to collect. Boiling water is not the solution to the problem. Hot water soaks into the wood, causing it to expand. As the wood dries it shrinks. In a short time the handles are loose and the cracks and crevices are bigger than ever.

(2) A good practice is to fill all the cracks around the handle with plastic wood; then do not let the piece of cutlery lie in hot water. There is no occasion for leaving a knife in water for any length of time. The knife, cleaver, or saw can be kept clean by simply wiping, then rinsing in clean water, and wiping with a dry cloth. The preceding treatment not only will prolong the life of the cutlery, but will help keep it in better shape for inspection.

3. Beef. *a. Importance in the mess.* Beef is the most important food used in the Army mess. It probably is the most universally popular food and forms the main dish of many meals. For these reasons the Army cook should have a good general knowledge of the kind and quality of beef supplied for Army messes and of methods of cutting and use. This information is given in the following paragraphs.

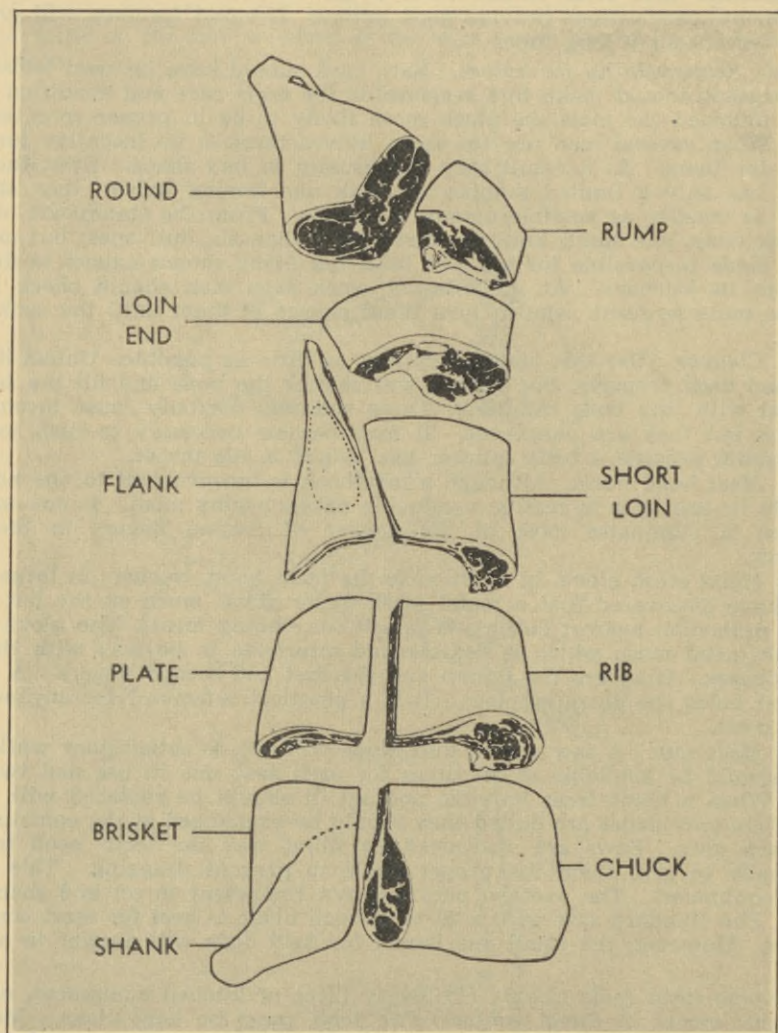


Chart used by permission of National Live Stock and Meat Board.

Plate 2. Beef Chart, showing location and names of wholesale cuts.

b. Type used. The carcasses (sides and quarters) desired for Army use are the beef (plump and meaty) type, as distinguished from the dairy (lean and bony) type, as carcasses of the beef type carry a greater proportion of meat to bone, and the flesh is of better quality.

c. Classes. The classes of carcass beef are steers (males castrated when young), heifers (young females), cows, bulls, and stags (males castrated after they reach maturity). Steers are more desirable than any other class of beef for Army use because of their better conformation (shape and plumpness), better development of the best cuts, and better quality of meat with less waste. Army specifications permit the purchase of beef from steer carcasses only.

d. Weight. A steer carcass used in the Army mess may weigh from a minimum

of 450 pounds to a maximum of 900 pounds. Each side will weigh from 225 to 450 pounds. The average 12-rib forequarter represents about 52 percent of the side and weighs from 115 to 235 pounds. The hindquarter, being 48 percent of the side, weighs slightly less than the forequarter. The difference in weight of the forequarter and hindquarter in a 300-pound side will be about 12 pounds.

4. Beef cutting. *a. General.* In cutting beef carcasses consideration is given to the suitability of different cuts for different purposes. Lean beef is not all of the same tenderness. In general, the muscles (lean meat) of locomotion used for work, such as walking and running, are not as tender as the supporting muscles

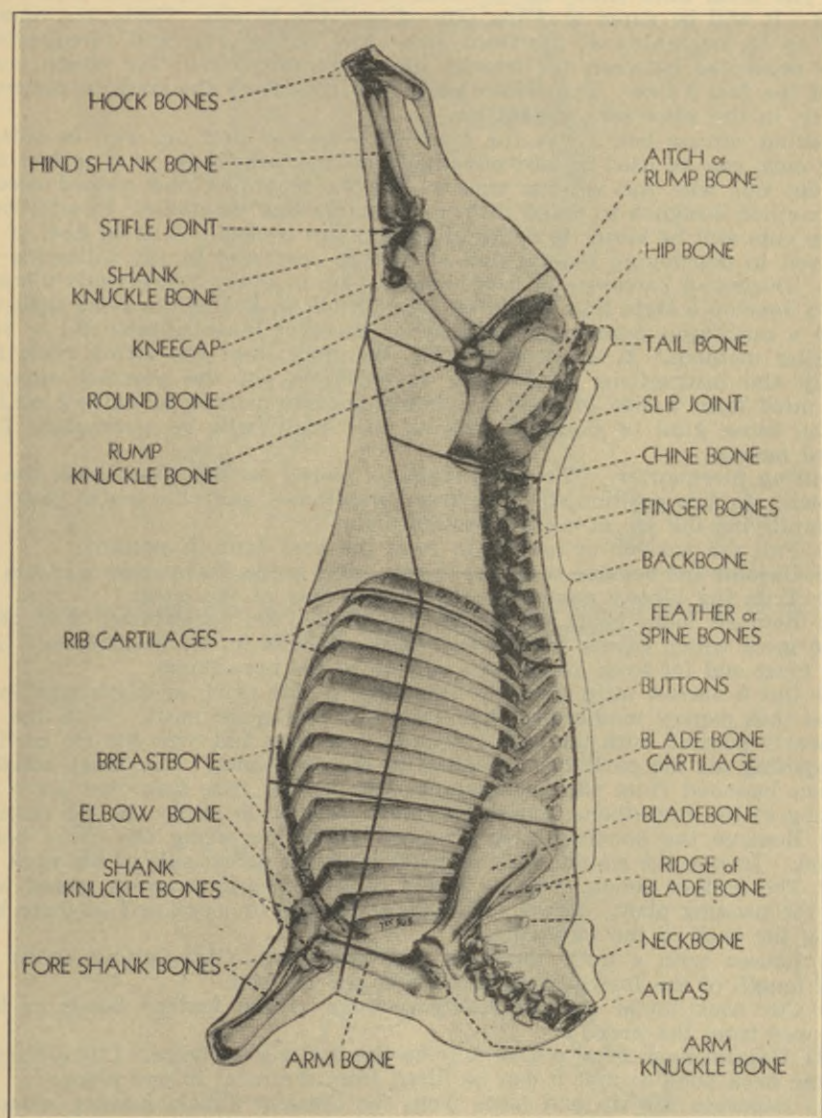


Chart used by permission of National Live Stock and Meat Board.

Plate 3. Beef Chart, showing location, structure and names of bones.

which are found along the back of the carcass. Since the meat differs in tenderness, the object of cutting beef is to separate the less tender meat from the tender; and for the sake of uniform cooking, the thin meat is separated from the thick meat. The less tender wholesale cuts include the chuck, shank, brisket, plate,

flank, and round. The tender ones are the rib, short loin, and loin end. All cuts of meat, however, are tender when properly cooked.

b. *Division of beef side into wholesale market cuts.* (1) The beef chart (Plate 2) shows the entire side of beef broken into wholesale cuts. This chart is especially valuable since it shows the location of each wholesale cut in relationship to the full side. It will be noticed that the hindquarter includes the round, rump, loin end, short loin, and flank. The forequarter cuts are rib, chuck, shank, brisket, and plate.

(2) Plate 3 shows the location, structure, and names of the bones in a side of beef. The solid lines show the division of the wholesale cuts as illustrated in Plate 2. It will be noted that the side of beef has 13 ribs. These are numbered from 1 to 13, beginning at the front end. The hindquarter and forequarter are usually separated between the twelfth and thirteenth ribs. The chuck contains parts of the first 5 ribs. This leaves parts of 7 ribs, from the sixth to the twelfth, inclusive, in the wholesale market rib.

c. *Cutting carcass beef.* For the most part, carcass beef, as well as wholesale market cuts, can be used to best advantage in the Army mess if it is first boned. When cut this way the various muscles can be separated and cooked according to the method designed to make them most tender and palatable. In addition, the boneless cuts will be easier to carve after they are cooked. A great deal of study was given to developing the method of cutting described in the following paragraphs. Dozens of carcasses of beef were cut up in every conceivable manner in order to develop a style that would be easy to follow, and at the same time would provide a maximum number of good solid pieces of meat suitable for a variety of cooking methods. It is recommended, therefore, that the Army cook follow carefully the instructions given here in order to get the greatest amount of usable meat from a side of beef. Incidentally, this method of cutting will produce the same kind of boneless cuts as the Army will be purchasing for its standard menus.

d. *Cutting forequarter.* The forequarter is placed on the block with the meat side down. In this position the backbone, breastbone, and ribs are in plain sight, thus simplifying the job of cutting around them.

(1) Pull the wooden or metal pin from the beef neck, if present.

(2) Unjoint and remove the atlas joints. This is the first vertebra of the neck.

(3) Trim the bloody meat from the throat side of the neck.

(4) Remove loose heart fat which lies beside the breastbone, then remove the thin meat which covers the rib cartilages attached to the breastbone. Loosen brisket meat and fat from around the outside of the breastbone.

(5) Cut a narrow strip from the thin edge of the skirt, or diaphragm muscle. Pull the thin papery membrane from the skirt and plate meat. With the knife lying nearly parallel with the ribs, cut under the skirt and over the rib cartilages, thus exposing all the cartilages attached to the rib bones. The meat which has just been loosened from the cartilages should be cut free from the plate meat. Beginning at the breastbone, loosen the plate meat from under the rib cartilages.

(6) Remove the boneless strip of meat which lies along the chine bone of the chuck. Loosen the similar strip of meat from the throat side of the neck bone.

(7) The feather bones, or spine bones, of the forequarter were scored with a saw in the packing plant. Break and remove the top or loose half of these bones, all along the back of the forequarter.

(8) Loosen with a knife and pull the back strap (ligamentous strip) from the full length of the forequarter, starting at the rib end.

(9) Cut back under the remaining sections of the feather bones to loosen these bones from the meat.

(10) Unjoint neck bone where it joins the first rib vertebra. Cut around and under the neck bone so that it can be lifted from the meat in one piece.

(11) Separate the rib and plate from the crosscut chuck, leaving seven ribs on the chuck (Plate 4, line ab). This can be done easily by sawing across the backbone and rib cartilage, between the seventh and eighth ribs. One full cut with a sharp steak knife will separate the two pieces of meat.

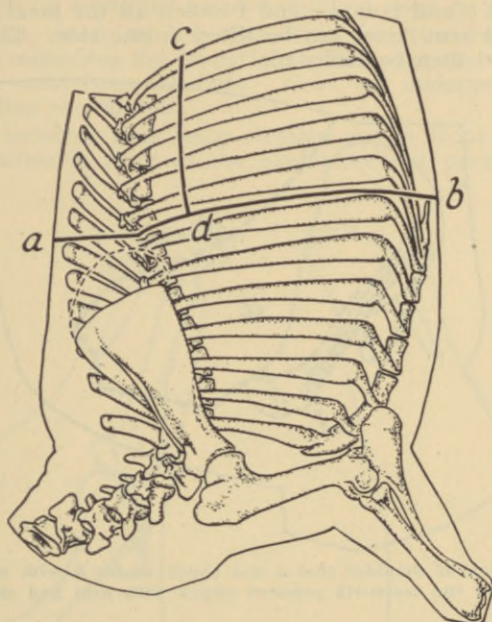
(12) Turn the rib and plate over, meat side up. Make a mark with the knife, one-half inch from the rib eye, at each end of the rib. Cut across the ribs joining these two knife marks to separate the plate meat from the rib meat (Plate 4, line cd). Do not saw the ribs.

(13) Starting at this knife mark, cut along parallel to the ribs and peel the

plate meat in one piece from the bones, leaving the intercostal muscles, or rib fingers, attached to the ribs.

(14) Next, cut closely to the ribs and lift the spencer roll from its cradle of bones.

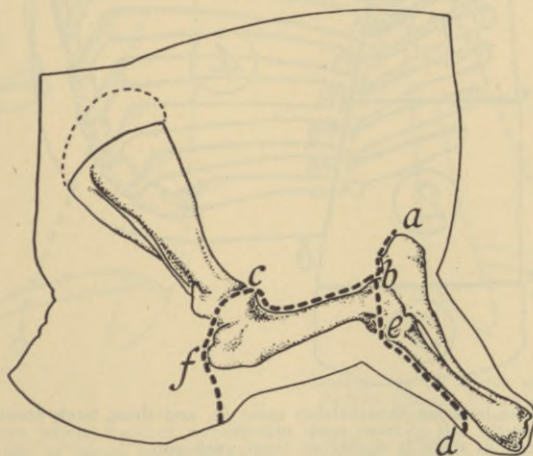
(15) Remove the rib fingers from between the ribs. This can be done by running the knife closely along each side of the ribs. Loosen the rib fingers from



Line *ab* shows where plate and rib are separated from the crosscut chuck leaving seven ribs on the chuck.

Line *cd* shows where the plate meat is separated from the rib meat at the edge of the rib eye.

Plate 4. Outside skeletal view of forequarter.



Dotted lines show path knife should follow in removing shank and arm bones.

Plate 5. Outside view of blade, arm, and shank bones in a seven-rib crosscut chuck.

the plate side first, then turn the bones around and work from the backbone side. Each rib finger will come out in one piece.

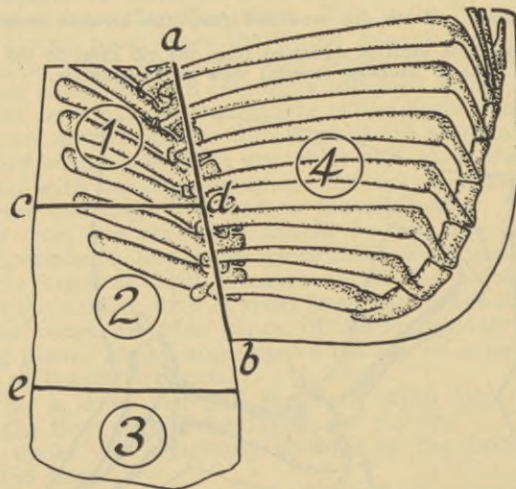
(16) Turn the crosscut chuck over so that meat side will be uppermost. Study Plate 5 to see how the shank and arm bones are to be unjointed from the blade bone.

(17) With the rib side of the chuck away from you, start at the end of the elbow bone *a* (Plate 5) and pull the knife toward you until it strikes the arm bone at *b*. Turn the knife and run it along the arm bone until it reaches the socket joint at *c*. At this point the knife goes through the socket joint to separate the arm bone from the shoulder blade.

(18) Remove the meat from in front of the shank bone, starting at point *d* (Plate 5). Cut to point *e* then run the knife over the top of the arm bone to *b*. Between points *e* and *b* and points *c* and *f* loosen all the meat from the arm bone so that the shank and arm bones can be lifted to one side. The meat attached to the shank bone should then be removed.



Dotted lines show location of shoulder clod *a* and chuck tender *b* with respect to blade bone.
Plate 6. Outside view of the seven-rib crosscut chuck with arm and shank bones removed.



Line *ab* indicates division between thin brisket meat ④, and thick back meat ①, ②, and ③.

Line *cd* divides the four-rib roll ① from neck roll ②.

Line *eb* shows where end of neck is separated from neck roll.

Plate 7. Outside skeletal view of seven-rib crosscut chuck with neck, arm, blade, and shank bones removed.

(19) Separate from the brisket the boneless meat that covered the front part of the shank and arm bones.

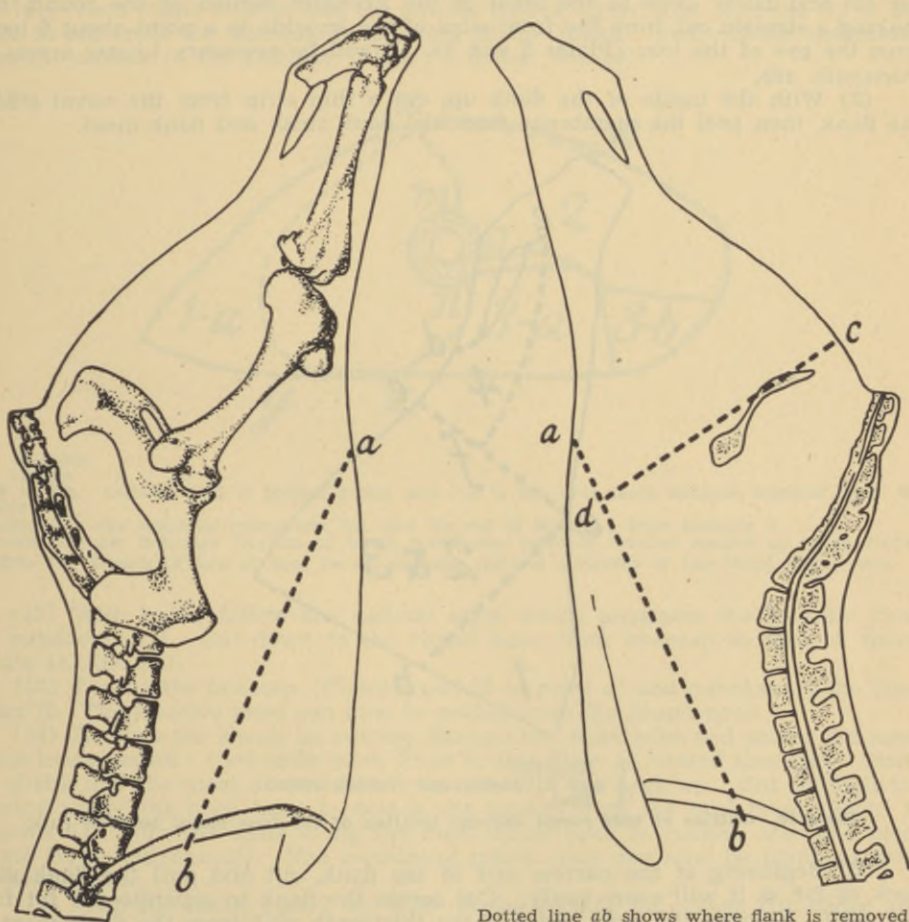
(20) The shoulder clod *a* (Plate 6) is removed by first running the knife along the side of the ridges of the bladebone. Next, cut the meat free from the narrow end of the bladebone. Start pulling the clod from the heavy end toward the back

of the chuck, at the same time cutting underneath the clod meat at the natural seam which separates it from the brisket. Keep pulling and cutting until the thin part of the clod has been pulled from the bladebone.

(21) Remove the thin layer of meat which covers the chuck tender and neck muscles. This may be done by first running the tip of the knife along the top of the ridgebone to loosen the meat at that point. Pull the layer of meat toward the end of the neck, cutting along the natural dividing seam as you pull.

(22) Lift out the chuck tender. See Plate 6 for the location of this boneless piece of meat that resembles the tenderloin. First, run the knife along the ridgebone to loosen the meat from the bone. Next, cut underneath the tender at the dividing seam, pulling as you cut.

(23) Pull the boneless neck meat straight out in front of the chuck. Cut it off at a point 2 inches in front of the bladebone and parallel with the rib side of the chuck.



Dotted line *ab* shows where flank is removed.

Plate 8. Outside view of bones in hindquarter of beef.

Dotted line *cd* shows where flank is removed.
Dotted line *cd* indicates where the round is separated from the rump and loin.

Plate 9. Inside view of beef hindquarter showing exposed section of aitchbone, back-bone, and thirteen rib.

(24) The bladebone and cartilage attached to it can now be lifted from the inside chuck muscle. Cut close to the bone so that a minimum amount of meat will be left attached to the blade.

(25) Separate the thin brisket and rib meat from the thick back meat by cutting between them at the edge of the eye of the inside chuck muscle (Plate 7, line *ab*).

(26) Peel the brisket meat from the ribs by cutting closely to the bones, leaving the rib fingers attached to the ribs.

(27) Cut across the back muscle between the third and fourth ribs. The object here is to separate the tender inside chuck meat from the less tender neck meat.

(28) Cut closely along the ribs to remove the boneless chuck roll, from the fourth to the seventh ribs, inclusive.

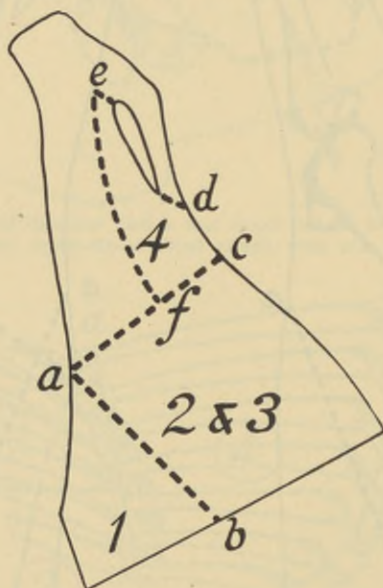
(29) Separate the boneless neck roll from the ribs to which it is attached.

(30) Remove the rib fingers from between the first seven ribs of the forequarter as described in (15) above for the comparable five-rib plate section of the forequarter.

e. Cutting hindquarter. The outside of the hindquarter should lie on the block. Most of the work of cutting and boning the beef hind will be done from the inside which is now uppermost.

(1) Remove the clod fat and flank in one piece. This is done by cutting under the fat and fairly close to the meat of the knuckles section of the round, then making a straight cut from the front edge of the knuckle to a point about 6 inches from the eye of the loin (Plates 3 and 8). It will be necessary to saw across the thirteenth rib.

(2) With the inside of the flank up, cut a thin strip from the naval side of the flank, then peel the membrane from the flank steak and flank meat.



1. Knuckle.
- 2 and 3. Inside and outside round.
4. Heel.

Plate 10. Outline of beef round showing location of the four major boneless cuts.

(3) Beginning at the narrow end of the flank, cut and pull the flank steak back as far as it will come easily. Cut across the flank to separate the fat from the meat. Remove the bone (part of the thirteenth rib) from the flank meat.

(4) The clod fat should be cut into thin slices which later may be tied or laid on lean boneless roasts and pot roasts. This fat protects the lean meat while it is being cooked and adds to the flavor and juiciness of the cooked meat.

(5) The hanging tender is attached beneath the kidney knob of the left hindquarter. It should be removed and split open lengthwise, so that the gristle running through the center of it can be taken out.

(6) The kidney knob and all surplus fat should be removed from the inside of the loin and rump. The kidney knob can be cut open and the kidney removed.

(7) To separate the round from the loin and rump, saw through the tip of the aitchbone (Plate 9, dotted line *cd*), then cut down to the round bone, cutting as

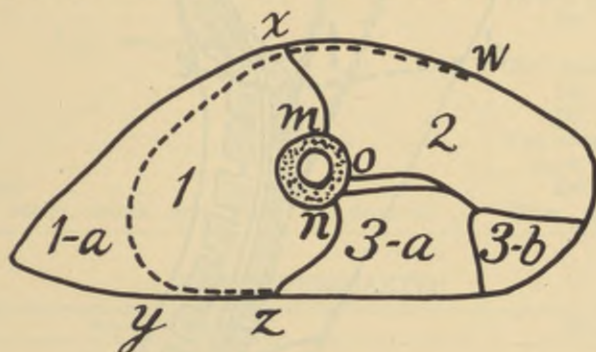
closely as possible to the aitchbone during the operation. Saw through the round bone and complete the separation by cutting with the knife.

(8) The round is to be divided into four boneless cuts—the knuckle, inside, outside, and heel. This will be comparatively easy since, with the exception of the heel, the outer cuts are separated by natural dividing seams. (See Plate 10 for location of the four cuts.) Plate 11 shows the dividing seams which separate the knuckle, inside, and outside.

(9) With the inside of the round up, use tip of knife to cut through the thin layer of meat from kneecap to face of the round above the round bone (Plate 10, dotted line *ab*). Pull thin layer of meat and membrane from the outside of the knuckle (Plate 11, dotted line *xy*). Cut meat loose from the knuckle at the block where it starts to go back under the round.

(10) Cut down the round bone from the kneecap to face of the round, following the same line made originally with the tip of the knife (Plate 10, dotted line *ab*, also Plate 11, line *xm*).

(11) Turn round over so that the outside will be uppermost. Use the tip of the knife to cut from the kneecap to the face of the round. Peel off the membrane from the outside of the knuckle (Plate 11, dotted line *yz*).



1. Knuckle.

2. Inside.

3-a to 3-b. Outside (3-a is bottom round and 3-b is the eye; these muscles together form the outside).

Dotted line *xyz* separates membrane, fat, and tip end of flank 1-a from knuckle 1.

Dotted line *xw* indicates location of tough membrane covering fat-free section of inside round.

Plate 11. Sketch of face of beef round showing natural divisions of the three major cuts.

(12) With knife, follow the natural seam which separates the knuckle from the outside round. Cut down to the round bone from kneecap to face of round (Plate 11, line *zn*).

(13) Loosen the kneecap (Plates 3 and 10 at point *a*) and cut close to the bone under it. The knuckle meat can now be pulled from the round bone.

(14) Remove the shank by cutting through the stifle joint and across the meat of the lower round. (See stifle joint, Plate 3, also Plate 10, dotted line *afc*.) Stand the shank and the meat attached to it on end with the hock up. Cut through the opening under the hock bone to detach the tendon from the heel meat (Plate 10 at point *d*). Run the knife along the hind shank bone to remove the heel piece (Plate 10, dotted line *ef*). The remaining shank meat can now be trimmed from the shank bone.

(15) With the inside round up, trim off the surplus fat. Then cut under and remove the tough membrane which covers the fat-free section of the inside round (Plate 11, dotted line *xw*). Next, run the knife along the top side of the round bone, and cut through the dividing seam to separate the inside and outside pieces.

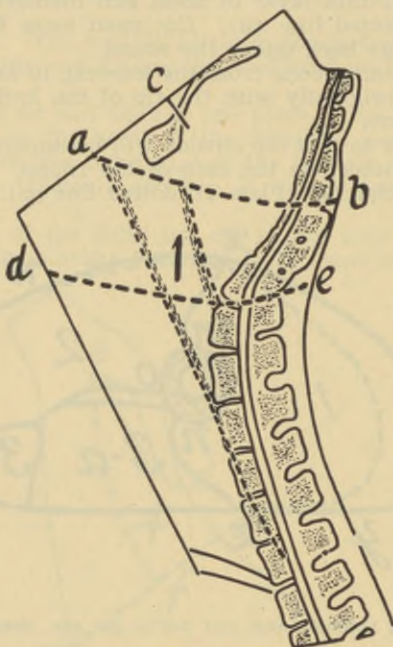
(16) Cut along the round bone to separate it from the outside round.

(17) The rump is separated from the loin by sawing through the bone about 1½ inches in front of the tip of the aitchbone and across the backbone about 4 inches in front of the first tail bone (Plate 12, dotted line *ab*). Finish the separation by cutting with the knife.

(18) To facilitate boning the rump, saw down through the aitchbone about 1 inch back of the tip so that the rump knuckle bone can be cut loose in one piece (Plate 12, saw at point *c*). Cut the meat from this bone. Now remove the tail bone,

then the aitchbone. Trim loose meat from the boneless rump so that the resulting rump butt will be a smooth, blocky piece of meat.

(19) The trimmed loin is on the block, meat side down. The tenderloin should be removed first (Plate 12, point 1). To do this run the knife close along the chine bone, then starting at either the rump or rib end (whichever is most convenient, depending upon whether the loin is from the right or left side) strip the tenderloin, with the aid of the knife, from the inside of the loin. Cut close to the finger bones and hip bone, leaving no more meat than is necessary on these bones.



Dotted line *ab* shows where rump is separated from loin.
Point *c* indicates place to saw across aitchbone of rump in order to remove knuckle bone.
Point *1* shows location of tenderloin. The loin end is separated from the short loin at dotted line *de*.

Plate 12. Inside view of loin with rump attached.

(20) The loin end can now be separated from the short loin. Cut through the meat from the top side of the loin immediately in front of the hip bone. Saw through the backbone to finish dividing these two wholesale cuts (Plate 12, dotted line *de*). With practice this separation can be made without a saw by making a cut with the knife between the sacral and lumbar vertebrae, then breaking the backbone over the edge of the block.

(21) The hip bone and backbone may be removed from the loin end in one piece. The first step is to cut along the feather or spine bones on the top side. Turn the piece over and cut closely around the hip bone, then the backbone. Continue cutting until all the meat has been loosened from these bones. Trim off loose pieces of meat so that the boneless sirloin butt will be a smooth, neat-looking cut of meat when you are through with it.

(22) The easiest way to remove the bones from the shell loin (short loin with tenderloin out) is to separate the meat from the feather or spine bones first. One continuous cut with a sharp knife is all that will be necessary. Cut close to the feather bones the full length of the loin. Now turn the shell loin on edge so that it rests on the backbone. With the aid of the knife, separate the loin meat from the finger bones. The meat which remains attached to the backbone is the most difficult to remove. This is where a good sharp boning knife comes in handy. By carefully weaving the tip of the knife around the processes of the vertebrae, most of the meat can be detached from the bone and left on

the loin strip. Cut the flank meat from the loin strip on a line with the edge of the eye muscle.

f. *Beef cuts and their uses.* The wide variety of boneless cuts from the side of beef may be used in a number of different ways. Generally speaking, however, the most satisfactory results in cooking will be obtained by using the tender cuts for roasts and steaks and the less tender cuts for such dishes as pot roasts and stews, and in ground form for meat loaf, patties, and chili. When buying forequarters and hindquarters alternately it is often a good idea to save the spencer roll (and chuck roll, if needed) from the forequarter, to cook with the tender cuts from the hindquarter. The heel and outside round from the hindquarter can be held back to cook with the less tender forequarter cuts. The following table shows the use recommended for the various boneless beef cuts:

BEEF FOREQUARTER

Name of cut	Recommended use
<i>Tender cuts</i>	
Spencer roll	Roast, steaks.
Chuck roll	Do.
<i>Less tender cuts</i>	
Shoulder clod	Pot roast, stew.
Chuck tender	Do.
Neck roll	Do.
Boneless plate	Pot roast (when rolled), stew.
Boneless brisket	Do.
Boneless meat (skirt, shank, arm, neck, rib fingers) ..	Stew, ground beef.

BEEF HINDQUARTER

Name of cut	Recommended use
<i>Tender cuts</i>	
Knuckle	Roast, steaks.
Inside round	Do.
Rump butt	Do.
Tenderloin	Do.
Sirloin butt	Do.
Loin strip	Do.
<i>Less tender cuts</i>	
Outside round	Pot roast, stew.
Heel	Do.
Boneless flank	Stew, ground beef.
Kidney	Stew, gravy.
Boneless meat (hanging tender, shank, trimmings from rump, sirloin butt, and loin strip).	Stew, ground beef.

g. *Beef cutting test.* No two sides of beef are exactly alike, and no two men cut meat exactly the same way. As a result the figures given here will not be identical to the yields you may expect in your kitchen; but the following table will give a close approximation of the number of pounds of meat you may expect from forequarters and hindquarters of beef weighing from 125 to 180 pounds each.

BEEF HINDQUARTER

Name of cut	125-pound hindquarter	150-pound hindquarter	180-pound hindquarter
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Inside round	14.5	17.4	20.9
Outside round	13.0	15.6	18.7
Knuckle	7.5	9.0	10.8
Heel of round	4.5	5.4	6.5
Rump butt	4.0	4.8	5.8
Sirloin butt	9.5	11.4	13.7
Loin strip	7.5	9.0	10.8
Tenderloin	5.5	6.6	7.9
Boneless meat	20.5	24.6	29.5
Kidney	1.5	1.8	2.1
Bones	21.0	25.2	30.3
Fat and waste	16.0	19.2	23.0
Total	125.0	150.0	180.0

BEEF FOREQUARTER

Name of cut	125-pound forequarter	150-pound forequarter	180-pound forequarter
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Shoulder clod	11.7	14.0	16.8
Chuck tender	1.8	2.3	2.8
Spencer roll (5 ribs)	7.7	9.3	11.2
Chuck roll (4 ribs)	5.6	6.8	8.2
Neck roll	7.0	8.4	10.0
Brisket roll	10.5	12.6	15.2
Plate roll	6.0	7.3	8.8
Boneless meat	41.0	49.0	58.6
Bones	25.5	30.5	36.6
Fat and waste	8.2	9.8	11.8
Total	125.0	150.0	180.0

h. Beef cuts divided according to cooking methods. Following is a summary of all the boneless cuts in a side of beef grouped according to their tenderness and the most acceptable method of cooking.

ROASTS AND STEAKS (tender cuts)

Name of cut	125-pound hindquarter, 125-pound forequarter	150-pound hindquarter, 150-pound forequarter	180-pound hindquarter, 180-pound forequarter
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Inside round	14.5	17.4	20.9
Knuckle	7.5	9.0	10.8
Rump butt	4.0	4.8	5.8
Sirloin butt	9.5	11.4	13.7
Loin strip	7.5	9.0	10.8
Tenderloin	5.5	6.6	7.9
Spencer roll (5 ribs)	7.7	9.3	11.2
Chuck roll (4 ribs)	5.6	6.8	8.2
Total	61.8	74.3	89.3

POT ROASTS (less tender cuts)

Outside round	13.0	15.6	18.7
Heel of round	4.5	5.4	6.5
Shoulder Clod	11.7	14.0	16.8
Chuck tender	1.8	2.3	2.8
Neck roll	7.0	8.4	10.0
Brisket roll	10.5	12.6	15.2
Plate roll	6.0	7.3	8.8
Total	54.5	65.6	78.8

BEEF STEW (less tender boneless meat)

Flank, neck	41.5	49.7	59.5
Rib fingers, kidney, and trimmings from plate and brisket.			

BEEF FOR GRINDING (less tender boneless meat)

Shank, hanging, tender, and trimmings too small for stew	21.5	25.7	30.7
--	------	------	------

MISCELLANEOUS

Name of cut	125-pound hindquarter, 125-pound forequarter	150-pound hindquarter, 150-pound forequarter	180-pound hindquarter, 180-pound forequarter
	Pounds	Pounds	Pounds
Bones	46.5	55.7	66.9
Fat and waste	24.2	29.0	34.8
Total	70.7	84.7	101.7

SUMMARY OF PRECEDING FIGURES

	Pounds	Pounds	Pounds
Roasts and steaks	61.8	74.3	89.3
Pot roasts	54.5	65.6	78.8
Beef stew	41.5	49.7	59.5
Ground beef	21.5	25.7	30.7
Bones, fat and waste	70.7	84.7	101.7
Total	250.0	300.0	360.0

i. *Army boneless beef.* (1) This is carcass beef of Army specification, class, grade, and weight, cut into wholesale market cuts in accordance with specific instructions. The bones, excess fat, gristle, and tendons are removed and the cuts of boneless beef separated into groups according to their tenderness. The most tender cuts are packed for use as roasts and steaks, while the less tender cuts are packed for use as boiling or stewing beef, or for ground meat (hamburger, meat loaf, etc.) The larger cuts are individually wrapped in waxed paper and the smaller cuts wrapped in units of about 10 pounds. The wrapped meat is packed in fibreboard boxes coated on the inside with parafin. The meat may be chilled but is usually frozen.

(2) Army boneless beef has many advantages over carcass beef. All the meat delivered is edible and there is no waste in bones, fat, or gristle. It requires no butchering except the further cutting for steaks and stews. It reduces required storage space by 60 to 70 percent. It reduces weight by approximately 25 percent. It supplies meat in cuts more suitable for definite purposes than would be possible from the use of carcass beef.

(3) Frozen Army boneless beef should be thawed in the original container, either in chill rooms or at room temperature. Seventy-two hours or more may be required to defrost frozen boneless beef in chill rooms, but at room temperature the meat becomes sufficiently defrosted for use in 24 hours. Frozen meat should not be defrosted in water, either hot or cold. No deterioration will take place during defrosting if the meat is kept wrapped and in the shipping boxes. Beef does not have to be completely defrosted before it is used. However, meat containing considerable frost requires a somewhat longer time to cook. For the thawing of frozen meat in the field see paragraph 15g.

(4) Army boneless beef should not be confused with commercial boneless beef which is made from lower grades of beef, largely from cow and bull carcasses. Such boneless cuts are deficient in tenderness palatability and food value, and should never be accepted for Army boneless beef.

5. Wholesale market cuts of beef for small messes. In small messes where it is impractical to use beef in quarters, wholesale market beef cuts are available. These should be of the same class and grade required for carcass beef. Beef purchased as wholesale market cuts usually cost the organization more than when quarters are purchased. However, certain cuts can be readily obtained that will meet all the requirements of the mess at no increased cost. The square-cut chuck weighs just a little more than half the weight of the forequarter. The round weighs just a little less than half the weight of the hindquarter. The square-cut chuck sells at an average of 15 to 20 percent less than carcasses, and the round sells at an average of 15 to 20 percent more than carcass price. These two cuts when bought alternately will cost just about the same as carcass beef, and will yield beef suitable for every purpose for which the whole carcass could be used. They have the advantage over carcass beef in having less waste because carcasses contain the skirt, flank, kidney knob, etc., which have waste and are not easy to use to advantage. Wholesale market cuts should be used in the same way as described for those cuts under carcass beef.

6. Lamb. a. General. According to available figures approximately 93 percent of the lambs produced in this country are marketed before they are old enough to be called mutton. Climatic conditions in different parts of the country, combined with orderly marketing on the part of lamb growers and feeders, are responsible for making quality lamb available the year around.

b. Four classifications. The four general classifications of lamb are: hothouse lamb, genuine spring lamb, spring lamb, and lamb. Hothouse lambs are in the luxury class. Their sale is limited to a few of the largest cities. Genuine spring lambs are from about 3 to 5 months old. Since practically all lambs are born from December to June inclusive, depending upon the climate in various sections of the country, this means that genuine spring lamb is available from March to November, although it is most plentiful from April to July. Spring lambs are from about 5 to 8 months old. The bulk of these lambs reach the market from July to December. The fourth classification, "lamb" refers to those which are from approximately 8 to 12 months of age. Most of these lambs come from the feed lots and are usually available from January to May.

c. How to identify. (1) There is no definite age when lamb becomes mutton but there are certain features which characterize young lamb, lamb, and mutton. Bones are the most important indication of age. The bones in young lamb are soft and reddish in color. As the animal becomes older the bones gradually harden, and at the same time they lose their pinkish color and turn white. The "break" joint in the lower fore shank bone is a sure means of identifying lamb. This joint has four well-defined ridges. In young lamb the ridges are smooth, moist, and red. As the lamb matures this joint loses its color and moistness. When the mutton stage is reached the break joint cannot be broken. The forefoot must be taken off at the round (spool) joint, immediately below the break joint.

(2) Lamb cannot be identified by its size. Excellent quality fed lambs often weigh more than mutton. Improved breeding and feeding are producing top quality dressed lambs which weigh as high as 60 pounds or more. A good indication of age, however, is the color of flesh. In lamb the color varies from light to dark pink. The color deepens as the animal grows older. In mutton the flesh will be dark red. Lamb fat is softer than mutton fat. It is creamy white or slightly pink. Mutton fat is whiter and more brittle.

d. Place of lamb in mess. Lamb has a definite place in the Army menu. It is

easy to cut, cook, and serve. The meat is young and tender. Its appearance on the table will be welcomed by the men because of the variety it adds to the menu. The entire back section (shoulders, rack, loin, and legs) can be cut into chops for broiling and pan-broiling; but probably the most satisfactory method of using carcass lamb in the Army menu is to serve it in two ways—lamb stew and lamb roast. When used as stew, all surplus fat should be removed from the meat. Roast lamb should be cooked well done or just slightly under the well-done stage. The "fell", that thin, papery covering over the lamb, does not need to be removed from lamb roasts. It does not affect the flavor of the lamb and, when left on, it helps to keep in the juices and hold the roasts in shape. The fell should be removed from loin and rib chops.

7. Lamb cutting. *a. General.* The bone structure in the lamb carcass is almost identical with that of beef. Wholesale market cuts of lamb differ from beef, however, in form, size, and names. Since lamb is light in weight it is seldom split into sides but is sold either whole, or divided into from two to four wholesale market cuts. These cuts may be as follows:

- (1) Saddle legs and loin (unsplit).
Rack Forequarters (unsplit).
- (2) Long saddle legs, loin, and hotel rack (unsplit).
Triangle or stew shoulders, breasts, shanks, and neck (unsplit).
Legs two legs unsplit.
- (3) Loin unsplit.
Hotel rack unsplit.
Triangle or stew shoulders, breasts, shanks, and neck (unsplit).

The lamb chart (Plate 13) shows the carcass of lamb broken into cuts. Normally the shoulders, breasts, shanks, and neck are not separated as shown in the chart but are sold in one piece as a triangle, stew, or slug. The usual packinghouse procedure is to leave the first three ribs in the shoulders and nine ribs in the hotel rack. One rib (the thirteenth) is left in the saddle. Plate 14 shows the structure and names of the bones. The solid lines show one method of dividing the lamb into wholesale cuts.

b. Army method of cutting lamb. In order that carcass lamb may be used to the best advantage in the Army menu, a special method of cutting was developed. This method utilizes the whole lamb as two major cuts, the long saddle and the triangle. The long saddle, which includes the legs, loin, and hotel rack, is used for boneless roasts. The triangle, consisting of the shoulders, breasts, shanks, and neck, is used for boneless stew. This method of cutting yields about the right proportion of stew and roasts. One hundred pounds of carcass lamb will provide approximately 24 pounds of boneless stew and 35 pounds of boneless roast. If more roast lamb and less stew is desired, either one or both shoulders can be rolled for roasting. When one shoulder is roasted with the cuts from the long saddle, 100 pounds of lamb will provide approximately 44 pounds of boneless roasts, leaving 15 pounds of boneless lamb for stew. Of course, the entire lamb could be used for either of these dishes, but the division just described gives variety in the menu and is the most economical method of using the carcass.

c. Cutting lamb triangle. These instructions will start with the full carcass since it is assumed that most lamb for the Army will be purchased in carcass form. It is recommended that the triangles be cut up for stew first, leaving the long saddles for a later meal. The fat covering inside and outside the long saddles gives them the necessary protection for a few days of aging.

- (1) Put the lamb on the block with the back up.
- (2) Use the knife and saw to remove the neck at the point where it joins the shoulder.
- (3) Pull the fell and excess fat from the outside of the neck. Remove the neck bone in one piece. Pull out the backstrap, then cut the boneless meat into suitable pieces for stew.
- (4) Turn the carcass on its side, breasts nearest the cutter.
- (5) Start at the cod fat and cut through the uppermost flank to about the middle of the thirteenth rib. Continue cutting over the ribs to a point about 1 inch above the elbow joint, then cut straight across the arm bone. Saw across the arm bone; then hold the flank firmly in the left hand and saw across the ribs, following the cut made with the knife.
- (6) Remove the shank and breast from the other side of the lamb. This can

be done by dropping the saw blade on the first rib of the lower breast (the position of the lamb is not changed) and sawing parallel to the cut made in removing the upper breast. Saw through ribs, arm bone, and meat from the first to the thirteenth rib, then finish with a knife by cutting through the flank to the cod fat.

(7) Separate the shanks from the breasts. Pull the fell from the shanks. Remove the meat from the bones and cut it into stewing pieces.

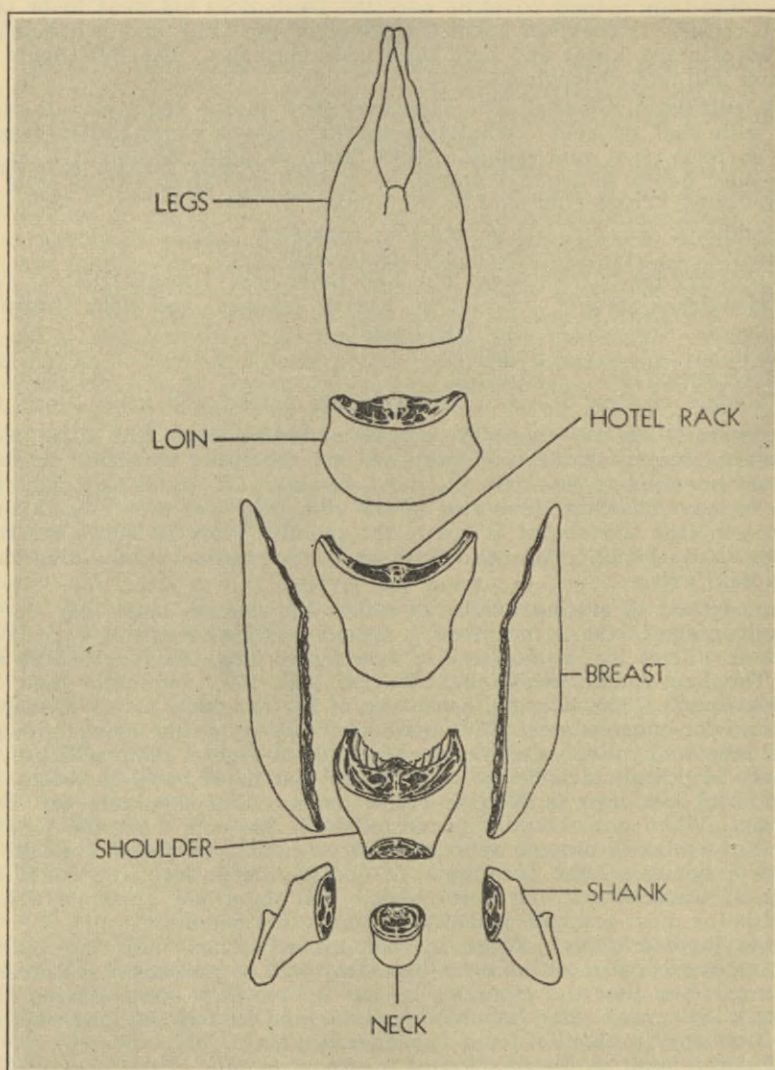


Chart used by permission of National Live Stock and Meat Board.
Plate 13. Lamb Chart, showing location and names of wholesale cuts.

(8) Take one breast at a time, with rib side up, and cut under the diaphragm muscle to expose the rib cartilages. Then slide the knife underneath the rib bones and lift them out by guiding the knife closely along the bones. Turn the breast over and pull off the fell. Trim off all surplus fat. Cut boneless meat into pieces for stew.

(9) Turn the remaining section of the lamb on its back. Cut and saw between the fifth and sixth ribs on each side of the carcass to separate the square-cut shoulders from the long saddle.

(10) Separate the two shoulders from the ribs and the unsplit backbone. Start

with the arm sections of the shoulders up. Loosen the meat by cutting down toward the block alongside the rib bones, then along the spine or feather bones, first on one shoulder, then the other. Turn the shoulders over so that the arm sections are down. Cut around the backbone from the top side to finish removing the shoulder ribs and backbone.

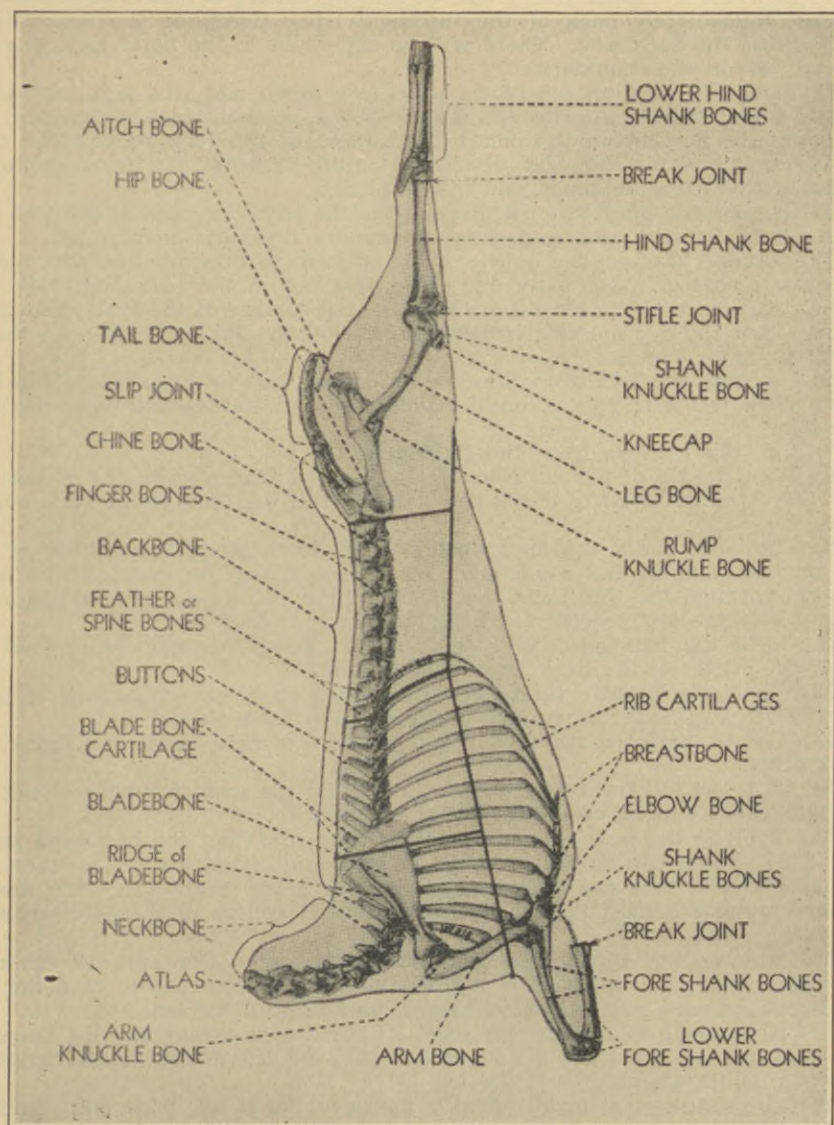


Chart used by permission of National Live Stock and Meat Board.

Plate 14. Lamb Chart, showing location, structure and names of bones.

(11) Pull the backstrap from the back sides of both shoulders.

(12) Work on one shoulder at a time. Place the shoulder on the block, outside down. Open the shoulder from the rib and arm sides. Cut back into the meat, parallel with the block, until the arm bones and bladebones are exposed. With the tip of the knife cut along the edges of these two bones. Unjoint and remove the arm bone. Scrape the front end of the ridgebone, then pull out the shoulder blade.

(13) When the shoulder is to be used for stew, remove surplus fat while cutting the meat into small pieces.

(14) If one or both shoulders are to be roasted, roll and tie, using the rib side as the face of the roll.

d. Cutting long saddle. The shoulders and the long saddle are the most desirable sections of the lamb for roasts. The roasts from the long saddle are the boneless rack, boneless loin, and boneless legs.

(1) Separate the hotel rack from the loin by cutting across both flanks to the backbone, immediately back of the thirteenth rib. Complete the separation by sawing across the backbone. There will be eight ribs in the hotel rack, since five ribs were left in the shoulders.

(2) Place the rack on the block, meat side down and ribs pointing up. Run the knife down, close to the ribs and feather bones, on both sides of the rack. This will loosen the meat from the bones on the end of the rack nearest the cutter. Turn the rack, end for end, and repeat the boning process. The meat should now be entirely free from the bones, and in two pieces.

(3) Remove the bladebone cartilages from the shoulder ends of the two pieces of rack meat. Pull the backstraps from the meat and remove surplus fat.

(4) In order to make the boneless roll uniform in thickness, reverse the ends of the two pieces of meat. Lay one piece of meat on the block, fat side down. Lay the cut surface of the second piece on the cut surface of the first piece in such a manner that the eye muscles will touch each other. Roll and tie with three or four cords.

(5) Separate the loin from the legs by cutting just in front of the hip bones.

(6) With fell side resting on the block, cut all kidney fat from the inside of the loin.

(7) Lift the kidneys from the kidney fat.

(8) With the tip of the knife loosen the tenderloins on each side of the backbone. Slide the knife along the finger bones to roll the tenderloins back over the flanks.

(9) Cut back under the finger bones, then down along the feather or spine bones on each side of the backbone. When lifting out the backbone be careful not to cut through the thin meat that connects the two pieces of boneless loin.

(10) Fold the loin together and tie with three or four cords.

(11) Split the two legs. With the outside of legs up, saw lengthwise down through the center of the backbone and tail bone.

(12) Bone one leg at a time. First, place leg on block with inside of leg up. Cut away all surplus fat around the aitchbone and flank side of leg.

(13) Cut through the stifle joint to separate the shank meat and shank bones from the leg.

(14) Pull the fell from the shank meat. Trim the meat from the shank bone. The shank meat will be used later ((18) below).

(15) Remove the pelvic bone (aitchbone and hip) and the backbone and tail bone. These bones can be taken out in one piece, although the job is made somewhat easier when they are separated at the slip joint (Plate 14). The first step is to loosen and roll back the tenderloin so the hip section of the pelvic bone will be exposed.

(16) Unjoint the pelvic bone from the leg bone. Continue to cut closely around the pelvic bone to separate it from the meat. Keep cutting until the pelvic bone, backbone, and tail bone have been removed from the leg.

(17) Split the inside of the leg open lengthwise to expose the leg bone. Cut meat from around the leg bone so that it may be lifted out. Also remove the kneecap from the shank end of the leg.

(18) Use shank meat to fill opening in leg where pelvic bone was removed.

(19) Roll the boneless leg lengthwise and tie it into shape.

8. Fresh Pork. *a. General.* Pork is seldom sold in carcass form or in sides. Practically all hog carcasses are made into commercial cuts in the packing plant (see pork chart, Plate 15). The heavy lines on the bone structure chart (Plate 16) show the division of the side into the major wholesale cuts. About 30 percent of the pork carcass is sold fresh; the rest is made into cured and smoked meats, rendered into lard, or manufactured into sausage. Demands of the trade influence the way the side of pork will be cut and used. Consequently, pork cuts cannot be classified definitely as those which are always sold fresh and those which are always cured, because practically every pork cut may be cured, and under certain conditions, is cured. On the other hand, some of the cuts which are usually cured may be available as fresh pork.

b. Pointers about pork. Most hogs are marketed under 1 year of age, so the flesh is usually tender and the bones soft. In older hogs, however, the meat will not be as tender and the bones will not be as soft as they are in young pork. In general, the pork produced in the United States is quite uniform, so there are fewer grades than in other meats. The color of young pork is a grayish pink changing to a delicate rose in the older animal. The flesh is comparatively firm and fine grained, and free from excessive moisture. The lean is well marbled and covered with a firm white fat.

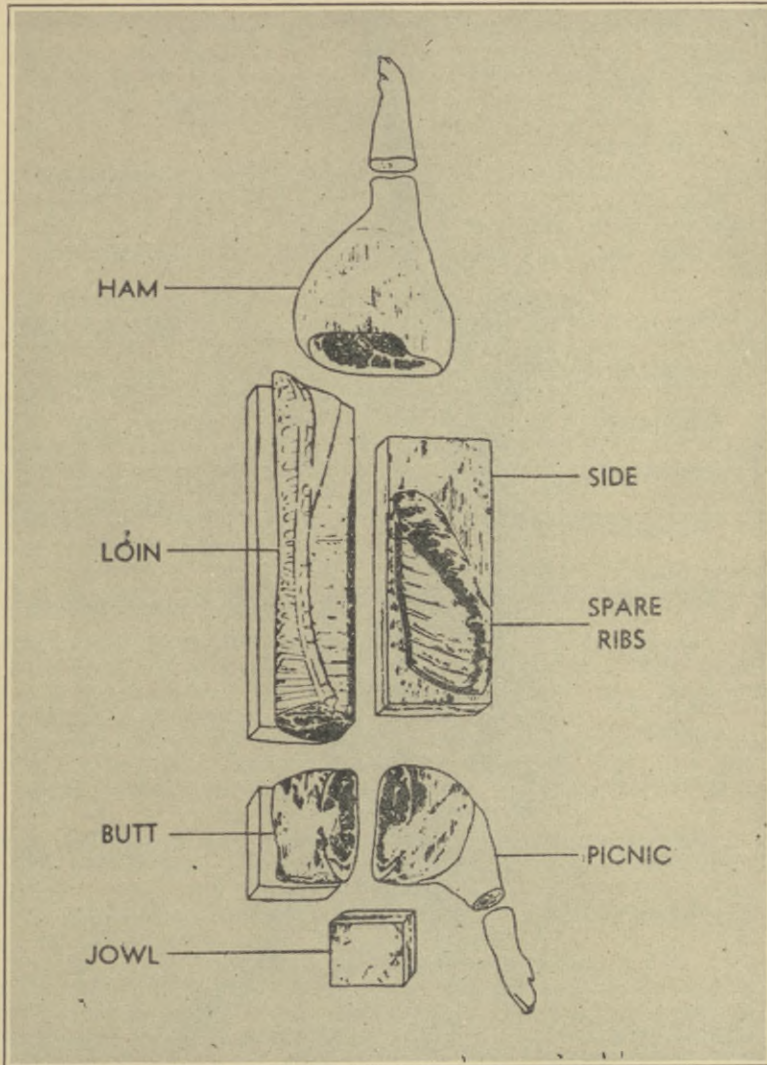


Chart used by permission of National Live Stock and Meat Board.

Plate 15. Pork Chart, showing location and names of wholesale cuts.

c. Place of pork in Army mess. (1) There are several reasons why pork is valuable in the Army mess. It has a high fat content which makes it an excellent energy food. A meal containing considerable fat "sticks to the ribs." That is one reason why nothing is so satisfying as a breakfast of ham or bacon and eggs. Pork is an outstanding source of thiamine (vitamin B₁). This vitamin is needed for growth; it aids in the utilization of carbohydrates; it promotes the health of the body cells; and it prevents the disease, beriberi. Pork is a universally liked meat.

The per capita consumption of pork and beef in the United States has been approximately the same for many years. Pork is also valuable in the Army mess from the standpoints of variety and economy. Sometimes the statement is made that pork is "hard to digest," but this is not true. Being somewhat fatter than other meats it may remain in the stomach for a longer period; but it digests in the same length of time as chicken, and in common with other meats, it is completely utilized by the body.

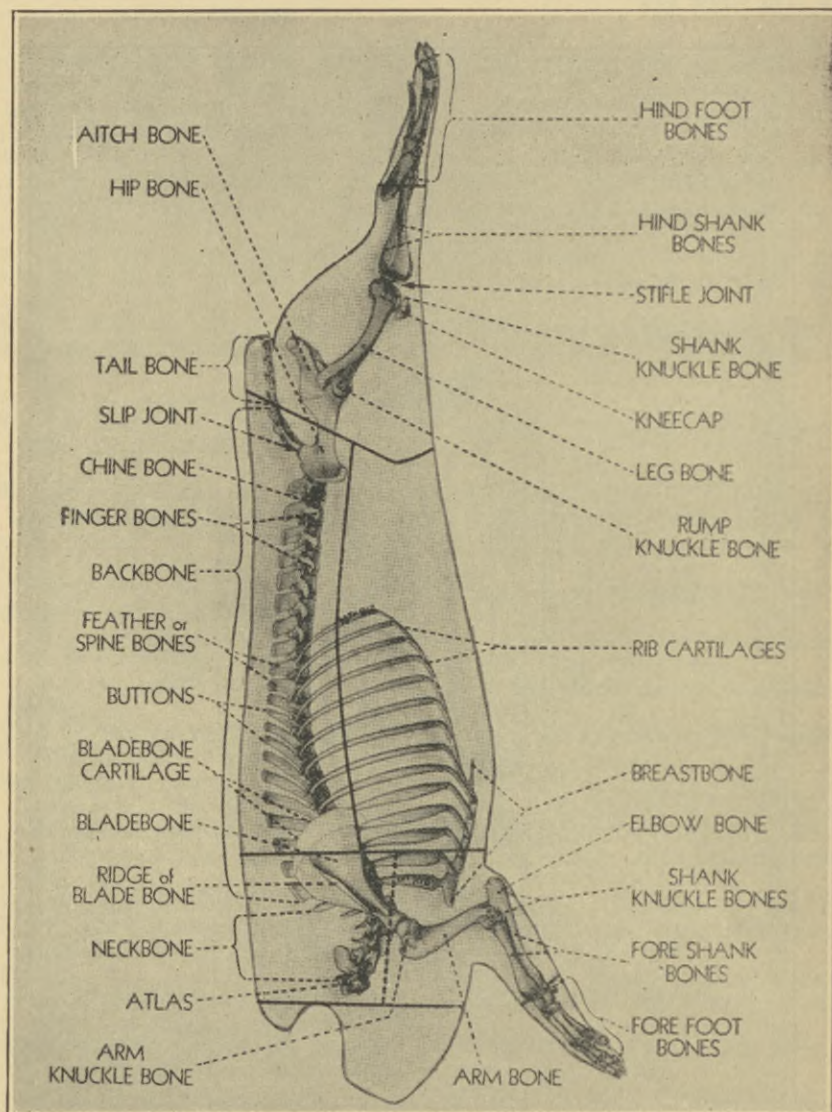


Chart used by permission of National Live Stock and Meat Board.
Plate 16. Pork Chart, showing location, structure and names of bones.

(2) Pork should *always* be cooked thoroughly for the following reasons:

(a) Pork muscle (lean meat) may contain trichinae. These microscopic parasites cause trichinosis in human beings. Fortunately the trichina parasite is killed by thorough cooking. Well-done pork is perfectly safe to eat.

(b) The rich, delicious flavor of pork is developed more fully when it is cooked slowly and thoroughly.

9. Preparing fresh pork. a. General. The preparation of pork for the mess does not require much work because the cuts are of a size and form that are easily handled. The usual fresh cuts are shoulders, fresh picnics, Boston style butts, loins, spareribs, neck bones, and at some seasons of the year fresh hams or leg of pork.

b. One roast from light shoulder. When the pork shoulder weighs less than 12 pounds it can be made into a single boneless roll that will be the right size and thickness for roasting.

(1) Remove the shoulder hock, with knife and saw, from immediately above the elbow joint.

(2) Take the collar, or skin, from the outside of the arm section of the shoulder.

(3) Turn the meat over so that the fat side rests on the block.

(4) Split open the shoulder from the arm and blade sides. Cut into the meat, parallel with the block, until the arm bones and blade-bones are exposed.

(5) Unjoint and remove the arm bone.

(6) Cut meat free from underneath the blade so that this bone may be lifted out.

(7) Fold the boneless meat into a long roll and tie securely.

c. Two roasts from heavy shoulder. A single boneless roast from a shoulder weighing much more than 12 pounds is apt to be quite thick. While it can be roasted, a better plan is to split the heavy shoulder into two boneless roasts, as follows:

(1) Cut off the hock, close above the elbow bone.

(2) Remove the collar, or skin, from the outside of the arm section.

(3) The fat side should be resting on the block. Split the shoulder open parallel with the block; begin at the shank end and follow the natural seam that separates the inside and outside shoulder muscles.

(4) Lift off the boneless inside muscle. Roll and tie.

(5) Open the remaining section of the shoulder from the blade and arm sides. Cut through the meat until the arm bones and blade-bones are exposed. Remove these bones by cutting the meat loose from them.

(6) Roll the boneless outside muscle into a long, narrow roast. Tie with a few cords to hold it in shape during cooking.

d. Pork steaks from shoulder. When pork shoulders are selling for several cents a pound less than loin, it is an advantage to serve shoulder pork and steak occasionally.

(1) Remove the hock and collar as described in b and c above.

(2) With the knife and saw, cut steaks about one-fourth inch thick from the arm section of the shoulder. Fat side of shoulder should be up. Start at the shank end and continue cutting until the blade-bone is reached.

(3) Turn the remaining section of the shoulder (Boston style butt) so that blade steaks can be cut at right angles to the arm steaks that were just removed. Start at the end where the blade-bone is exposed. Use knife and saw to remove the steaks.

e. Cushion roast from the picnic. The picnic is the lower half of the pork shoulder. It includes the shank and arm sections. The bone structure in the picnic shoulder makes this cut a difficult one to carve if it is cooked with the bones in it. Prepared as a cushion picnic roast, this section of the shoulder will present no carving problem.

(1) Remove the hock and collar as described in b above.

(2) "Tunnel" out the arm bone. To do this, cut around the ends of the arm bone from each side of the roast. Removing the bone in this fashion leaves a good pocket in the boneless arm meat.

(3) Take the skin from the hock. Cut the meat from the shank bones. Grind the boneless meat.

(4) Fill the pocket in the arm section with the ground shank meat. Tie two strings around the roast to help hold the ground meat in the pocket.

f. Carving Boston butt roast. The Boston style butt is the top half of the pork shoulder. The blade-bone may be removed from the Boston butt before roasting, but if this is done the meat does not hold together very well when the boneless roast is carved. Consequently it is recommended that the Boston butt be cooked with the bladebone in it. After roasting, it is a simple matter to run the carving knife under the blade and lift the bone to one side. The few ounces of meat attached to the blade and the ridge of the blade can be separated from the bone with a

small boning knife. The meat underneath the bladebone is one solid piece which will carve easily.

g. Boneless roast from pork loin. A practical way to use the pork loin as a roast is to remove the bones before cooking. This assures an easily carved roast.

(1) Strip the tenderloin from its cradle of bones along the backbone.

(2) Remove the small section of bladebone from the shoulder end of the loin provided this is not a bladeless loin.

(3) Loosen the loin meat from the feather bones by cutting closely along these bones the full length of the loin.

(4) With inside of loin up, separate the hip bone from the backbone by running the knife through the slip joint. Lift hip bone from meat by cutting closely around it.

(5) Turn the loin over so that it rests on the backbone with the loin strip next to the cutter. Separate the strip from the ribs and finger bones.

(6) Cut across the center of the boneless loin strip to separate the meat into two pieces of equal length.

(7) Lay the two pieces together, fat sides out, with the thick ends at opposite ends of the boneless roast. Tie the two pieces together with cords spaced about 3 inches apart.

(8) The tenderloin may be tied in with the boneless roast, or it may be cooked separately. The backbone may be used for another meal.

h. Boneless chops from pork loin. The customary procedure is to use a knife and cleaver to cut pork chops. Unless the cleaver is very sharp, and the man who is wielding it skilled in its use, the pork chops are very likely to be full of bone splinters; also a large percentage of them will be thin on one side and thick on the other, thereby eliminating all possibility of cooking the meat uniformly. All of these difficulties can be overcome by using a saw instead of a cleaver, or by removing the loin strip and tenderloin from the backbone so that boneless chops can be served.

(1) Steps (1) to (5), *g* above, describe the making of a boneless loin roast and how to separate the tenderloin and loin strip from the bones in a pork loin.

(2) The tenderloin may be cut into pieces about 2 inches in length, then stood on end and flattened (frenched) with the flat side of a cleaver.

(3) For attractive boneless loin chops, cut them in double slices. The loin strip should rest on the block, fat side up. If chops one-half inch thick are desired, make a slice that thickness, stopping the knife before it goes entirely through the meat. The second slice should be the same thickness as the first one, but cut all the way through the meat.

(4) Open out the two pieces of meat. This cut is called a butterfly chop.

i. Cutting spareribs into individual ribs. The object of the following instructions is to show a practical method of cutting spareribs that will not only provide attractive servings, but at the same time will eliminate disagreeable bone splinters.

(1) Remove the breastbone with a knife by cutting through the cartilages that connect it with the ribs.

(2) Slice between the ribs.

(3) It is recommended that each rib be separated from its neighbor before cooking, but if desired, two or more ribs may be left attached together.

(4) The important thing to remember is to avoid cutting across the center of the ribs with a cleaver; the cleaver cannot help but make bone splinters. Bone splinters are not only a nuisance but they are dangerous.

j. One roast from light fresh ham. A light, fresh ham (leg of pork) weighing less than 12 pounds, like a light shoulder, may be made into a single boneless roll that will be about the right size for roasting. The following steps illustrate an easy method of making the boneless fresh ham roast:

(1) Remove the hock at the stifle joint.

(2) With a knife, lift the skin from the outside. A "skinned" ham will have only a narrow collar, while the outside of a "regular" ham will be covered with skin.

(3) Trim meat from outside of aitchbone. Remove the aitchbone by unjointing it from the leg bone and cutting it free from the leg meat.

(4) Split the inside muscle over the top of the leg bone.

(5) Run the knife lengthwise through the inside muscle, with the tip of the blade sliding along the cushion side of the leg bone. Cut meat free from leg bone so that the bone can be lifted from the meat.

(6) Remove the kneecap from the shank end of the knuckle side of the ham.

(7) Roll and tie the boneless meat into shape.

k. *Two roasts from heavy fresh ham.* When the fresh ham weighs much more than 12 pounds, it is advisable to make it into two boneless roasts. The two rolls will be uniform in size and of a thickness that will be very satisfactory for roasting.

(1) Separate the hock at the stifle joint.

(2) Remove skin from outside of ham.

(3) Take out the aitchbone by unjointing it from the leg bone and cutting it free from the meat.

(4) With the face or inside of the ham up, split it lengthwise into two equal-sized pieces.

(5) The cushion piece will be thick in the center, and the end where the aitchbone was removed will be fairly thin. Lay the thick part of the cushion over the thin end. This is done by starting at the shank end and cutting a layer of cushion meat that will be thick enough, when folded over the thin end, to make the roll uniform. Stop the knife before the cushion slice has been cut free.

(6) Tie a few cords around the cushion roast to hold it in shape.

(7) Remove the leg bone and kneecap from the knuckle half of the split fresh ham.

(8) Tie with four or five pieces of cord.

10. Smoked meats. a. *General.* Smoked meats play an important role in the Army menu, especially during field maneuvers when refrigeration facilities are limited. Properly cured hams and bacon cannot be classified as nonperishable, but they can be kept much longer without refrigeration than could possibly be expected of a piece of fresh meat. In the packing house the supervision of the cellars and the curing of meat cuts is considered a very essential phase of the plant operations, and it is work that requires close and constant attention.

b. *Curing and smoking meat.* For Army use bacon is dry cured or dry salt cured. Hams are sweet pickle cured. After the curing process is completed the meat is sent to the smokehouse. Here it is hung in rows over smouldering hardwood fires.

c. *Kinds of smoked meat.* The principal smoked meats are: hams, bacon, picnics, shoulder butts, jowl squares, briskets, and beef ham sets (dried beef). There are two styles of smoked ham: regular and skinned. The regular hams are marketed with the outer skin and fat remaining intact. The name "skinned ham" is self-explanatory. It means that about half of the outer skin and part of the fat were removed before the ham was smoked. Smoked picnics (calas) are pork shoulders with the butt portion removed just beyond the knuckle bone. Shoulder butts are boneless. They are made from the eye muscle of the Boston style butt. The term "bacon" is applied to smoked bellies, though jowl squares and briskets are sometimes referred to as bacon squares and bacon briskets. Canadian style bacon is made from the boneless loin strip.

d. *Quality of smoked meat.* Nearly all packers make from one to three grades of most of the smoked meat products. The grade of the finished product depends upon the curing method, quality of the fresh meat, and the way it was trimmed. Fancy bacon and hams are cut from the best quality pork and have smooth, thin skin and firm white fat. The meat is fine grained and bright colored. The bacon is free from "seeds." The lower grades are usually defective in one or more of the preceding characteristics.

11. Cutting smoked meats. a. *General.* Smoked hams and picnics are the only two cuts of smoked meat that will require much consideration from the standpoint of proper cutting. Both pieces of meat may be cooked unboned, but the bones complicate the carving job. For that reason it is often advisable to remove the bones before cooking.

b. *Boneless smoked ham for baking.* The following method of removing the bones from the smoked ham is recommended for Army use:

(1) Use the knife to lift the skin from the outside of the ham, provided it is a regular ham. If it is a skinned ham, remove the collar and the skin that covers the shank.

(2) Remove the aitchbone by unjointing it from the leg bone and cutting it free from the meat.

(3) The shank may be removed at the stifle joint, provided it can be used to

advantage in the preparation of some other dish; otherwise it may be left attached to the ham. In (4) to (6) below it is assumed that the shank is on the ham.

(4) Start at the small end of the shank and split open the top half (face) of the ham by running the knife closely along the shank bone, then the leg bone. Remove these bones as well as the small kneecap bone.

(5) The shank meat is so much thinner than the balance of the ham that it is advisable to cut off this meat and put it in the pocket left by the removal of the aitchbone.

(6) Roll and tie the boneless ham before baking.

c. *Slicing smoked ham.* Slicing an unboned smoked ham not only involves a lot of work (unless the kitchen is equipped with an electric meat cutter) but it is not the most advantageous way to cut the ham into attractive servings. The method followed by most first-class hotels and restaurants is a more acceptable one.

(1) Take off the skin.

(2) Remove the aitchbone.

(3) Cut boneless slices from the meat that is exposed by removing the aitchbone. The slices should be made diagonally across the end of the ham until the leg bone is reached.

(4) Stand the ham on the cut surface of the butt end, with the cushion side on the right. Start at the end of the shank and cut down along the shank and leg bones until the block is reached. The cushion side of the ham can now be sliced into attractive horseshoe-shaped slices.

(5) Run the knife through the stifle joint to separate the shank from the knuckle side of the ham.

(6) Cut closely around the leg bone so that this bone may be lifted from the meat. Also take out the small kneecap bone.

(7) Turn the knuckle piece onto cut surface. Start at the large end and cut the entire piece into boneless slices.

d. *Boneless smoked picnic for baking.* The smoked picnic probably will be used largely for seasoning and baking. In order to get the greatest number of attractive servings from this cut of meat, the bones and skin should be removed before cooking.

(1) Remove the skin.

(2) With fat side down, split open the picnic, following over the top of the shank bones and the arm bone as nearly as possible. Continue cutting until the meat has been freed from the bones and the bones can be removed from the meat.

(3) Fold the boneless meat together and tie with cord.

12. *Veal.* a. *General.* Veal is the flesh of calves. Milk-fed veal is considered best. According to Federal specifications, the minimum weight of dressed veal for the Army is 75 pounds, maximum weight 190 pounds. The moisture content of veal is high and its protective covering of fat is quite thin. Therefore, hanging or aging is not advisable. It must be ordered fresh and used promptly.

b. *How to judge quality of veal.* The shape or general build of the carcass is the first thing to consider in judging quality of veal. The same thing is true of other kinds of meat. Good quality veal is plump and blocky; the neck and shanks are short; the rounds are full; the shoulders thick; and the rib and loin well fleshed. The carcass is thinly covered with clear, firm, white fat and the flesh is firm and light grayish in color. The kidneys should be covered with firm fat.

c. *Place of veal in Army menu.* Two factors recommend veal as an article of diet in the Army menu. These are: tenderness and variety. Veal is a wholesome, nutritious meat, and being from a young animal it is always tender. The delicate flavor of veal is relished by many.

13. *Cutting veal.* a. *General.* The bone structure of veal is identical with that of beef. (Compare the veal bone structure chart (Plate 18) with the beef bone structure chart (Plate 3). The names of the wholesale market cuts and the way they are made in the packinghouse are very similar to lamb. Plate 17 shows the location of the major cuts in a side of veal. Normally, the carcass is not split but is sold as legs, loin, rib, and triangle, or a combination of these cuts such as the saddle and rack.

b. *Veal for Army use.* As a general rule, the entire veal carcass may be utilized in much the same way as lamb; namely, the triangle for stew and the long

saddle for roasts. The back section (shoulders, rack, loin, and legs) also may be cut into chops and steaks. The actual making of boneless veal cuts for Army use, however, will involve a combination of beef, lamb, and pork cutting methods. The reason for this is obvious when it is realized that a light veal weighs slightly more than a heavy lamb. A heavy veal weighs about the same as a medium-weight dressed hog and a little under one-half the weight of a light carcass of beef. From this it can be seen that the weight of the veal carcass will influence materially the cutting method to be followed.

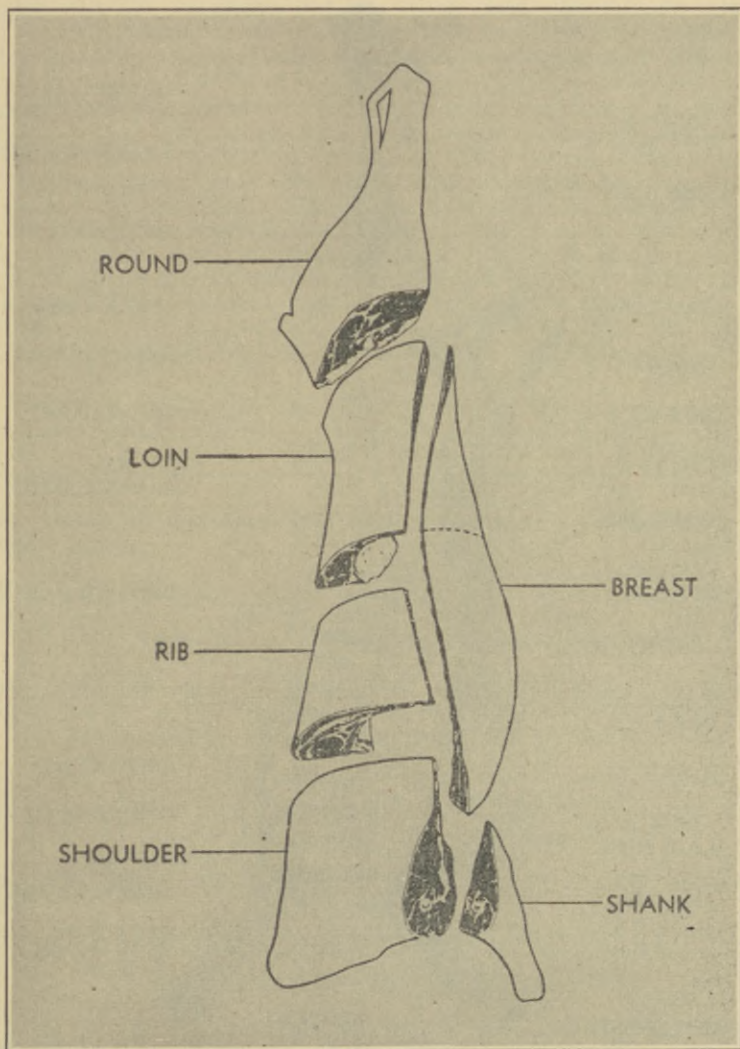


Chart used by permission of National Live Stock and Meat Board.

Plate 17. Veal Chart, showing location and names of wholesale cuts.

c. Light veal. Light veal carcasses weighing less than 100 pounds may be cut into boneless roasts and boneless stew in practically the same manner as recommended for lamb (par. 7). The roasts will be somewhat larger in circumference than the comparable lamb roasts, but they will not be too large to cook satisfactorily.

d. Heavy veal. A heavy veal carcass, or heavy saddles and racks, should be split down the center of the backbone, the same as beef. The usual procedure is to saw through the tail bone and sacral vertebrae, then use a cleaver to finish

splitting the backbone. The forequarter is usually separated from the hindquarter between the twelfth and thirteenth ribs. There is no reason, however, why all 13 ribs should not be left on the forequarter.

(1) *Forequarters.* The method described for cutting the forequarter of beef (par. 4d) will be the most satisfactory method to follow in boning heavy veal forequarters. This method will supply the greatest number of solid pieces of

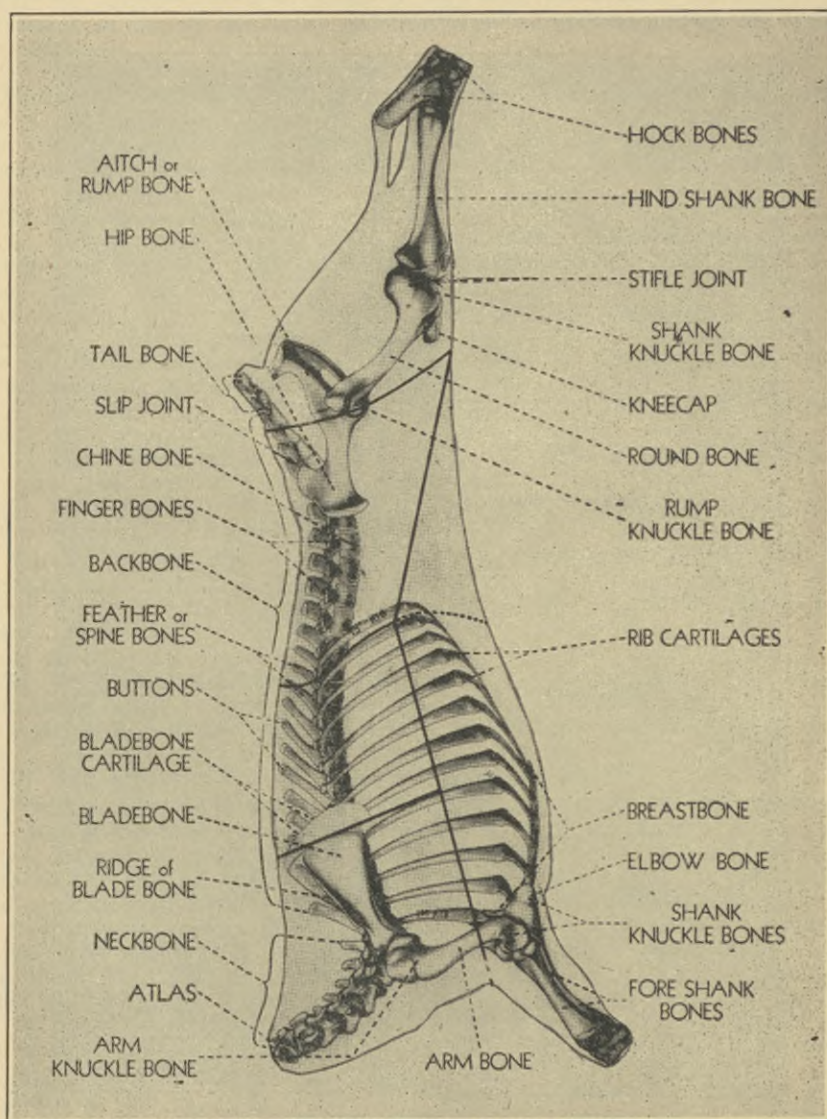


Chart used by permission of National Live Stock and Meat Board.

Plate 18. Veal Chart, showing location, structure and names of bones.

meat for roasts, if a maximum amount of roasting meat is desired. At the same time it is an easy way to bone the forequarter when only meat for stewing is needed.

(2) *Hindquarters.* The heavy veal hindquarters should be divided into four major cuts: flank, market round (round with rump off but with knuckle attached), hip (loin end and rump), and short loin. The tenderloin should be removed before the hip and short loin are separated.

(a) The flank will be used for stew, or for a dish other than a roast.

(b) If the market round is a large one it should be divided into four pieces (knuckles, inside, outside, and heel) as recommended for beef (Plate 10). If the round is of medium size it may be split into two boneless rolls as recommended for a heavy fresh ham (par. 9k).

(c) The hip (rump and loin end) should be boned in one piece. The resulting boneless veal butt will make an excellent roast.

(d) The loin strip should be removed from the backbone of the shell loin. (A short loin with the tenderloin out is a "shell" loin.) Sometimes it is advisable to tie two loin strips together for roasting so that less meat will be exposed to the oven heat. This plan is comparable to the way a boneless pork loin is prepared for roasting (par. 9g). The same suggestion applies to the tenderloin.

14. Meat specialties. *a. General.* The name "meat specialties" is given to those edible parts of beef, veal, pork, and lamb which cannot be classed with the regular cuts. They are known also as "extra edible parts," "fancy meats," "meat sundries," "variety meats," etc. Use of these specialties is desirable because they introduce variety in the menu. They are economical. In addition, they furnish the same food elements found in muscle meats, and in some cases are extraordinary sources of these nutrients, being rich in vitamin A and in the vitamin B group. Because of their high moisture content and their lack of fat, these organs do not keep well and should be kept in the refrigerator until time to use them. There is little waste in these meats, and being boneless, it is easy to figure the number of pounds needed for one meal.

TABLE OF MEAT SPECIALTIES

Name	Characteristics	Cooking Methods
Brains:		
Calf, lamb, pork, beef.	Very tender, soft in consistency	Precook. Cream; scramble; fry.
Heart:		
Veal, lamb, pork, beef.	Muscular organ which has had considerable exercise. Boneless; high percentage edible. Beef heart largest.	Stuff and braise. Cook in water.
Kidneys:		
Veal, lamb, pork, beef.	Surfaces of all kidneys are smooth and moist. Veal and beef kidneys characterized by irregular depressions in surface.	Cook in water. Stew; broil.
Liver:		
Veal, lamb, pork, beef.	Beef liver largest. Pork liver highest in iron. All excellent sources of essential nutrients.	Braise; fry; broil.
Oxtails, beef	Well flavored. Considerable bone.	Soup; braise.
Sweetbreads:		
Veal, beef, lamb.	Great delicacy. Tender. Thymus gland of calf, young beef, and lamb. Divided into two kinds: heart and throat sweetbreads.	Braise; fry broil.
Tongue:		
Veal, lamb, pork, beef.	Pork, lamb, and veal tongues are usually sold in a ready-to-serve form. Beef tongue may be purchased fresh, pickled, corned, or smoked. Boneless; high percentage of lean meat.	Cook in water.

b. Sweetbreads. These are the thymus glands of beef, veal, and lamb. Veal sweetbreads are larger than those from beef. As the animal matures, the anterior part called "throat sweetbreads" disappears, but the posterior part known as "heart sweetbreads" is used. Calf sweetbreads are more valuable commercially. Swine (pork) do not have sweetbreads, while those of lamb are too small to have any commercial value.

c. Brains. Brains and sweetbreads are much alike in tenderness and texture,

and may be used in much the same way. An occasional mess including brains is looked upon with favor by Army men.

d. Hearts. Veal, lamb, and pork hearts are tenderer than those from beef. They are also smaller. The heart is a muscular organ and the meat is fibrous. Beef hearts contain a small piece of cartilage near the top center. This should be removed. Beef hearts should be given long, slow cooking to make them tender.

e. Tongue. Like hearts, the tongue receives considerable exercise and, before it is cooked, is one of the least tender of meat specialties. Veal and beef tongues are larger than those from pork or lamb. Tongue is sold fresh, pickled, corned, or smoked.

f. Kidneys. This variety meat is prized highly. Kidney stew especially has become famous. Kidneys should be of a dark red color, firm texture, and free from strong odors. Pork, beef, veal, and lamb kidneys are equally satisfactory for mess use. If kidneys have a strong odor, this can be removed by slicing and soaking the meat in salt water for several hours before cooking. While the kidneys taken from a beef carcass are not sufficient in quantity by themselves for a meal for the mess, they can be used to good advantage in lean beef stew, potpie, or in soups and gravies.

g. Liver. Liver is a very rich source of iron and other substances concerned in the formation of red blood cells. It also is an excellent source of vitamin A and the B complex. The flavor of liver is enhanced by serving it with bacon. Pork and lamb liver should be scalded before cooking; beef and veal liver need not be. Beef livers should be full, short, thick, and tender, of a dark mahogany color, have the gall bladder removed, and be free from bile stains.

h. Oxtails. While they have considerable bone, oxtails also have a goodly portion of meat and are very rich in flavor. Oxtails require long, slow cooking in moist heat to make them tender and are used for soup or prepared by braising. Before preparation, they should be cut into pieces at each joint.

15. Frozen meats and fish. *a.* In time of peace, beef, veal, lamb, mutton, pork, poultry, and fish may be delivered to Army messes in either a chilled or frozen condition. "Chilled" means that the meat has been held in a chill room until it reaches a temperature of 34° to 36° F. "Frozen" means that meat has been held in a freezing room, often called cold storage, at a temperature usually below zero until solidly frozen to the center. In the continental United States, meats, poultry, and fish normally are received by messes in a chilled condition. In the Tropics they sometimes are frozen when received. In time of war they may be received in frozen form both in the Tropics and elsewhere.

b. Frozen meats and fish should never be thawed in water, as this soaks out some of the meat juices, which reduces palatability and food value.

c. While it is possible to thaw in ordinary room temperature, this is bad practice and should be resorted to only when there is not time to thaw in a refrigerator, because by the time the meat, poultry, or fish is thawed to the center the outside may begin to spoil. This spoilage is evidenced first by a slimy surface, and there may be a slight tainted odor; these evidences of spoilage increase as time goes on, and eventually the spoilage reaches such a stage that the surface must be trimmed away. The best method of preventing surface spoilage while thawing is to thaw at a temperature slightly above freezing (up to 40° F.). This requires longer time but is safe. Regardless of the temperature of thawing, there should be a good circulation of air around the frozen product being thawed. This is because moisture appears on the surface while thawing, and moisture favors spoilage. If the air around the thawing meat is kept moving it carries away the moisture and the meat remains dry and in better condition.

d. If there is not sufficient room in the refrigerator to permit hanging a quarter of frozen beef or a carcass of veal, it must be divided. This is not particularly difficult. It can be done with a meat saw. It is less difficult if thawing is allowed until cutting down to the bone can be done with a knife, but this method is not recommended in a warm room.

e. When using frozen meats, the time required for thawing must be considered in planning cooking operations. For example, if roast beef is to be served on Sunday, the frozen beef should be delivered Thursday or early Friday morning. Following are approximate times required for thawing in an Army mess refrigerator:

	Hours
Frozen beef, quarters, chucks, or rounds	36-48
Frozen beef, loins, ribs	36-48
Frozen veal, mutton, or lamb carcasses	24-36
Frozen veal, mutton, or lamb cuts	18-30
Frozen pork, cuts	18-30
Frozen poultry or whole fish	12-24

f. Thin cuts of frozen meat, that is, cuts not more than 1 inch thick, may be satisfactorily pan fried by putting the frozen cuts directly into the hot pan without first thawing them. In pieces of this size the frost is quickly driven out, and the interior becomes cooked before the outside is overcooked. However, if the thin cuts are to be fried in deep fat, they must first be thawed. If this is not done, the cold in these cuts will cool the fat below the proper frying temperature. About the only thin frozen cuts used in Army messes are frozen fish filets, and when cooked without being first thawed they are more palatable.

g. When frozen meats are supplied to troops in the field as part of the field ration, usually there will be no refrigerator in which to thaw them. They must be thawed in the open, the rapidity of thawing depending on weather conditions. In hot weather the surface of the meat will begin to spoil before the meat is thawed at the center. This spoilage may be retarded by hanging wet cloths or sacks around the thawing meat. The wind blowing on these wet sacks will keep the meat cooler than the surrounding atmosphere. Sometimes frozen meat will be received in the field only a short time before it must be cooked for the next meal. In such a case a stew may be made, using the chuck, shanks, or round. The meat saw or cleaver must be used to cut off these cuts. In hot weather cooked meats will keep longer than chilled fresh meat, and when necessary to save meat to prevent loss through spoilage, the cook should not hesitate to cook more meat than is needed for immediate service.

h. Frozen Army boneless beef should be thawed in the boxes in which it is packed. Because of the frost in the meat, the box becomes the equivalent of a refrigerator and keeps all the meat refrigerated while defrosting is taking place. The surface of the meat is not exposed to the warm air of the room and surface deterioration (slime) does not develop.

16. Sausage. a. Commercial sausage is made from finely chopped or ground meat (or meat products) to which cereal (as flour or corn meal) may or may not have been added, and flavored with spices and condiments. It usually is stuffed into a casing. Federal specifications do not permit the Army to purchase sausage to which cereal has been added. The presence of any cereal must be declared on the label, and when over 3 percent of cereal is present the product must be labeled "Sausage and Cereal." Sausage containing cereal should not be accepted by Army messes.

b. Fresh pork sausage is made from fresh pork trimmings and should never be eaten raw. It should be cooked until well done.

c. Cooked and smoked sausages, such as bologna, frankfurters, etc., are made from combinations of beef and pork trimmings and meat products.

d. Dry sausage includes all summer sausages which are made from pork and beef trimmings and for the most part are preserved by drying. Some varieties of summer sausage are smoked. Dry sausage containing lean pork, prepared in an official establishment, is prepared in one of the ways prescribed by the Bureau of Animal Industry to kill any trichinae that might be in the pork. No dry sausage should be used unless it was prepared in an official establishment.

SECTION II

COOKING OF MEATS

17. Meats, cooking terms, defined.

Bake. To cook by dry heat in an oven. Usually applied to vegetables, pastries, desserts, etc. Not applied to roasted meats, although such meats are actually baked. See "Roast."

Barbecue. To roast slowly (an animal), whole or in pieces, on a gridiron, spit,

or over coals in a specially prepared trench. The meat is usually basted with a highly seasoned sauce.

Baste. To pour liquid over a piece of meat during baking, roasting, or broiling in order to prevent drying or scorching. Basting improves flavor. The liquid used may be pan dripping, water, stock, milk, cream, or melted fat.

Boil. Meats should never be boiled. See "Simmer."

Bouillon. A soup stock made from lean beef without bone, clarified by straining, and seasoned. It may be used as soup stock or served as soup.

Braise. A method used to cook less tender cuts of meat such as pot roast. Braising is really steam roasting (cooking in moist heat). The meat is seared (browned) in a hot pan in a small amount of fat, then simmered in a covered pan or dutch oven in its own juice; or water, stock, milk, or cream may be added. Braising may be done either in the oven or on top of the stove. It is one of the best methods of cooking the less tender cuts, as a long cooking in the moist heat makes these cuts tender when done.

Broth. The liquid resulting from simmering meat in water.

Broil. To cook by direct (radiant) heat from hot coals, a gas flame, electric unit. Sometimes called grilling.

Brown. See "Sear."

Consomme. A soup made from two or more kinds of meat, usually beef, veal, and chicken, then seasoned, strained, and served clear.

Fricassee. To sear or sauté meat (usually beef, veal, or chicken which has been cut in small pieces) until partly cooked, then simmer in gravy until done.

Fry. To cook in fat, especially to cook in a small amount of fat (also called sauté or panfry or simply fry) and to cook in deep fat (also called french frying or deep-fat frying).

Larding. Placing strips of fat on top of, or inserting into, meat to add flavor and prevent dryness in roasting. See "Lardoon."

Lardoon. A long, slender, pencil-like portion of salt pork, bacon, or suet used for larding.

Marinate. To allow meat to stand in a marinade (a brine or pickle, used either for the purpose of tendering meat, in which case it is composed of only water and vinegar; or for enriching the flavor, various spices, herbs, etc., being added for this purpose).

Pan broil. To cook in a hot, uncovered frying pan, keeping the fat poured off.

Panfry. See "Fry."

Parboil. To simmer for a short time in order to make certain foods tender before cooking by another method.

Pot roast. A large piece of meat cooked by braising. Chucks, necks, briskets, and rumps of beef; breast and shoulder of veal and mutton; and the shoulder, butt, and shank of pork are often made into pot roast.

Roast. To cook in the oven by dry heat in an uncovered pan without added water, except water used for basting. Roasting is used for thick pieces of tender meat, as ribs of beef, loin of pork, leg of lamb, etc. The tender cuts should be roasted; less tender cuts (chuck, round, etc.) should not be roasted but should be braised. Poultry is usually roasted in a covered pan.

Sauté. To fry in shallow fat. Often called fry. Sautéing may be done on top of the stove in a frying pan, or similar pan, covered or uncovered; or in the oven usually in an uncovered bake pan.

Sear. To brown the outside surface quickly by high heat. Dry heat or hot fat may be used. It improves flavor and appearance.

Simmer. To cook in water which is just below the boiling point; sometimes erroneously called boiling.

Steam. To cook by steam.

Stew. To cook small pieces of meat in a simmering temperature in sufficient water to cover, with the addition of vegetables toward the end of the cooking process.

Stock. The liquid obtained by soaking and simmering meat (usually scraps) and bones for several hours. A good base for soups and gravies.

18. Meats, seasoning. a. When meats are to be roasted or braised, salt and pepper are rubbed on the meat before cooking. The following quantities should be used:

Beef, lean pork, veal, and lamb:

$\frac{3}{4}$ teaspoon of salt to each pound of meat.

$\frac{1}{8}$ teaspoon of pepper to each pound of meat.

Fat pork, such as butts and shoulder:

$\frac{1}{2}$ teaspoon of salt to each pound of meat.

$\frac{1}{8}$ teaspoon of pepper to each pound of meat.

b. When meats are cooked in water, as simmered beef and stews, salt, pepper, and other seasonings to taste are added to the water.

c. When meats are fried, either in deep or shallow fat, or boiled, salt and pepper to taste are sprinkled on before or during cooking.

19. Meats, principles of cooking. a. There are several objects in cooking meat:

(1) First, and most important, to make it more palatable. Cooking meat develops a pleasant flavor.

(2) To loosen and soften the tissues, thus making it easier to eat and digest.

(3) To kill any germs which might be present. This is merely insurance; meats do not ordinarily contain any germs but might pick them up through contact with wrappers, or tables, etc.

(4) To coagulate (thicken) with albumen, thus giving the meat a better appearance.

b. Cooking of meat does not add to the food value; in fact some methods of cooking cause losses which lower the food value. (See par. 20.)

c. *Methods of cooking tender and less tender meats.* (1) *Beef* (for classification as tender and less tender, see par. 4).

(a) Tender cuts of beef are easily cooked into steaks or roasts. When roasting, it is not necessary to use a covered pan.

(b) Less tender cuts of beef may be divided into two classes:

1. Those portions which can be made into good steaks and roasts by pounding steaks and by braising roasts.

2. Those portions which cannot be made into good steaks and roasts and are used in stews or ground meat dishes.

(c) Any less tender cut of beef can be made tender by a long cooking (about 3 hours, depending on degree of tenderness) in moist heat at low temperature (below 200° F.). (See "braising, fricasseeing, stewing," par. 37.) This long, slow cooking in moist heat is necessary to make these cuts tender. On the other hand, since they are already tender, it is not necessary to cook tender cuts in moist heat, and somewhat higher temperature and shorter times can be employed.

(2) *Veal.* Veal requires the kind of cooking given less tender meats (long, slow cooking in moist heat).

(3) *Pork.* All pork is cooked as a tender meat but must always be cooked until well done.

(4) *Lamb and mutton.* The same principles of cooking apply to lamb and mutton as to beef.

(5) *Poultry.* Young poultry is tender; old poultry (fowl) is cooked by the same principle as for less tender cuts of beef.

d. The flavor of meats is improved in cooking by the addition of seasonings which may be other meats, spices, sauces, or added vegetables. Seasonings are especially important when left-over cooked meats are cooked again, as they lack flavor unless skillfully seasoned. In such cases some fresh meat is often added, and vegetables nearly always. (See par. 29.)

20. Simmering. a. If the cooking of meat is started in cold water, the pores are not sealed and the food value of the meat is lessened because the meat juices escape into the water and carry with them some meat solids which then become dissolved in the water (see par. 22). This action is hastened by the gradually increasing heat of the water. The amount of food thus escaping from the meat into the water is dependent on three things:

(1) The amount of meat surface exposed to the water.

(2) The temperature of the water.

(3) The length of time the meat is left in the water.

If the meat is cut into very small pieces and cooked for a long time, the liquid will be much richer, but the meat itself will become stringy and less tasty and its food value will be much reduced; however, it still has some food value, as it contains most of its original protein and makes a palatable dish if combined with vegetables and seasoning. Meat cooked in this way may lose as high as 40

per cent in weight. This loss is largely water, but 5 to 8 per cent is material which has a high food value.

b. If meat is put into boiling water or hot fat, the albumen on the entire surface is immediately coagulated, forming a crust which prevents the dissolving of the juices and extractives. When meat is cooked in this way it has the desired meaty taste, but the broth will be poor. It is impossible to have a rich broth and a juicy well-flavored piece of simmered meat at the same time. In cooking meat for soup, put the meat in cold water and slowly increase the heat to a simmering point; this will extract all the meat juices into the broth. If it is desired to prepare simmered beef, put the meat in boiling water and keep it boiling for about 10 minutes. This sears (closes) the surface of the meat by sealing the pores and tends to prevent escape of meat juices. After 10 minutes, allow the temperature of the water to drop to about 180° F., which should be maintained until cooking is completed. If allowed to boil during the entire period of cooking, the albumen throughout the meat will coagulate and become hard and dry. The time of cooking at the lower temperature will be longer, but the meat will be juicy and tender instead of dry and tough as it would be if kept boiling during the entire cooking period.

21. Meats, roasting. a. (1) Roasting, as applied to beef, veal, pork, mutton, and lamb, is cooking in the oven by dry heat; that is, the pan is not covered. When the pan is covered, the cooking is called braising, and is done in moist heat, due to the steam being kept in by the cover.

(2) As applied to poultry, roasting is cooking in the oven by moist heat, as the pan is usually covered. The texture of the flesh of poultry is such that roasting in an uncovered pan would result in excessive dryness.

(3) Braising is the best method of cooking the less tender cuts, while roasting (uncovered) is the best method for tender meat.

b. (1) The principal difference between roasting and simmering is that in simmering the meat is surrounded by water and in roasting it is surrounded by hot air. In braising it is surrounded by hot air and steam. More of the meat juices are retained in roasting or braising than in simmering. The shrinkage during roasting is mainly due to loss of water. In recent experiments it was found that the loss by shrinkage was only 6 per cent when meat was roasted at 250° F., but the shrinkage was 30 per cent, or 5 times as great, when the temperature was doubled.

(2) If roasted in an uncovered roaster, the meat should be basted frequently, and it may be necessary to add a small amount of water to keep the fat in the bottom of the pan from burning. If the meat has not browned enough during the last 10 to 15 minutes of roasting, increase the heat sufficiently to obtain the desired brownness.

(3) Meat which is to be roasted or braised should be placed in the pan fat side up.

c. It is very difficult to determine from outside appearances how well done a piece of meat has become. A general rule is to allow 20 to 22 minutes per pound (after searing) with oven at 250° F. for a medium-done roast and 25 to 30 minutes for a well-done roast. The most accurate method of determining how well the meat is done is by the use of a meat thermometer. Before putting the roast in the oven (after searing), the thermometer is placed in the meat so that the bulb will be as near the center of the cut as possible. The oven temperature should be as near 250° F. as possible and the meat should be allowed to cook until the thermometer registers 140° F. for a rare roast; 160° F. for a medium roast, and 180° F. for a well-done roast. Temperatures higher than 250° F. will shorten the time of cooking, but the outside of the meat may be too brown and the shrinkage will be higher. At 250° F. the shrinkage will be less, but the cooking time will be increased. Thermometers are recommended for general use in service messes.

d. In roasting lean cuts of meat, fat should be placed on top of the roast, or, if the meat is boned and rolled, on the inside of the roll. This fat may be suet, pork fat, or bacon. Where sides of beef are purchased and cod fat is available, it is well to use this fat, or other fat of the side of the carcass, in the roasting of the lean cuts. Fat backs of pork also are very good. Strips of this fat can be threaded through the lean meat by punching holes with a larding needle or other sharp, slender implement, such as a large skewer or ice pick, and then inserting the strips. The added fat greatly improves the flavor of cuts of lean meat having little or no fat.

22. Meats, searing. *a.* Searing is done by exposing the meat for a short time to a high heat so that the surface is browned. It has been the general belief that this seals the pores of the surface of the meat and thus prevents escape of meat juices; however, recent experiments show that it is doubtful whether searing actually does this. Escape of meat juices is not actually a loss as they are used for gravy if the meat is roasted, and serve to enrich a stew. The browning of the surface improves appearance of a roast and adds flavor to both the roast and the gravy. For these reasons, searing is desirable whether or not it prevents escape of juices.

b. To sear meat which is to be roasted or braised, place it in an uncovered pan in a hot oven (450° to 500° F.—10 to 12 counts) for a period of about 15 minutes; or in a hot pan over the fire and turn it until all sides are browned. If the meat is deficient in fat it is well to add a little fat when searing. There is always danger of burning meat by searing in the oven and for this reason it is recommended that searing of meats for Army messes be accomplished in a hot pan on top of the stove. Searing sometimes is called browning (see *a* above).

c. It is the general practice to sear meat which is to be cooked in water (see pars. 20 and 25) by plunging it into boiling water. It is generally accepted that this seals the pores and retains the juices in the meat. This procedure is recommended whenever it is desired to produce a juicy piece of meat (as simmered beef) which has been cooked in water.

23. Meats, broiling. *a.* Broiling is a quick way of preparing steaks and chops. Steaks should be cut from 1 to 1½ inches thick for broiling. If cut too thin they will become hard and tough. Broiled meats should be rare or medium; never well done. The temperature should be kept moderate; if too high the meat will be toughened or scorched on the outside before the center is done. For a steak 1 inch thick the time required for cooking will be approximately 12 minutes, 6 minutes for each side.

b. Broiling is by direct heat; that is, exposed to a flame or other direct heat. It should not be placed too close to the flame as this will scorch the meat. Broiling also may be done on top of the stove by placing the meat on a very hot frying pan or griddle on which a small piece of suet has been rubbed. The pan must be very hot or the meat will stick. Turn the meat often until done. This method is called pan broiling.

24. Meats, frying. *a.* Deep or shallow fat is used for frying meats. Beefsteak, hamburger steak, meat balls, and lamb or mutton chops are fried in shallow fat; pork chops are usually fried in shallow fat, but sometimes are fried in deep fat. Croquettes, etc., are usually fried in deep fat.

25. Meats, stewing. There are two methods of making stews; in one method the meat retains its flavor and in the other the juices are extracted and the meat will lack flavor but the broth will be rich and well-flavored. In order to have the meat retain the flavor, it is necessary to sear it in hot fat, which will make a brown stew, or sear by plunging into boiling water. After searing the meat is simmered until tender. Vegetables are added during the cooking process (see par. 15d). To make a stew with a rich thick broth the meat is put on in cold water and slowly brought to the simmering point. This method extracts the meat juices into the broth, but this flavor is not lost as the vegetables in the stew pick it up.

26. Meats, pan broiling. The cuts which lend themselves best to pan broiling are tender beefsteaks, lamb or mutton chops or steaks, ham, and bacon. The broiling should be done on a hot plate or frying pan, uncovered, pouring off fat as it accumulates in the pan. Sear the meat quickly on both sides, and then cook more slowly until the desired degree of doneness is reached. Bacon is put into a cold pan, cooked slowly and the fat poured off frequently. (See par. 37.)

27. Meats, braising. Meat for braising should be cut quite thin. A little fat is melted in a hot frying pan. The meat is browned quickly on both sides and then cooking continued at a lower temperature in a covered pan. The cuts of meat usually cooked by braising are round steaks, veal steaks or chops, and pork chops. (See par. 37.)

28. Pot roast of beef. Cuts of beef suitable for a pot roast are chuck, ribs, clod, round, and rump. Rub the roast with salt, pepper, and flour. Brown the meat on all sides in a small amount of melted beef fat. After searing, add a small amount of water, cover tightly, and simmer until tender. Time required: about 3 hours. (See par. 37.)

29. Specification beef, cooking. a. Beef is usually supplied to Army messes in quarters, alternate hind and forequarters. In every quarter of beef there are two kinds of cuts—tender and less tender. The tender cuts are easily cooked into palatable roasts or steaks. While equally as nutritious as the tender cuts, the less tender cuts require somewhat different treatment to make them into attractive dishes. Too often this problem is met by making them into stew or by grinding. While it is true that some portions of the less tender cuts (neck, brisket, navel end, shank, and flank) are not suitable for roasts or steaks, and therefore are best used for stews or by grinding, it also is true that meat from the chuck (other than the neck), the round, and rump can be made into good steaks and roasts if properly cooked. There is little excuse for always using these portions for stew or ground-meat dishes.

b. A good investment for any mess is the purchase of one or two steak masticators. With these, steaks from the chuck and round can be made very tender and palatable. Steaks are pounded with the masticator, which not only breaks down the tissues and makes the meat tender but also tends to flatten and give them a larger appearance. Pounding with a masticator tends to drive out the meat juices which give flavor, but the loss of these juices can be prevented by sprinkling flour over the surface of the steaks, or by rolling or dipping them in flour before pounding. The flour is then pounded into the meat and absorbs the juices as they are released, thus retaining the flavor. If masticators are not on hand, the flat side of a cleaver may be used.

c. It may occur that the menu calls for beefsteak or for roast beef, and that the mess has a quarter of beef on hand which does not provide sufficient tender meat for a meal of steak or roast. In such case the shortage can be made up by using the necessary quantity of less tender meat, for steak by pounding, and for roast by braising, and marinating before braising, if necessary.

d. Marinating is done by soaking the meat in a marinade for 2 to 4 hours, depending on size and degree of tenderness. The marinade consists of three parts water and one part vinegar and is used in sufficient quantity to cover the meat. The action of the vinegar softens the fibers and also freshens the meat. After soaking, the meat is removed from the marinade and cooked, usually by braising. The marinade keeps well and may be used again for other meat.

e. Those less tender portions which will not make good steaks or roasts can be made into many attractive dishes. There are a number of recipes in this manual which show how these cuts can be used to advantage. Too often they are used in stew with the result that the menu becomes monotonous. Variety is provided by serving them cut into small pieces for potpie; in diced form as in chili con carne; or in one of the many types of ground-meat dishes, as meat loaf, croquettes, hash, etc. Meat for hamburger or meat loaf should be ground comparatively fine. The grinder must be sharp enough to cut the meat and not shred or pull it apart, as this makes a very stringy unpalatable meat dish. In ground-meat dishes made from beef, the addition of a small quantity of ground bacon or pork fat improves the flavor. The proportion should be 1 or 2 pounds of bacon or pork fat to 10 pounds of beef. This is a good use for dry salt-cured bacon. If eggs are mixed with ground meat (1 egg to 2½ pounds of meat), the albumen of the egg will coagulate quickly when heat is applied and thus retain the meat juices and hold the meat together.

f. Frequently a mess has left-over cooked meats on hand. These can be made into stews or potpies, or into ground-meat dishes. If there is not sufficient left-over meat for a complete meat dish the quantity may be increased by adding fresh meat. This will improve the dish, as dishes made from left-over cooked meats lack the flavor of those made from fresh meats. When left-over cooked meats are made into stews and meat pies, vegetables should be added to improve the flavor. Seasonings, as sage, curry, and garlic, may be used to advantage in left-over meats. If the quantity of left-over meat is small, it may be used in a meat dressing, onions and sage being added for seasoning, and bread for volume; this dressing to be served with some fresh-meat dish.

30. Beef, sundry cuts, cooking. Army messes are interested principally in the following sundry cuts of beef:

a. *Brains* may be fried, creamed, scrambled, or simmered and fried in deep fat. They should be cooked quickly. To prepare for cooking, it is best to allow the

brains to stand in cold salted water from 1 to 2 hours, then remove all arteries and blood clots. Regardless of the method of cooking, it is best to parboil the brains first for 3 or 4 minutes as this makes them tender.

b. *Tongues* may be simmered or baked and should be cooked slowly and skinned as soon as cool enough to handle.

c. *Hearts* may be baked with dressing, simmered, or braised, and should be cooked slowly. All beef hearts from animals slaughtered in federally inspected plants are cut nearly in half by Federal inspectors who inspect for beef measles.

d. *Sweetbreads* may be broiled, braised, or creamed. Wash in cold water and allow to soak 1 hour in fresh cold water, then drain. Cover with boiling salted water (1½ teaspoons salt and 1 teaspoon vinegar to each pint of water). Parboil for 20 minutes, then drain off the hot water and put sweetbreads in cold water until chilled or ready for use as they will darken after parboiling if not kept in cold water. After parboiling, they may be cooked in any of the methods listed; that is, broiled, braised, or creamed.

e. *Liver* may be fried, braised, used in meat pies, or combined with other meat for hash. It is best when fried. In braising or frying, the slices should be thin and should be cooked slowly. If cooked too fast, the liver becomes hard and leathery. It is advisable to parboil liver before frying. This makes it tender and eliminates much of the strong liver flavor which is objectionable to many men.

f. *Kidneys* may be broiled, stewed, or fried. They are not popular cooked alone and are best used when disguised by being added to some other meat. The kidney which comes with the hind quarter of beef may be added to the flank or shank meat for use in stews, meat loaf, hamburger, etc. Whenever used, kidneys should be cut up and soaked for a long time in cold salt water to remove any objectionable odor or flavor.

g. *Tails* may be braised, simmered, or used for soup. Before cooking they should be cut into pieces at the joints. Tails should be cooked slowly.

31. Pork, cooking. a. *General.* Pork for Army use is usually purchased in wholesale market cuts, as loins, butts, etc. It must always be cooked until it is well done, regardless of the method of cooking. Rare or medium cooked pork should never be served. There are two reasons for this: First, pork is not palatable unless well done; second, pork is sometimes infested with the trichina parasite, which, if not destroyed, may cause serious illness. This parasite is killed when the meat is heated to 137° F. at the center. Pork is well done when the center of the piece reaches a temperature of 182° F. As this temperature is well above the minimum required to kill trichina, well-done pork may be served with no fear of this parasite. When pork is an even, grayish color throughout, with little or no pink color, it is well done.

b. *Methods of cooking.* (1) Pork should be either roasted, fried, or braised although some parts such as ribs and feet are often simmered. As previously stated, pork should always be cooked well done, never rare.

(2) A little lemon juice rubbed into the pork before searing adds considerably to its flavor and reduces the greasy taste. Some cooks rub the surface with a cut clove of garlic.

(3) Pork roasts should be wiped off with a damp cloth, then sprinkled with salt and pepper and rubbed with flour, then seared; that is, browned by placing in a hot pan on top of the stove and turning until all sides have been subjected to the heat. After searing, the roast should be placed in an oven at a temperature of 250° to 350° F., depending upon the time available to complete the roast. A moderate oven (250° to 325° F.—16 to 18 counts) is best for roasting pork. At 350° F. the time required to get the roast well done would of course be shorter than with an oven temperature of 250° F., but the cooking losses are greater.

(4) The time required for roasting pork at 250° F. (after searing) is approximately as follows:

Loins, 35 to 40 minutes per pound for each piece.

Ham, 30 to 35 minutes per pound for each piece.

Shoulder, 30 to 35 minutes per pound for each piece.

Butts, 50 to 55 minutes per pound for each piece.

(5) No water should be added to a pork roast, and if the temperature can be maintained between 250° to 300° F., the roast should not be covered. The

necessity of basting depends upon the temperature of the oven. If a high temperature is maintained (350° F.), the roast should be basted frequently, but basting is not necessary when roasting at a temperature of 250° to 325° F. The shoulder and butts should be braised. When cooked the outside color of the pork should be a uniform brown, not too dark. The crust should not be hard, but crisp, and when carved there should be little or no pink color in the meat.

(6) Pork steaks, which are cut from the shoulder or butt, and chops should be seasoned and then seared at a high temperature. When brown on both sides reduce the heat and cook slowly in a small quantity of fat for 20 to 30 minutes in a closely covered pan. This method will make a juicier steak or chop than if cooked uncovered.

(7) When simmering spareribs, the meat should be seared in boiling salted water, then the temperature of the water should be reduced to a simmer and the meat cooked until it starts to fall from the bones.

(8) Sliced cold roast pork is an excellent meat dish. However, left-over fried pork is not palatable when sliced cold and, therefore, should be made into other dishes, such as meat pie, chop suey, etc. (See "Recipes.")

32. Pork, sundry cuts, cooking. a. The average Army mess is interested in the following sundry cuts:

(1) *Hearts.* Wash the hearts in warm water. Take out all clotted blood, veins, and arteries. Cook in salted simmering water for 1½ to 2 hours. The hearts may then be eaten or, if desired, may be browned or baked in the oven for a period of 30 minutes at a temperature of 325° to 330° F.

(2) *Tongues.* Wash tongues in warm water. Cook slowly in salted water for 1½ to 2 hours, or until done. As soon as cool enough to handle, remove the skin.

(3) *Brains.* Allow brains to soak in cold water for 1 to 2 hours, then wash in warm water and remove all arteries, blood clots, etc. Parboil 4 to 5 minutes.

(4) *Feet, tails, and hocks.* These sundry cuts are usually simmered with turnips, cabbage, or rutabagas. Hocks are also baked with tomatoes or tomato sauce.

b. The cost of these sundry pork cuts is generally very reasonable and their use should be encouraged. The meat is palatable and nutritious. Many dishes can be prepared from them and thus break the routine of roasted or fried pork.

32A. Veal, cooking. Veal is low in extractives and has little fat. It requires lower heat and longer cooking than beef. It should be cooked with added fat in the form of salt pork or bacon and, if roasted, should always be braised; that is, cooked with a covered roaster, as this makes the meat juicy. Veal roasts are seared and then braised at a temperature of 230° to 250° F. for 20 minutes per pound of meat. The drippings from a veal roast should be used for making a brown gravy.

33. Lamb and mutton, cooking. a. The tender and less tender cuts of the carcass of lamb will correspond to the same cuts of beef. The greater demand for the more tender cuts makes the less tender cuts cheaper. These are equally as high in nutritive value as the tender cuts and many palatable dishes can be prepared from them by careful cooking.

b. (1) The problem in cooking lamb and mutton is the same as in all meat cooking; that is, cooking the center without overcooking the outer surface. In roasting or simmering, the meat should be seared first, then the temperature reduced. Broiled cuts should be seared first, then the temperature reduced. The rules for broiling lamb or mutton chops differ somewhat from broiling beefsteak. The best method of broiling lamb or mutton chops is to first sear them on both sides, then lower the heat and finish broiling at reduced temperature, turning the chops occasionally, but being careful not to pierce the brown crust. The time required is 10 to 15 minutes. In roasting, after the meat is seared the temperature should be reduced to 300° F., allowing 30 minutes to the pound. The hardening of the surface of the roast is lessened by frequent basting, or by covering the roaster so that the steam in the roaster will accomplish the basting. Less tender cuts are usually made into stews, potpies, or fricassee.

(2) There is a parchmentlike skin over the outer surface of mutton or lamb which is called the fell. It should be removed before cooking, as this fell tends to give the meat a wooly taste.

c. Lamb or mutton, especially lamb, is very palatable either hot or cold, but should be served either very hot or entirely cold, not warm.

34. Sausage, cooking. a. *Pork sausage.* Pork sausages require cooking to kill any trichinae which may be present. Pork sausages may be fried or baked with other foods. They should first be placed in lukewarm water and this water brought to a boil; then remove from the water and fry or bake. This preliminary cooking in water toughens the casings and tends to prevent bursting. If the casings burst while frying or baking there is a loss of fat from the sausage.

b. *Frankfurters.* In cooking frankfurters (wieners) the water should be brought to the boiling point and the frankfurters simmered for 10 to 12 minutes. Do not boil as this will toughen the casings. The meat of the frankfurter has already been cooked at the factory; therefore, it is only necessary to heat them before serving.

35. Reindeer, cooking. The general rules for cooking beef should be followed in cooking reindeer meat. Due to the fact that this meat is lacking in fat, added fats should be used in cooking.

36. Meats, carving and serving. a. (1) The chief objectives of good carving are to obtain attractiveness and the best flavor from the meat, and to prevent waste. Meat should never be carved with a hard, sawing motion. Carved meat should be placed on the platter with the most appetizing side up and the pieces arranged in an attractive manner, not thrown loosely on the platter. It requires no expense, and very little effort, to arrange meat neatly on a platter so that it will be pleasing to the eye.

(2) Good carving cannot be accomplished without good tools. Sharp carving knives are essential. Knives should be run over a steel just before starting to carve and frequently during the carving, if the amount of carving warrants. The steel should be held in the left hand, in a nearly horizontal position (the point slightly raised) and parallel to the body. The knife should be held in the right hand. Start the blade along one side of the steel, beginning with the heel of the knife at the point of the steel. The strokes should be reversed from side to side of the steel. All hand motion of the knife blade along the steel should be in the wrist and not a movement of the entire forearm. The touch of the blade on the steel should be light, and six strokes should be sufficient; if more are required, the knife should be sharpened on a stone. If the knife is sharp the cut will be clean and even.

b. *Carving rib roasts.* Beef should be sliced across the grain into pieces of uniform size and thickness convenient for individual service; not cut into chunks. Rib roasts are tempting and appetizing when neatly sliced across but have no appeal if cut into chunks. An excellent way of carving a rib roast is as follows: Stand the roast on end on a carving board or wooden table with the rib bones to the left of, and with the meat side away from, a right-handed carver. Stick a large meat fork in the bone side of the roast, low enough that the knife will not strike the fork, and hold the roast firm with the fork in the left hand; cut thin slices across the grain until the knife reaches the bone. Cut several slices in this manner, leaving them attached to the bone and then run the point of the knife along the bone, releasing the slices. By this method all the meat can be cut from the bones except the small strings between the ribs.

c. *Carving round roasts.* Use a long thin knife. To start the carving, place the roast on a carving board with the large or rump end down and the small or shank end up. Start at the outer edge of the meat and cut across the face (across the grain) of the roast, cutting toward the round bone and making the slices about $\frac{1}{8}$ inch thick. As the knife approaches the bone, raise the edge so that it will come to the surface just as it reaches the bone. Each slice should be about the size of the hand. Continue slicing around the roast, turning it so as to keep the cut surface of the roast level.

d. *Preparation and carving of pork loin roasts.* Pork loins contain the backbone and part of the rib. The backbone should be cracked with a cleaver at about 1-inch intervals before roasting the meat. This enables the carver to cut slices from the loin through the meat and the bone. The slices should be about $\frac{1}{4}$ inch thick and every other slice will contain a piece of the backbone and the rib.

37. Meat cookery tables. a. *Braising.* (1) *Cuts for braising.* All meat cuts can be used for braising but the following are recommended for this method of cooking:

- (a) *Beef.*
 Round, outside (bottom round)
 Rump, boneless.
 Chuck:
 Clod:
 Chuck roll.
 Boneless neck.
 Chuck tender.
 Plate, boneless.
 Brisket, boneless.
- (b) *Variety meats.*
 Liver.
 Heart.
 Kidney.
- (c) *Veal.*
 Boneless shoulders.
 Boneless breasts.
 Shank meat.
 Neck meat.
 Boneless flanks.
- (d) *Lamb.*
 Boneless shoulders.
 Boneless breasts.
 Shank meat.
 Neck meat.
- (e) *Pork (fresh).*
 Loin chops.
 Leg steaks.
 Shoulder steaks.
 Spareribs.
 Pork hocks.

TIMETABLE FOR BRAISING

Meat cut	Average weight or thickness	Approximate cooking time (hours)
Beef:		
Pot roast	3 to 5 pounds .	3 to 4.
Swiss steak	1½ to 2 inches	2 to 3.
Round steak	¾ inch	¾.
Birds	½ inch	1½.
Shortribs	2 inches	1½.
Fricassee	2-inch cube ...	1½.
Veal:		
Breast:		
Stuffed	4 pounds	2.
Rolled	3 pounds	2.
Birds	½ inch	1.
Chops	½ to ¾ inch ..	1.
Chops (breaded)	... do	¾ to 1.
Steaks	... do	¾ to 1.
Lamb:		
Breast:		
Stuffed	2 to 3 pounds .	1½ to 2.
Rolled	1½ to 2 pounds	1½ to 2.
Neck slices	¾ inch	1.
Shanks	½ pound each .	1½ to 2.
Pork:		
Chops	¾ to 1 inch ...	¾ to 1.
Shoulder steaks	¾ inch	½ to ¾.
Spareribs	2 to 3 pounds ..	1½.

(2) *How to braise.* (a) Season with salt and pepper. Herbs, spices, and vegetables may be added for flavor variety.

(b) Brown meat on all sides in hot fat. Browning develops aroma, flavor, and color.

(c) Add a very small amount of liquid, if necessary. Both meat and gravy will be more attractive. No liquid should be added to pork chops.

(d) Cook at a simmering temperature (185°-200° F.). Meat should never be boiled. High temperature dissolves connective tissues, making meat stringy and hard to carve. It also increases shrinkage and dries out meat. Braising may be done in oven or on top of range.

b. *Frying and deep-fat frying.* (1) *Frying.* Frying means to cook in a shallow layer of fat. It differs from pan-broiling in which no fat is added, and is used for thin slices of round steak, veal steak and chops, liver, and sometimes pork chops. Frying gives crispy browned exterior and fine-flavored but less tender product than braising.

(2) *Method for frying.* Dredge meat in flour, if desired. Season with salt and pepper. Brown quickly on both sides in a small amount of hot fat. Do not cover. Continue to cook at reduced temperature until done.

(3) *Deep-fat frying.* Deep-fat frying means to cook in a deep layer of fat. It is not recommended for uncooked meat. It may be a convenient method for browning breaded chops which have been partially or wholly cooked before crumbing, and is often used to finish cooking precooked chicken. It is used in preparation of croquettes. Care should be taken to keep fat from smoking.

TEMPERATURES FOR DEEP-FAT FRYING

Food	Temperature (°F)	Bread test (seconds)	Cooking time
Croquettes	375	60	To golden brown.
Doughnuts	350	40	2 minutes each side.
French-fried onions	360	50	To golden brown.
French-fried liver	350	60	Until brown.
Fritters	360	50	3 to 5 minutes.
French-fried potatoes	370	60	5 to 12 minutes.
Shoestring potatoes	370	60	3 to 5 minutes.
Potato chips	370	60	2 minutes.

c. *Pan broiling.* (1) *Cuts for pan broiling.*

(a) *Beef (steaks).*

Round:

Top round (inside).

Sirloin tip (knuckle).

Loin:

Filet mignon (tenderloin).

Top sirloin (sirloin butt).

Strip club (strip).

Rib (Spencer roll).

Chuck, inside (chuck roll).

(b) *Variety meats.*

Liver.

(c) *Veal.* Veal is never pan broiled

(d) *Lamb.*

Leg steaks.

Loin chops.

Rib chops.

Shoulder chops.

(e) *Pork (fresh).* Fresh pork should not be pan broiled.

(f) *Pork (smoked).*

Ham.

Bacon.

(2) *How to pan broil.* (a) Place meat on heavy frying pan or griddle. Pan need not be preheated.

(b) Do not add fat. Enough fat cooks out to grease pan.
 (c) Brown well on both sides. This develops flavor and aroma.
 (d) Season with salt and pepper.
 (e) Reduce temperature; meat will be juicier. Prevents over-browning.
 (f) Do not cover or add water. The meat will braise, not broil, in the presence of moisture. The aim in pan broiling is to get results comparable to broiling.

(g) Turn occasionally. This insures even cooking.

(h) Pour off fat which collects in pan. Meat should broil, not fry.

(3) *Cooking time.* (a) Definite times for pan broiling cannot be given. The time is about the same as for broiling a cut of same thickness.

(b) To test for sufficient cooking cut small gash and note color.

(c) Beef steaks may be cooked rare to medium. Ground meat should be cooked well done.

(4) *Suggestions.* (a) Use tender cuts.

(b) Steaks or chops should not be cut too thick.

(c) When pan broiling ground meat, rub pan with a little fat.

d. *Roasting.* (1) Cuts that may be used for roasting.

(a) *Beef.*

Round:

Inside (top round).

Knuckle (sirloin tip).

Loin:

Tenderloin.

Sirloin butt.

Strip

Rib (spencer roll).

Chuck roll.

(b) *Veal.*

Boneless legs.

Boneless loin.

Boneless rack.

Boneless shoulders.

(c) *Lamb.*

Boneless legs.

Boneless loin.

Boneless rack.

Boneless shoulders.

(d) *Pork (fresh).*

Boneless leg rolls.

Boneless loin rolls.

Boston butt.

Fresh picnic shoulder.

Spareribs.

(e) *Pork (smoked).*

Ham.

Picnic.

Shoulder butt.

(2) *How to roast.* (a) Wipe with a clean, damp cloth. Meat should never be washed.

(b) Season with salt and pepper. Seasoning may be added at start, during, or end of cooking.

(c) Place fat side up. Basting is not necessary—as fat melts it runs over and through meat.

(d) Do not cover. Steam surrounds meat which is covered, making it a pot roast.

(e) Roast at a constant, moderate temperature (325° F.—16 counts). Searing does not keep in juices. Meat and gravy will be nicely browned without initial sear. A moderate temperature reduces shrinkage and increases flavor, juiciness, and tenderness.

(f) Do not add water. With a moderate temperature, drippings will not burn.

(g) Roast until done. Time depends on kind of meat, degree of doneness, and oven temperature. A meat thermometer is the most accurate way to tell when roast is done.

TIMETABLE FOR ROASTING MEATS AT 325° F.

Kind of meat	Minutes per pound
Beef:	
Rare	18 to 20.
Medium	22 to 25.
Well done	27 to 30.
Rolled roasts	10 to 15.
Veal	25 to 30.
Lamb	30 to 35.
Rolled roasts	10 to 15 extra.
Pork	30 to 35. (Always cook pork very well done with no trace of pink.)
Smoked pork:	
Large ham	20
Small ham	25
Picnic	35

e. Stewing. (1) *Cuts for stews.* All meat cuts can be used for stewing but the following are recommended for this method of cooking:

(a) *Beef.*

Flank meat.
Shank meat.
Hanging tenderloins.
Boneless neck.
Boneless brisket.
Boneless plate.

(b) *Variety meats.*

Heart.
Kidney.

(c) *Veal.*

Boneless shoulders.
Boneless breasts.
Boneless flanks.
Neck meat.
Shank meat.

(d) *Lamb.*

Boneless shoulders.
Boneless breasts.
Shank meat.
Neck meat.

(2) *How to make stew.* (a) Have meat cut in small cubes. A boneless stew is more attractive than one with bones. Avoid bone splinters by avoiding use of cleaver, if stew meat is not boneless.

(b) Season with salt and pepper. The salt will penetrate small pieces, so is best put in at start of cooking.

(c) If desired, brown on all sides in hot fat. A browned stew has more meat flavor than a light stew.

(d) Cover with water. The water need not be boiling as hot water does not seal in juices any more than searing. Meat should be covered by water so that all will be cooked at same temperature.

(e) Cover kettle.

(f) Cook at a simmering temperature (185°-200° F.) until tender (about 2 to 2½ hours). Meat will be stringy and tasteless if boiled.

(g) Add vegetables just long enough before meat is tender so that they will be done, but not overcooked. Vegetables should be uniform in size.

(3) *For variety in stews.* (a) Use different combinations of vegetables.

(b) Strive for attractive color combinations.

(c) Tomatoes will give flavor variety to the gravy.

(d) Omit potatoes and serve rice or boiled noodles in their place.

(e) Turnips give a sweet taste to a stew which many do not relish.

(f) Avoid the use of parsnips or other vegetables which many do not like.

f. *Cooking in water (large cuts).* (1) *Cuts for cooking in water.*

- (a) *Beef.*
Flank meat.
Shank.
Neck.
Brisket.
Plate.
Corned beef.
- (b) *Variety meats.*
Heart.
Tongue.
- (c) *Pork (fresh).*
Spareribs.
Pig's feet.
Pork hocks.
- (d) *Pork (smoked).*
Ham.
Picnic.
Shoulder butt.
- (e) *Veal.* Veal is not cooked in water.
- (f) *Lamb.* Lamb is not cooked in water.

(2) *How to cook in water.* (a) Cover meat with water. The water need not be hot since boiling water does not seal in juices. The meat should be entirely covered so that all meat will cook at same temperature.

(b) Season with salt and pepper, except smoked pork cuts and corned beef. Cloves, peppercorns, bayleaf, or flavor vegetables may be added.

(c) Cover and cook at simmering temperature until meat is tender. Never boil because the connective tissue will be dissolved and the meat hard to carve; also shrinkage will be greater and meat will be dry and tasteless.

(d) If vegetables, such as potatoes, onions, or cabbage, are cooked in kettle with meat they should be put in just long enough before meat is done for them to be tender. Overcooking vegetables gives them a poor texture and strong flavor.

TIMETABLE FOR COOKING IN WATER

Cut	Average weight (pounds)	Approximate time per pound (minutes)
Ham:		
Large	12 to 14.....	20.
Small	10 to 12	25.
Half	6 to 8	30.
Picnic shoulder	4 to 8	45.
Corned beef	4 to 6	40 to 50.
Fresh beef	4 to 6	40 to 50.

g. *Ground meat and its uses.* (1) *Cuts for grinding.* Grinding breaks up the connective tissue and makes the meat tender. Any meat cut may be ground, but it is sound economy to use the least tender portions for grinding. The cuts given below are recommended.

- (a) *Beef.*
Neck.
Shank.
Flank.
Plate.
Brisket.
- (b) *Veal.*
Neck.
Shank.
Breast.
Flank.
Shoulder.

- (c) *Lamb.*
Neck.
Shank.
Breast.
Shoulder.
- (d) *Pork.*
Boston butt.
Picnic shoulder.
Lean trimmings.
- (e) *Smoked pork.*
Picnic.
Shoulder butt.
Ham trimmings.
- (f) *Variety meats.*
Liver.
Kidney.
Heart.

(2) *Suggestions for using ground meat.* (a) *Loaf.* Meat loaf is roasted like any tender cut in a moderate oven (350° F.). A loaf weighing 2¾ pounds will take 1½ to 2 hours.

1. The loaf may be made from one kind of meat or of two or more kinds. Good combinations are—

- 1 part fresh pork to 3 parts lean beef.
- 1 part smoked ham to 3 parts veal.
- 1 part salt pork to 10 parts veal.
- 1 part fresh lean pork to 2 parts smoked ham.

2. Liver may be used for loaf. The slices should be dropped in boiling water for a few minutes before grinding.

3. Ground lamb makes a good loaf, alone or with beef, pork, or veal.

4. Meat should be ground medium fine; too fine a grind makes the loaf too compact; if too coarse, the connective tissue is easily detected.

5. Seasoned meat may be shaped into a loaf and roasted or may be extended by the use of bread crumbs, mashed potatoes, or cereals.

6. If breadcrumbs are dry, they should be moistened with water, milk or tomato juice.

7. If the proportion of "extenders" is higher, a thick white sauce or eggs should be added as a binder.

(b) *Patties.* Ground meat, with or without an "extender" may be shaped into patties usually about 1 inch thick. These are cooked by pan broiling or frying.

Salisbury steak is ground beef, seasoned only with salt and pepper and pan broiled on a lightly greased griddle.

(c) *Variety.*

1. Individual patties may be wrapped in bacon.

2. Variety in flavor may be obtained by the use of different seasonings; catsup, chili sauce, minced onion, mustard, or horseradish.

3. Uncooked liver ground with cooked meat for hash gives freshness.

SECTION III

FISH AND POULTRY

38. *Fish.* a. Fish may be served broiled, fried, sauteed, baked or in salad.

b. Fish are very perishable and for this reason great care should be taken to avoid serving any which are not in good condition. All fish should be carefully inspected when received in the mess and again before being cooked or served, if kept very long. Fish may be classed as fresh, stale, or putrid, as described below. Only strictly fresh fish should be accepted or served by the mess. Fresh fish, is not frozen, should be delivered to the mess packed in cracked ice.

(1) *Fresh fish* have a bright appearance; the scales are firmly adherent and glittering; the natural slime, if present, is that common to the species; the eyes are outstanding and full; gills and mouth closed; blood in abdomen bright with no off odor; abdominal walls firm and elastic with no discoloration; fresh

firm, elastic and tight on the bones; when placed horizontally across the hand the fish does not bend; when placed in water it sinks.

(2) *Stale fish* have a duller appearance than fresh; scales are more or less easily removable and slightly slimy or smeary or may be abnormally dry; eyes red bordered; surface of eyeball cloudy; gills pale yellow, dirty or grayish red and covered with slime of disagreeable odor; blood in abdomen dull in color and may have slight off odor; abdominal walls becoming soft and flabby; body bony and bends easily especially at the tail end; finger impressions easily made and remain; meat somewhat soft and more easily discolored; when placed in water a stale fish floats.

(3) *Putrid fish*. All the brightness gone; dull lifeless color; scales very loose and covered with a smeary slimelike mass of very disagreeable odor; eyes breaking down or gone; all bright color gone from the gills which have an extremely offensive odor; body withered and flabby; abdominal walls soft and pulpy with apple-jelly-like appearance and discolored; meat soft; abdomen bloated; body blood dirty brown in color and with offensive odor. A putrid fish floats when placed in water.

c. *To clean fish*. (1) *Scaling*. The scales are removed with a knife held at such an angle that the blade will work under the scales as the knife is pushed in the direction of the head from the tail, with short, quick motions.

(2) *Removing the entrails*. With a pointed knife cut the entire length of the belly from the vent to the head, taking care not to cut the entrails. Cut the head from the body, starting cutting from the belly side. The entrails can then be removed by hand. In some small fish it is possible to remove the entrails with the head by opening the belly, then loosening the head by cutting from the back, and pulling in the direction of the vent. After the entrails have been removed the fish should be wiped thoroughly, inside and out, with a cloth wrung out of cold water. There may be some clotted blood near the backbone that cannot be removed in any other way than by wiping.

(3) *Skinning*. Haddock, eels, bullheads, etc., do not have scales and are usually skinned. The fins along the back should first be removed with a sharp knife or scissors. Make a cut, skin deep, along the entire back; grasp the skin on the back, just back of the head, between the thumb and a knife blade and pull downward and backward. The skin will usually come off in a sheet. If the flesh is tender, care should be taken not to tear it by pulling too quickly. In skinning bullheads it may be necessary to fasten the fish by the head by hanging it on a hook or by driving a nail through the head because the skin is tight to the flesh and it takes hard pulling to remove it. It may be necessary to use a pair of pliers for this purpose.

(4) *Boning*. Haddock, cod, halibut, whitefish, etc., are quite easily boned. After the fish are scaled and cleaned (or skinned), run a sharp knife along each side of the backbone from the tail to the head and pull back the flesh from the backbone. Any small bones that cannot be removed readily with the backbone may be pulled out by the fingers. Another method of boning is to dress the fish and remove the head, then grasp the backbone at the head end with one hand and pull the flesh away from the backbone with the other. Pull out all loose bones that have not been removed with the backbone, and/or scrape over the flat surface of the inside of the fish with a knife.

39. *Poultry*. a. *General*. Poultry includes those birds which are usually raised on farms for their flesh and eggs. The principal classes of poultry are chickens, turkeys, ducks, and geese. Turkey is included in the ration for Thanksgiving Day and for Christmas, but chicken is the class of poultry most used in the mess. Ducks and geese are seldom used in Army messes. Ducks yield a smaller amount of food than any other class of poultry and are usually high in price. Geese are usually less expensive and yield a good proportion of edible meat, but are not so popular because of their supposed greasiness. When cooked properly, roast goose is very tasty and a desirable change from the other classes of poultry. (See recipe 87.) Ducks and geese have no white meat such as is found on the breasts of turkeys and chickens. Chicken is the only class of poultry which is commonly served to the mess fried or fricasseed.

b. *Chickens, kinds and uses*. There are four principal classes of chickens: Broilers, fryers, roasters, and fowl. Broilers and fryers are young birds with tender flesh and are best suited for broiling or frying. They are too small to

roast satisfactorily and have too little fat on them to be used for stew or fricassee. Fresh broilers can be found on the market during June and July, and fresh fryers during July, August, and September of each year. At all other seasons fresh broilers and fryers are both scarce and expensive, but they may be procured from cold storage during this time if desired. Fowl and roasters best meet the needs of the Army mess. Fowl, which are fat hens over 1 year of age, are usually somewhat tough, and, therefore, used for stew and fricassee. The best grades of hens are sold as fowls and usually are kept in cold storage; stewing hens are the poorer grade. They can be bought fresh at any time of the year. Roasting chickens are quick-grown young cockerels. Their meat is tender, and they are excellent for roasting. Fresh roasters are found on the market from September to January; at other times frozen roasters may be procured. Cocks (old roasters) and stags (male birds with marked masculine characteristics) should never be used by Army messes. Age is determined by the size and development of the birds, the condition of the shanks, claws, and spurs, and the condition of the cartilage of the breastbone. Young birds are lankier and rangier than mature (old) birds, and the head, wattles, and comb are undeveloped. The shanks (lower leg) of young birds are smooth and bright, while with increasing age the shanks become roughened, scaly, and dull colored. On broilers the spur is scarcely noticeable; on fryers it shows as a small rounded knob; on roasters the spur is more prominent, but not hard; on stags the spur becomes longer and harder. The claws of young birds are short, slender, and pointed, while on the old birds they become long, dull, and stubby. The cartilage at the rear (lower) edge of the breastbone is soft and pliable in young birds while as the bird grows older this cartilage gradually turns to bone and becomes firm and rigid. Cockerels and cocks have a greater development and usually deeper color of wattles and comb and larger heads than pullets and hens. Hens have a deeper, broader body, especially in the abdomen, than cocks. The shanks and thighs of hens are much slenderer than those of the male birds, and the spurs of the hen are small and undeveloped. The neck, back, and tail feathers of the cock are usually much heavier than those of the hen. A cook should be able to recognize readily the different classes of birds in order that he may determine which is the best manner of cooking and serving them.

c. Turkeys, kinds and uses. Army specifications prescribe only young turkeys for use in the mess. Here again age is reflected in the size of the bird, condition of the breastbone, size of the dewbill and beard, size of the spurs, and color of the legs. Young toms are more rangy and leggy than hens. Hens have short, plump bodies; small, short legs and wings; small heads with small dewbills (the fleshy growth just above the beak), and either a small beard or none at all. Old toms have a long, coarse beard, prominent dewbill, and large heavy spurs. The beard begins to grow on the breast of the male turkey at the age of 2½ months, and at 1 year old is from 3 to 5 inches long, becoming longer each year. When about a year old, the turkey hen begins to grow a beard, but it is always short compared with that of the tom. The dewbill is always larger and more elastic in the male (tom) than the female bird. Young toms have only a short, blunt knob on the inside of the shank, while old toms develop a stout spur. The hen turkey has only a small rudimentary spur or button. Turkeys' feet are said to be black up to 1 year of age, assume a pinkish color up to 3 years, and then gradually turn a dull gray. The breastbone cartilage of the young turkey is always soft and pliable, gradually becoming hard and firm as age advances.

d. To draw and clean poultry. The poultry received by the Army mess usually has been killed and bled, then dressed and chilled or frozen. Dressed means that the feathers have been removed, but dressed poultry practically never has been drawn (entrails removed); therefore, if the mess receives dressed poultry it is necessary to remove the entrails after receipt. If the entrails have been removed before being received by the mess, the poultry is called dressed and drawn. Before drawing a bird the skin should be cleaned. The fine hair found here and there on the skin can be easily removed by singeing. This is done by holding the bird for a moment over a gas flame, or any other clean flame, and turning it so that all portions of the skin come in contact with the flame. Pin feathers are removed by grasping them between the thumb and the blade of a paring knife and pulling them out. Next step (except in the case of turkeys) is to cut off the head with a cleaver or a heavy butcher knife and to remove the feet by cutting through

the hock joint with a knife. All of the tough coarse skin on the hocks should be trimmed off. The legs of turkeys contain a number of coarse tendons that are objectionable if not removed. To do this, loosen the skin and the ligaments on each side of the hock joint, and then twist the foot until it is free except for the tendons. Then by hanging the bird up by the feet and pulling straight downward, these tendons will pull out of the leg muscles and remain attached to the feet (shank). The first step in drawing a bird is to remove the crop, gullet, and windpipe. Slit the skin covering the crop crosswise with a knife, and loosen the crop all around with the fingers. Then cut the gullet below the crop and close to the breastbone, and remove the crop and neck part of the gullet by pulling. By thus removing these parts first, the entrails remaining can be drawn out more easily. The windpipe may have to be cut near the lungs to remove it readily, and should be pulled out at this time.

Next cut from the rear of the breastbone to the vent (anus) and loosen the vent by cutting around it. Insert the hand into this opening, grasp the intestines as far forward as possible, and draw them out to the rear. All except the lungs should come out together. The giblets (heart, liver, and gizzard) should now be separated from the entrails and the remainder discarded. There is usually considerable fat attached to the intestines of geese which should be removed and used for cooking or rendering. The blood vessels should be cut away from the top of the heart. The gall bladder is attached to the liver and should be carefully removed to avoid puncturing. No bile should be allowed to come in contact with the meat, as this may impart a very bitter flavor which is hard to remove. The inlet (gullet) and outlet (intestine) of the gizzard should be cut as close to the gizzard as possible, and the gizzard opened by cutting through one side down as far as the sack which lines the gizzard. This sack may be entirely removed with the fingers if a little care is used and the sack itself is not cut. The gizzards of geese have two disks of cartilage on their inner surface, which generally should be removed by a knife. The lungs are easily removed. They are soft and pulpy and lie in the forward end of the cavity underneath the ribs and on either side of the backbone. They have no food value and should be removed. The kidneys lie on either side of the backbone toward the rear of the cavity. They are not easily removed entirely, and may be left in, as they have some food value, and are palatable and edible. The oil gland (bag) just above the tail should be removed with a knife, care being taken to remove all of the gland. It can be distinguished from the surrounding tissue by its darker color. The drawn and dressed carcass is then ready for washing. It should be rinsed under a faucet, allowing the cold water to run through it and over it, washing off any stains or foreign matter. The carcass should never be soaked in water. If the bird is to be roasted, it is now ready to be stuffed. After stuffing, the cuts made for removing the entrails are sewed up and the bird is ready for the oven. If the bird is to be used for any other purpose than for roasting, it must be cut up. The wings, legs, and thighs are unjointed with a knife, and the remainder of the carcass cut into as many pieces as desired with either a knife or cleaver.

40. Poultry, methods of cooking. a. Roasting. Young cockerels weighing from 3½ to 5 pounds and over, and turkeys, ducks, and geese, are used for roasting. The whole drawn bird is usually roasted and stuffed with any desired stuffing. Brush the skin of the bird with melted or softened fat. Place in a slow oven (250°F.), breast up, in an uncovered pan. Place strips of body fat removed in dressing over the breastbone. Bacon or salt pork strips may be used. Allow 25 to 30 minutes per pound.

b. Broiling. Only young, tender chickens should be used for broiling. As the birds are small they are cut in half and placed on the broiler rack, rib side up. Cook until tender and brown, turning frequently. The fire should not be too hot or the outside will brown and the inside remain raw. Cooking time about 20 minutes.

c. Frying. For frying, the chicken is cut into four to six pieces. Roll each piece in flour or other mixture and sauté in a little fat until brown and tender. If the chicken is not young, it is advisable to parboil or steam it before frying.

d. Stewing or fricassee. Cut up the chicken as for frying. Brown in a pan with fat, cover with boiling water, season, and simmer until tender. The liquid is then thickened with cornstarch or flour before serving.

CHAPTER 8

INSPECTION AND STORAGE OF SUBSISTENCE SUPPLIES

SECTION I

GENERAL

1. Purpose. The object of this chapter is to provide information to subsistence inspectors at posts, camps, and stations where laboratory facilities are not available; and to mess personnel of smaller units to aid them in judging the fitness of foods that may have deteriorated since inspection, and in providing proper storage facilities. Although the information in this chapter may be considered over-technical and too detailed for the company or battery mess officer or mess sergeant, it is believed that occasions will arise where the information will be of value.

There are small units and detachments at a distance from Quartermaster installations who receive subsistence supplies direct from contractors, or who purchase subsistence items on the open market. Small detachments traveling by motor may also find the information in this chapter valuable, since in many cases the mess officer will have no Quartermaster or Medical personnel to rely on.

Because of rapid changes in production, handling, refrigeration, and marketing of subsistence supplies, procedure given herein should not be considered as unchangeable or inflexible. New and improved methods are being developed daily in the food field, and inspection should be flexible enough to accommodate itself to those changes.

It will be noted that some of the material in this chapter duplicates material in certain other chapters in this book. This has been done for the convenience of the reader, to obviate the necessity to turn to other chapters while concentrating on any particular subject.

2. Necessity for inspection. Inspection is necessary to determine conformity of goods in question to specification requirements. When a specification has been officially established the inspector should not be influenced by price differentials in favor of articles below minimum requirements, but should insist upon conformity with the specification. Subsistence commodities vary greatly in food value because of variations in growth, preparation, sanitation, and methods of handling. Federal specifications establish a minimum of quality and condition for foods which are believed desirable or necessary to promote health and vigor. Inspection by competent personnel insures authorized quality as well as delivery of authorized quantities.

SECTION II

CANNED FRUITS AND VEGETABLES

3. Trade terms. *a. Blanching.* Short preliminary cooking or parboiling given most vegetables and some fruits in an open kettle or "blancher" in order to soften the products, insure cleanliness, and remove any mucous coatings that may form upon surface of products handled.

b. Brineless pack. A development using a minimum of brine or only brine naturally present in the product, and an exceptionally high vacuum (mechanical). Benefits obtained are more natural color and flavor.

c. Buckled. Condition of cans with ends permanently distorted by too high an internal pressure during processing. Buckled cans generally show slight ridges in the ends near the seam. The ends will not pull back to their natural position and can only be forced back with difficulty. The high internal pressure developed may be due to overfilling, too short an exhaust, or when applied to No. 10 cans, improper cooling under pressure.

d. Can. From the word "canister." Refers to either a metal or glass container but primarily taken by the trade to refer to a metal container.

e. Canning. Art of preserving food by placing it in hermetically sealed containers and obtaining complete or practically complete sterilization by application of heat.

f. Collapsed can. A can which has caved in after sealing, processing, and cooling because of insufficient fill or as a result of leaks occurring in the seams, if such leaks are sufficient for some steam to pass out. Such leaks may close temporarily after or during processing so that the can has a very high vacuum when cooled. Collapsing may then occur.

g. Collar can. Sanitary type of key-opening can with a narrow band of metal inserted in the top in such manner as to provide a rim for the cover to fit after the can has been opened by the consumer. Example, coffee can with key-opening device.

h. Crimping. Process of fastening ends onto sanitary type cans by use of a machine called "double-seamer."

i. Double-seamer. A machine which automatically places ends on sanitary cans and crimps them over a composition rubber or paper gasket without use of solder.

j. Exhausting. Removal of air from filled containers for dual purpose of giving product sufficient room in the can in which to expand in processing, and to reduce possibility of spoilage which might result if aerobic bacteria were present. Air is removed by two methods:

(1) *Heat exhaust.* Filled cans are heated before closing and sealed while hot. In cooling, a partial vacuum is created in the can through contraction in volume of contents.

(2) *Mechanical exhaust.* Cans are closed under vacuum by actually drawing air from can and sealing before vacuum is released.

k. Flat sour. A can not swollen whose contents have fermented without generating gas. External appearance does not indicate spoilage. Upon opening off-odor may be slight or entirely lacking. Taste may be more or less acid. It would be quite noticeable in a less acid product such as asparagus. Corn thus affected also has a tendency to become mushy. Flat sours are generally confined to starchy foods insufficiently processed or improperly cooled.

l. Flipper. A can having little or no vacuum and with loose ends which may be pushed in, or when one end is struck against a flat surface or jarred, the other may be forced outward. The end forced outward usually may be pushed back in by hand without forcing the opposite end outward. Flippers generally are the result of insufficient exhausting. Contents may or may not be sound depending on whether on opening fermentation is observed or off-odors are detected. See springer.

m. Hole and cap can. See vent filler. A hole cap soldered can differs from vent filler soldered can only in that a large opening is provided in center of top for filling purposes. It is then necessary to cap the can opening with a separate piece of metal which must be soldered to the can after filling. There is a small hole in center of cap which must be soldered the same way as the hole in the vent filler type of can.

n. Incubating. An expression applied to holding sealed cans suspected of having defects under special observation. Cans representative of lots in storage are placed in a warm room or chest where heat and storage conditions are regulated as desired. Bacteria if present in sufficient numbers as a result of insufficient processing will multiply rapidly and cause contents to become spoiled.

o. Enamel. A varnish-like substance baked on one side of tin plate at high temperature and faced toward inside of cans to retard loss of product color (fruit enamel) or to prevent deposit of sulphide of iron (corn or C enamel). When applied to outside of cans to prevent rusting it is known as outside lacquer.

p. Leaker. Any can which through mechanical adjustment or otherwise is not hermetically sealed and permits air to enter and product to exude. These leaks are further qualified by the section of can affected and are known as crimp, seam, end, body, etc.

q. Open bath. Processing in open vats or kettles at boiling temperatures as opposed to processing at high temperatures under pressure.

r. Pack. Product canned during a single season, for example, the 1940 apple pack.

s. Paneling. Appearance of larger, properly handled cans, noticeable principally in No. 10 cans where sides are drawn in with fluted ridges running at right angles to the ends. This condition is the result of increased external over internal pressure. Some paneling is expected and a desired condition in most No. 10 cans.

t. Pinholing. Result of attack of acid of product on minute spots of exposed

steel on interior of can which has been imperfectly coated with tin. Attack may also occur at ends where tin plate is broken in forming or stamping. Attack is greater in enameled containers than in plain ones. However, enamel prevents or retards fading and this kind of can must be used when it is necessary to prevent product losing color.

u. *Processing*. Subjection of sealed cans of product to heat for purpose of destroying harmful bacteria or causing it to change to spore form.

v. *Sanitary can*. Modern type of almost solderless metal container having ends crimped into place by double-seamers and containing solder only on body seam.

w. *Short vacuum can*. Springer resulting from insufficient exhaust.

x. *Spangling*. Staining of tin plate on inside of can either as sulphide of tin deposit or as etching action found on inner surface. It usually results in the can having a mottled or streaked appearance. It could be prevented by the use of C enamel lining. This condition is not objectionable or deleterious to contents.

y. *Springer*. A filled can whose ends are bulged as a result of overfilling, insufficient exhausting, or evolution of hydrogen or carbon dioxide gas through bacterial action, or action of acid contents on metal of can. When one end is pressed in with the hands or fingers, the opposite end bulges out. In this respect it differs from a flipper in which the loose tin may be pressed in without bulging out the opposite end. Products in such cans are not safe for human consumption and should be rejected.

z. *Swell*. A bulged-out, filled can with both ends remaining taunt as distinguished from a flipper or springer. All swells were previously springers. Springers, swells, and flippers are caused by much the same condition, fermentation and decomposition by micro-organisms; or chemical action accompanied by evolution of gas (hydrogen swell), the release of vacuum, and a consequent swelling or bulging. This condition may also be caused by leaky cans which permit entrance of micro-organisms. Products in such cans are not safe for human consumption and should be rejected.

aa. *Vent filler can*. The vent filler soldered type can is one which has both ends soldered to the body by the manufacturer and has a small hole in the center of one end through which a liquid product is introduced. After filling the opening is closed with solder. Used for canning evaporated milk.

4. *Vegetables*. a. *Grades*. (1) *Quality*. Commercially canned vegetables are generally graded for quality as follows:

(a) *Fancy*. Usually as nearly perfect as nature and the art of canning permit. Products of this grade should be tender, succulent, of fine form, free from blemishes and extraneous matter, and have a clear liquor.

(b) *Extra standard*. This grade is nearly as good as Fancy. It may be the second grade packed, a lot that was packed for fancy and because of some defect could not so grade, or it may be the best the particular season produces. It may have two or three but not all of the following defects:

1. Lack of form symmetry.
2. Lack of color uniformity.
3. Lack of the color depth found in Fancy.
4. Slight blemishes or spots.
5. Larger pieces than Fancy.
6. Not so tender or succulent as Fancy.
7. Not quite so well-trimmed as Fancy.
8. Not quite so fine-flavored as Fancy.

(c) *Standard*. This grade is good edible food, wholesome in every respect, but includes vegetables not considered fit for Fancy or Extra Standard grades on account of—

1. Off-color.
2. Excessive defects such as spots, blemishes, hard portions, lack of size uniformity.
3. Lack of symmetry of pieces.
4. Not well-trimmed, cored, or peeled.

A prominent feature of standard grade is often lack of tenderness as in peas or corn, or somewhat broken product, fewer whole pieces as compared with higher grades, or lack of color uniformity as in tomatoes.

(d) *Substandard*. This grade is ordinarily an "off-pack," a result of an item packed for standard (or higher grade) having been found inferior in quality

after canning. Accordingly, it represents a comparatively small proportion of commercial canned food. While the product must be wholesome and free from decomposed or putrid materials, it will usually be tough, flavorless, or off-flavor, unsightly and unattractive in appearance. It should not be difficult to detect this grade.

(2) *Standards.* The Federal Government has no authority to establish grades for canned goods except under the provisions of law. In the commercial field grading is done by inspectors licensed by the Federal Government. For guidance of these inspectors the Department of Agriculture has established and published grades for a number of items which are published in pamphlets known as United States Standards and copies may be obtained from the Department of Agriculture.

b. *Inspection.* (1) It might be well to remember that acceptance or rejection of supplies on the part of an inspector may mean that he will be called upon to explain his action, therefore an inspector must use discretion and oftentimes diplomacy. Inspectors should in no case permit themselves to become weak in their responsibility but they should give reasonable consideration to the following factors:

Availability.

Suitability.

Cost.

Climatic conditions.

Human and mechanical elements involved.

(2) Inspection is made to determine whether or not supplies meet contract requirements for *quality, quantity, and condition*. In the majority of cases requirements are based upon Federal or Army specifications which are made a part of the contract. Before making inspection for requirements, the inspector should make sure that he fully understands the contract requirements and specifications pertaining thereto. Federal specifications have been promulgated for practically every item of subsistence necessary for the Army. It is believed that these specifications adequately describe the characteristics necessary to secure desired item.

(3) Inspectors should call upon contracting officers for specifications or detail requirements of items to be inspected.

(4) When it is necessary to purchase an item for which no specification has been issued, the inspector must then depend upon his own good judgment. One of the best known and practical methods is to compare the sample being inspected with a like item of known grade and quality.

(5) Particular attention is invited to excerpts from the Federal Food, Drug, and Cosmetic Act, effective June 25, 1938, in section XV.

5. Fruit. According to Federal standards, canned fruit is:

The clean sound product made from properly prepared fresh fruit, with or without water and/or sugar:

(a) By processing in a suitable, hermetically sealed container, or

(b) By heating and packing in a suitable container which is then hermetically sealed.

a. *Sugar.* (1) *Form and kind.* In most canned fruits, sugar is added in the form of sirup. There are many kinds of sugars varying in sweetness, color, texture, granulation, and physical properties. Sucrose is a disaccharide most commonly known commercially as cane or beet sugar. Chemically and in degree of sweetness there is no difference between beet and cane sugar. If they are properly manufactured one is as suitable as the other. The matter of purity of any sugar is for the chemist or bacteriologist to determine. Under Government regulations, if any sugar other than sucrose or corn sugar is used that fact must be indicated on the label. Other sweetening agents such as dulcin and saccharine are considered as adulterants. The sirup density used varies directly with the grade of the pack, for example, fancy fruits have denser sirup than choice fruits of the same variety.

(2) *Density.* (a) *Test.* In practically all canned fruits, Federal specifications require that the fruit be packed in sirup testing not less than a given degree Brix at time of cut-out. This test is made with a Brix hydrometer which registers directly the percentage of sugar to water used, for example; sirup 10° Brix indicates that there is 10 per cent sugar by weight in the solution, that is, 10 pounds of sugar to 90 pounds of water. To obtain the reading a sufficient amount of liquor is drained into a graduate of diameter somewhat wider than the hydrometer base.

The hydrometer is allowed to sink into the sirup as far as it will of its own weight. When taking the reading, the hydrometer should not be in contact with sides of the graduate as tendency of the hydrometer to adhere to the sides would influence the depth to which it would sink and would show a higher density reading if in contact with the side of the graduate. The reading is taken at point of contact of the hydrometer scale with the sirup level. As hydrometers are scaled to float at a given height at a temperature of 62.5° F. or 17.5° C., necessary corrections for actual temperature must be made when accurate determinations are required. For practical work in testing canned goods this temperature variation may be disregarded as the correction amounts to less than 1 per cent for temperatures ranging from 14° F. to about 90° F. for the heaviest sirup used. Variation below 14° F. and above 90° F. is greater and correction should be made by subtracting the correction from the reading for temperatures below 63.5° F. and adding it for temperatures above this figure.

(b) *Variations.* Sirup never has the same density on cut-out as it does when added to fruit. This is a vexing problem to the canner. Federal specifications prescribe minimum cut-out densities for grades purchased and the canner who supplies the Government must meet these minimum requirements; however, an inspector should not consider sirup density of greater importance than character and quality of the fruit. Through careful test made in the western laboratories of the National Canners' Association, it was found that there were variations of as much as 2 per cent in the cut-out density of the same lot of canned fruit with the same grade of fruit used, and with the same initial degree of sirup, all packed in the same day.

b. *Requirements.* In addition to requirements for sirup density, particular attention should be paid to requirements for count (minimum and maximum number of pieces), drained weight, and net weight.

c. *Grading.* (1) Canned fruits may be scored numerically in the same manner as canned vegetables.

(2) It is recommended that subsistence inspectors provide themselves with a set of United States Standards for canned fruits and vegetables. These Standards may be obtained from the Agricultural Marketing Service, United States Department of Agriculture, Washington, D. C.

6. *Storage.* a. Keeping quality of canned food depends upon:

- (1) Nature of product.
- (2) Sanitary and quick handling (prevention of contamination).
- (3) Prior cure, for example, sauerkraut, corned beef, etc.
- (4) Added ingredients, sugar, salt, vinegar, spices, benzoate of soda, etc.
- (5) Exhaust (removal of air, oxygen). This is never complete.
- (6) Hermetical sealing, prevention of contamination.
- (7) Processing, partial or complete sterilization.

b. *Causes of spoilage.* Theoretically, canned food may keep forever. Practically, it could spoil or deteriorate to a great extent in from 1 day to 25 years. Such spoilage is caused by:

(1) Nature of product. Acid of certain fruits and vegetables reacts with metal of the can causing pinholes, etc. Many highly colored products (particularly red and black) fade. Some items disintegrate with time. Products containing sulphur and not packed in C enamel cans take on a black discoloration caused by interaction of tin or iron and sulphur, forming a black sulphide. This takes place shortly after processing.

(2) Improper handling.

(3) Incomplete exhaust. The oxygen present favors chemical action which increases fading, and also favors micro-organisms of most types, causing breaking down of fats, etc.

(4) Rusted and dented cans or those having nail holes punched in them in sealing the case.

(5) Improper sealing. Even a good seal may breathe a little air.

(6) Imperfect sterilization. Many thermophilic bacteria are not killed but continue to exist in spore form.

(7) Increased chemical action through warmth or heat. Action of acid is said to double in intensity for each 18° rise in temperature. Spores of thermophilic bacteria develop causing flat sours at temperatures slightly above 100° F.

(8) Freezing. This causes product to disintegrate (cell walls are broken). May sometimes burst can seams, and may cause sweating with consequent rusting.

c. *Preventive measures.* Considerable loss to the Government may be prevented by observing the following suggestions:

(1) Avoid storing in a damp place. Avoid sweating caused by sudden changes in temperature. Provide ventilation. These steps will prevent rusting.

(2) Avoid high temperatures. The ideal would be approximately 50° F. This can seldom be attained, but it is unnecessary to store near radiation or so high as to place canned food in warmer areas near the ceiling.

(3) Store cases on their sides on dunnage. If canned food is stored in this manner leakers will be detected more readily and should they develop, leakage will not collect in bare concave top surface of can and much rusting will be prevented. Further, can contents will have a better appearance on the cut-out as there will be no collection of off-color, etc., at the top.

(4) Avoid freezing temperatures (few items will freeze unless temperatures fall below 28° F. for several hours). However, frozen canned food is seldom ruined if cans do not burst or seams are not loosened. In defrosting do not warm suddenly. Rise in temperature should be slow. If cans are once frozen it is better to let them remain so until ready for use if there is danger of another freeze. Several short freezes affect food more than one long one.

(5) Use oldest lot first. There are exceptions to this rule. It might be that a newer lot is showing more signs of deterioration. In such event it should be used first. Constant and thorough inspection, together with a thorough knowledge of the stock, is the best safeguard.

(6) Keep places where spoiled canned food is held awaiting action of the contractor on reclamation or the survey officer clean and sanitary, otherwise such places become breeding sections for rodents, insects, and micro-organisms.

7. **Can sizes.** There are several hundred sizes and many styles of cans on the market; however, the can capacity table shown below describes those most commonly used.

CAN CAPACITY TABLE

Container description ¹	Name	Ounces avoirdupois capacity at 68° F.		Fluid ounces	Maximum allowable head space ²
		Per 1/16	Full can		
202 x 214	5Z	0.121	4.9	4.7	12
202 x 308	6Z	.121	6.1	5.8	14
208 x 211	Baby	.162	6.0	5.8	12
211 x 306	8Z short	.189	7.9	7.6	13
211 x 304	8Z tall	.189	8.7	8.3	13
211 x 400	Plenic	.189	10.9	10.5	16
211 x 414	No. 1 soup	.189	13.6	13.1	19
211 x 600	Pint	.189	17.0	16.3	22
300 x 407	No. 300	.234	15.2	14.6	17
300 x 409	No. 300X	.234	15.7	15.1	18
303 x 406	No. 303	.264	16.9	16.2	17
303 x 509		.264	21.9	21.0	21
303 x 512		.264	22.7	21.8	22
307 x 302	No. 2 squat	.307	13.5	13.0	13
307 x 306		.307	14.7	14.1	14
307 x 400	No. 2 short	.307	17.8	17.1	16
307 x 408	No. 2 special	.307	20.3	19.4	19
307 x 409	No. 2	.307	20.6	19.7	18
307 x 510	No. 2 tall (east)	.307	25.8	24.8	21
307 x 512		.307	26.4	25.3	22
307 x 604	No. 2½ round asparagus	.307	28.8	27.7	23
401 x 411	No. 2½	.432	29.8	28.6	18
404 x 414	No. 3	.487	35.1	33.7	19
502 x 510	No. 5	.703	59.1	56.7	21
603 x 408		1.032	68.1	65.4	18
603 x 700	No. 10	1.032	109.4	105.1	26
603 x 812	Full gallon	1.032	138.3	132.9	31

¹ First set of figures denotes diameter; second set the height. Figures are in inches and sixteenths. No. 10 can is 6-3/16" in diameter, 7" high. Gallon can is 6-3/16" in diameter, 8-12/16" high.

² As measured in 32ds from top of double seam. Head spaces greater than these will violate McNary-Mapes amendment; properly filled cans will show less head space.

Capacities shown are values without any head space; varying specific gravities of products preclude figures showing actual commercial weights obtained.

Capacity per 1/16-inch of height is same for all cans of same diameter. Figure may be used to calculate capacity of heights of cans not given.

SECTION III

FRESH FRUITS AND VEGETABLES

8. Grades and purchase. *a. Grades.* Standard grades for fresh fruits and vegetables were developed by the United States Department of Agriculture and are known as United States grades. Minimum quality requirements are clearly defined in the various grades. Since all Federal United States Standards describe the minimum quality permitted in a grade, there is a possibility of difference in quality between vegetable lots of the same grade designation. Fruits and vegetables graded at point of origin may not grade the same when received at destination due to deterioration or injury in transit.

b. Purchase. The following points should be considered in inspection of fresh fruits and vegetables:

(1) Large size fruits and vegetables are not always the best quality. As vegetables mature they have a tendency to become woody or to develop a hollow condition.

(2) Avoid commodities showing decay. Those showing slight decay will deteriorate rapidly.

(3) Distinguish between blemishes that affect appearance and those that affect eating quality. Cauliflower or cabbage may arrive with a few outer leaves yellowed. Such blemishes are removed in normal preparation for use. Amount of waste resulting from removal of blemishes in preparation for table use should be one of the determining factors in acceptance or rejection.

(4) Appearance and quality are closely associated but fine appearance does not always signify fine quality. Often fruit of attractive appearance may have poor quality because of varietal characteristic or of some internal condition such as overmaturity.

(5) As fruits and vegetables are desirable for their flavor they should always be tasted before acceptance.

(6) See that containers hold full measure. Frequently containers are re-packed, sometimes so loosely that they do not hold the required quantity.

9. Apples. Apples for dessert should be of medium size and of good color and flavor. Tart or slightly acid fruit is best for general cooking purposes.

a. Containers and markings. (1) Boxes are marked to indicate variety, numerical count, and grade. Western boxed apples are packed as Extra Fancy, Fancy, or C grade, or as a combination of any of these grades.

(2) Barrels and baskets are marked to indicate variety, diameter of smallest apples they contain, and grade. Grade is usually based on United States grades as prescribed by United States Standards.

b. Inspection. (1) Apples of good quality should be firm, of good color and flavor. Immature apples lack color, flavor, and have a shriveled appearance after having been in storage.

(2) Overripe apples yield to slight pressure, flesh is often soft and mealy, and they lack flavor.

(3) Apples coming from storage should be examined for "scald." This is a storage and transportation disease. It first appears as brown-tinted irregular areas on the surface, especially green areas. In severe cases, affected area is dark brown and may show decay. This defect often appears after removal from cold storage. Scald is less likely to be found on fruit wrapped in oiled paper or packed with shredded oiled paper.

(4) Other inspection factors are internal break-down, freezing, insect and mechanical injury, bruises, and decay.

c. Storage. (1) Temperature, 31° to 32° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, at least two changes of air per day.

(4) Summer varieties are poor keepers and should not be stored. Fall varieties will keep from 1 to 4 months under good storage conditions, late fall and winter varieties from 4 to 6 months.

10. Avocado or alligator pear. The avocado is marketed to a considerable extent under the trade names of Flavocado and Calavo. Avocados vary greatly in shape, size, color, and appearance. The skin may be paper thin and relatively smooth, or it may be thick and leathery. Thin-skinned varieties are more attrac-

tive but the thicker-skinned are just as desirable so far as quality and flavor are concerned.

a. Inspection. (1) Avocados should be heavy, have a bright fresh appearance, and be fairly firm. Texture of flesh should be soft and buttery. Avocados not having buttery smoothness of flesh may have a flat watery taste.

(2) Reject bruised fruit as it affects flesh quality.

(3) Scab is a light-brown, irregular marking on surface and does not affect flesh quality.

(4) Decay is detected by dark sunken spots.

(5) Avocados with broken or punctured skin should be rejected.

b. Storage. Softening of avocados may be retarded by keeping fruit in a cool, dry place at a temperature not below 42° F. They should not be stored over 1 week.

11. Bananas. *a. Inspection.* (1) Ripeness stage:

(a) Full ripe—skin should have no trace of green and be flecked with brown.

(b) Hard ripe—skin is yellow with no trace of green and without flecks.

(c) Turning ripe—skin is yellow with green at tip.

(2) A good banana should be plump, well-filled, and firm. Poor condition is indicated by badly discolored skin and soft, mushy, or discolored flesh.

(3) Bruised fruit indicated by dark areas of skin is wasteful and should be rejected.

b. Storage. (1) Temperature, 56° to 60° F.

(2) Relative humidity, 75 to 85 per cent.

(3) Ventilation, free circulation of air around containers.

(4) Bananas stored in too low a temperature will lose flavor and skins will develop a dark brown color.

12. Berries. *a. Inspection.* (1) Quality is indicated by a bright, clean, fresh appearance, full solid color, and plumpness of individual berry. Berries should be free from dirt, trash, moisture, and adhering caps. Over-ripe berries are dull in color, soft, and leaky. Leaky condition is best discovered by tilting container and examining it for stains. Often the soft and damaged berries are on the bottom. Mold on surface of berries indicates decay.

(2) Strawberries without caps may be overmature and break down rapidly.

b. Storage. (1) Temperature, 30° F.

(2) Relative humidity, 80 to 85 per cent.

(3) Ventilation, free circulation of air.

13. Cherries. Cherries are classified as sweet and sour. Important sweet varieties are Royal Anne (light-fleshed), Bing, Lambert, and Windsor (dark-fleshed). Important sour varieties are Montmorency and Early June.

a. Inspection. (1) Good quality cherries should have a bright, fresh appearance, be plump, fairly firm, well-colored for variety, and juicy.

(2) Immature cherries are usually smaller than the ripe fruit, hard, of poor color, and very acid. Overmature cherries are generally of dull appearance, soft, shriveled, and may be leaky.

(3) Close examination should be made for worm injury which is not always apparent on outside of fruit.

(4) Decay is indicated by small, brown, circular spots and by damp, stained, and leaky boxes.

(5) Cherries that have been bruised or otherwise mechanically injured should be rejected as molds will develop readily at point of injury.

b. Storage. (1) Temperature, 31° to 32° F.

(2) Relative humidity, 80 to 85 per cent.

(3) Ventilation, free circulation of air around containers.

(4) Under above conditions, good, sound fruit will keep about 1 week.

14. Grapes. Grapes found in the market are of two distinct types, American, grown mainly in Eastern and Central States, and European, grown chiefly in California. Skin and pulp of the European type do not separate, but seeds separate readily from the pulp. The more important varieties are Flame Tokay, Malaga, Emperor, and Sultanina (Thompson seedless). Skin and pulp of the American type separate easily. The most common varieties are Concord, Catawba, Moore, Worden, Niagara, and Delaware.

a. Inspection. (1) Grapes of good quality should have fresh appearance, good color, and be plump. Individual berries should be firmly attached to stems. Usually the white or green grapes of both American and European types are at their best when turning to an amber color.

(2) Grapes injured by freezing have a flat flavor and should be rejected. European grapes injured by freezing have a dull, dead appearance, become sticky, the berries shatter readily and when pulled from the cap stem, the brush is somewhat discolored and shorter than normal. American type grapes injured by freezing are shriveled and show a milky pulp condition. When pulled from the cap stem the brush usually remains in the berry.

(3) Decay is indicated by mold, wet berries, leaky and stained containers. It is often found on berries at the stem end.

b. Storage. (1) Temperature, 31 to 32° F.

(2) Relative humidity, 80 to 90 per cent.

(3) Ventilation, free circulation of air around containers.

(4) European type is a better keeper than the American type. Under above conditions grapes of either type may be stored for 2 to 3 weeks.

15. Peaches. There are two classes of peaches, white-fleshed and yellow-fleshed. Both these classes have varieties that are clingstones and freestones. The free-stone varieties of both classes are most popular for desserts.

a. Inspection. (1) A peach of good quality should be free from blemishes, have fresh appearance, a ground color either whitish or yellowish and sometimes combined with a red color known as blush. The red color is not a true sign of maturity. Flesh should be firm.

(2) Immature peaches lack color, often showing a green ground color. Fruit will shrivel and generally flesh becomes tough and rubbery. Overmature fruit is soft and will break down rapidly.

(3) Worm injury may be detected by unevenness of form and small drops of gum on the surface.

(4) Decay is indicated by brown, circular spots.

(5) Peaches with growth cracks are wasteful and poor keepers.

b. Storage. (1) Temperature, 31 to 32° F.

(2) Relative humidity, 80 to 85 per cent.

(3) Ventilation, free circulation of air around all containers.

(4) Peaches will keep from 1 to 2 weeks under above conditions.

16. Pears. Pears are classified according to flesh texture. The dessert type has soft, melting, or buttery flesh and excellent flavor. The preserving type has crisp or hard flesh with pronounced grit. The dessert type only should be purchased as dessert for the Army. Pears are normally picked when slightly immature and are ripened in a cool, dark place. Flesh of tree-ripened fruit is often coarse, of poor flavor, and in some varieties very gritty.

a. Inspection. (1) A pear of good quality should be firm but not hard, clean, not misshapen, wilted, or shriveled. Some varieties are in prime condition while still green or greenish-yellow; others may be yellow and yet be too immature for eating.

(2) Pears showing scald should be rejected. Scald is indicated by skin discoloration extending into the flesh. In severe cases the fruit is badly discolored and unattractive.

(3) Wilted or shriveled fruits indicate picking at too immature stages and they will not ripen properly. Pears with water-soaked appearance are mushy and of poor flavor.

b. Storage. (1) Temperature, 31° to 32° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, free circulation of air around containers.

(4) Should further ripening be desired temperature should be raised to 60° or 65° F.

(5) Under above conditions pears may be stored 3 to 4 weeks.

17. Plums and prunes. A prune is a variety of plum which is suited for drying purposes. A ripe fresh prune can be separated from the pit like a freestone peach.

a. Inspection. (1) Plums and prunes of good quality are plump, clean, have fresh appearance, should be full-colored for variety, and soft enough to yield to slight pressure. Softening at tip is generally good indication that maturity has

been reached. Immature fruit is hard, generally shriveled, and of poor color and flavor. Overmature fruit is soft and often leaky. Presence of moisture or a stained container is evidence of injury, overripeness, or decay.

(2) Sunburned fruit is usually of poor quality and flavor. Sunburn is indicated by brownish or reddish-brown color on the cheek of the fruit.

b. *Storage.* (1) Temperature 31° to 32° F.

(2) Relative humidity, 80 to 85 per cent.

(3) Ventilation, free circulation of air.

(4) Under above conditions, fruit may be stored from 3 to 6 days.

18. *Citrus fruits.* Two sets of United States Standards for citrus fruits are issued by the Department of Agriculture, one applying to California and Arizona and the other to the remaining States producing citrus fruits.

The discolored appearance on grapefruit and oranges caused by normal color being overcast by a reddish-brown color is known as "russetting." When surface of fruit shows very little russetting it is called "bright." Russetting does not affect flavor.

Most citrus fruits grown in the United States are marketed under trade or brand names. In some instances fruit is graded according to United States grades, in others according to standards established by the packer. These grades do not necessarily conform to United States grades. Information on brands can be obtained from the Agriculture Marketing Service, Washington, D. C. When inspecting citrus fruits there is no need of inspecting fruit packed by the producer as his second grade when inspecting for U. S. No. 1.

a. *Grapefruit.* (1) *Inspection.* (a) Good quality should be firm but springy to the touch, not soft, wilted, or flabby. Skin should be smooth. Shape of individual fruit should vary from flat at stem and blossom ends to round. Elongated fruit is undesirable and wasteful.

(b) A very small amount of decay will affect flavor of the whole fruit. Decay will usually appear at the stem or blossom end.

(c) Cut fruit at stem end to examine for dryness which may be caused from being on the tree too long, or due to frost injury.

(2) *Storage.* (a) Temperatures, 31° to 32° F.

(b) Relative humidity, 80 to 85 per cent.

(c) Ventilation, free circulation of air around each box.

(d) Under above conditions grapefruit may be stored safely for 6 weeks.

b. *Lemons.* California produces most of the lemons grown in this country. Since lemons are desired for their acid flavor they are harvested before fully mature.

(1) *Inspection.* (a) A lemon of good quality should have smooth, fine-textured skin, greenish-yellow color, and be heavy for its size. Deep yellow-colored lemons are usually mature and not desirable. Shriveled or hard-skinned fruit should be rejected.

(b) Decay is indicated by mold or as a discolored soft area at stem end. Soft or spongy fruit may be affected by rot at center.

(2) *Storage.* (a) Temperature, 55° to 58° F.

(b) Relative humidity, 85 to 90 per cent.

(c) Ventilation, free circulation of air around each container.

(d) Under above conditions lemons may be stored for 2 weeks.

c. *Oranges.* The leading varieties shipped from California are Washington Navel (November to May) and Valencia (April to December). The Navel is seedless, has thicker skin and is rougher than the Valencia and segments are separated more easily.

Varieties for Florida and Texas are about the same. Parson Brown is the principal early variety (October and November), Pineapple is midseason (January to March), and Valencia is the late (March to June).

Usually oranges received on the market in bulk are not graded or sized, and are known as "orchard run."

Oranges are washed, colored, and polished before being placed in the market. Two methods are used for coloring, gas treatments and vegetable dye. If vegetable dye is used, the words "color added" are stamped on fruit surface. This coloring method is harmless and in no way affects flavor.

Early oranges are sour and lack juice, but are good keepers. End of the

season fruit is fully matured, sweet, and full of juice, but a poor keeper. If used at once the older oranges are preferred.

(1) *Inspection.* (a) Containers should be checked for count. Oranges of best quality are firm, heavy, and have a smooth, fine-textured skin. Those having a badly creased skin are puffy or spongy and light in weight, and are of poor quality.

(b) Decay is indicated by soft areas on fruit surface. Skin over soft areas is tender and breaks easily under pressure. These areas may be covered by mold. A very small amount of decay will affect flavor of the whole fruit.

(2) *Storage.* (a) Temperature, 32° F.

(b) Relative humidity, 85 to 90 per cent.

(c) Ventilation, free circulation of air around each box.

(d) Under above conditions oranges may be stored from 4 to 6 weeks.

19. *Asparagus.* Asparagus ages rapidly after cutting, tips spread, and stalks become tough and woody. Two kinds are found on the market; bleached or white, and green. The green is most popular as a fresh vegetable. If growth is rapid a green shoot 6 to 10 inches long may be obtained before any part of it has become tough. Spears showing 4 or 5 inches of green tips and an equal length of white butt usually have been cut well below the surface and the white part may be tough and woody.

a. *Inspection.* Asparagus should be fresh, tender, and firm, with close, compact tips. A tender stalk is brittle and is easily punctured. Green asparagus should be green for almost its entire length. Wilted appearance or spreading tip indicates considerable time has elapsed since cutting. Stalks angular in form are tough and woody. The whole stalk with exception of an inch or two of base should be tender.

b. *Storage.* (1) Temperature, 32° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, free circulation of air.

(4) Fresh asparagus should not be stored over 2 or 3 days.

20. *Beans.* a. *Lima (fresh).* There are two general classes of lima beans, the large "potato" type and the small "butter bean" type. Most lima beans are shipped unshelled because shelled lima beans are very perishable.

(1) *Inspection* (a) Pods of unshelled lima beans should be well-filled, clean, bright, fresh, and a dark green color. Shelled beans should be plump, have tender skin, and green or greenish-white color.

(b) Pods of unshelled beans that are dried, shriveled, yellowed, or flabby usually contain beans that are tough and of poor flavor.

(c) Decay is indicated on pods by irregular sunken areas in which mold may appear. Shelled beans will show a shiny condition or mold, and those with hard, tough skins are overmature and lack flavor.

(2) *Storage.* (a) Temperature, 30° to 32° F.

(b) Relative humidity, 85 to 90 per cent.

(c) Ventilation, free circulation of air around containers.

(d) Unshelled lima beans may be held 7 to 10 days; shelled should not be stored.

b. *Snap (green or wax).* (1) *Inspection.* (a) Snap beans of good quality should be clean, fresh, firm, crisp, tender, and free from blemishes. Firm, crisp, tender beans will snap readily when broken. All the beans in a lot should be of the same maturity stage so that they will cook uniformly. Stringiness is undesirable and may be detected by breaking the bean and gently separating the two halves. Seed in pod should be very immature. If seeds are half grown, pods will be tough, woody, and stringy.

(b) A dull, dead, or wilted appearance indicates beans have been on the market for several days and are no longer of best quality.

(c) Decay is indicated by soft watery condition or mold.

(2) *Storage.* (a) Temperature, 32° to 40° F.

(b) Relative humidity, 85 to 90 per cent.

(c) Ventilation, free circulation around each container.

(d) Under above conditions snap beans may be stored for 1 week.

21. *Beets.* Early beets are usually marketed in bunches, three to five to the bunch, with tops attached. Late crop beets are usually marketed with tops removed. Medium-sized beets of late crop are usually best quality.

a. Inspection. (1) Good beets should be smooth and free from blemishes. Those rough or ridged may be tough or woody. Soft, flabby, or shriveled beets are usually of poor flavor.

(2) Bunched beets that have become too mature are tough or woody and may be recognized by a short neck covered with deep scars or by several circles of leaf scars around the top.

(3) Decay is indicated by a soft form of rot.

b. Storage. (1) Temperature, 32° F.

(2) Relative humidity, 85 to 90 per cent for bunched; 90 to 95 per cent for topped.

(3) Ventilation, free circulation of air around containers.

(4) Bunched beets may be stored for 3 to 4 days, topped for 2 to 3 months.

22. Cabbage. *a. Market types.* The five market types of cabbage are:

(1) *Pointed*, the early or "new" cabbage and includes varieties that develop conical or pointed heads.

(2) *Danish* includes late maturing varieties and develops a hard, tight-leaved, compact head.

(3) *Domestic* includes varieties that develop heads either round or flat in shape but less compactly formed than those of the Danish type. This type includes early, midseason, and medium-late varieties.

(4) *Savory* types are finely crumbled leaved varieties.

(5) *Red* includes all red varieties.

b. Inspection. (1) A good head is reasonably solid, firm, heavy, or fairly heavy for its size. Stem should be cut close to head and all except three or four of the outer leaves should be removed. Early cabbage is not as solid as that of the late crop.

(2) Decay is detected readily by odor and slimy condition. Heads showing worm injury, decay, yellowing of leaves and burst heads should be rejected. Soft or puffy heads are poor quality.

c. Storage. (1) Temperature, 32° F.

(2) Relative humidity, 90 to 95 per cent.

(3) Ventilation, free circulation of air.

(4) Under above conditions early cabbage may be stored from 10 to 15 days, late from 3 to 4 months.

23. Carrots. Early carrots are usually marketed in bunches of three to five carrots with tops attached, late crop carrots are generally grown to full maturity, marketed with tops removed, and are known as "topped." They are usually of deeper color and of more pronounced flavor, but may be of coarser texture or have a tough and woody heart.

a. Inspection. (1) Carrots of good quality are firm, fresh in appearance, smooth, and a good color. Poor color indicates poor quality. Tops of bunched carrots should be fresh and green.

(2) Carrots that are wilted, flabby, soft, or shriveled should be rejected. Those excessively forked, rough, or having deep growth cracks are wasteful in preparation. Excessively thick leaf stems indicate undesirably large cores.

(3) Decay appears as soft areas which may be covered with mold.

b. Storage. (1) Temperature, 32° F.

(2) Relative humidity, 90 to 95 per cent.

(3) Ventilation, free circulation of air around containers.

(4) Bunched carrots may be stored for 7 days, topped may be stored from 2 to 4 months.

24. Cauliflower. Leaves of cauliflower are trimmed down to within an inch or two of the curd, leaving only as many outer leaves as will afford protection to it. Size of head is no indication of quality.

a. Inspection. (1) Good quality cauliflower is indicated by white or creamy-white, clean, heavy, firm, compact curd, with outer leaves fresh and green. Spreading of flower clusters making curd open and giving a "ricey" appearance indicates overmaturity and poor quality. Yellow leaves, particularly if they drop from stalk when handled, indicate age.

(2) Heads with spotted, speckled, or bruised curd should be rejected. Plant lice are indicated by smudgy or speckled appearance.

b. Storage. (1) Temperature, 32° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, free circulation of air around containers.

(4) May be stored 10 to 15 days.

25. Celery. *a. Definition of terms.* (1) *Rough celery.* Celery packed and shipped just as it is dug, except that it has been sized, with few damaged branches and with excess dirt removed. Rough celery is also referred to as "untrimmed."

(2) *Trimmed celery.* Same as "rough," except that stalks are washed, stripped, and trimmed of roots. Trimmed celery is bunched, usually 12 stalks to the bunch.

(3) *Stalk.* Individual plant.

(4) *Branch.* Individual division of stalk.

(5) *Bunch.* Usually 12 stalks.

b. Inspection. (1) Best celery is of medium length and thickness. It should be solid and branches brittle enough to snap easily.

(2) Pithy or stringy celery should be rejected.

(3) Center of stalks should be examined closely for blackheart by separating branches. Insects, insect injury, and seed stem can be detected the same way. Celery that has formed a seed stem is usually bitter.

(4) Freezing will cause browning and drying of tops and pithiness of branch.

e. Storage. (1) Temperature, 31° to 32° F.

(2) Relative humidity, 90 to 95 per cent.

(3) Ventilation, free circulation of air around containers.

(4) Under above conditions, may be stored for 2 to 4 months.

26. Corn (green). Two classes of corn are found on the market, sweet and field. Field corn is usually an early maturing variety. It may be just as tender as sweet corn but does not have the sweet taste. Ears of sweet corn are usually smaller than those of field, and husks are generally darker green in color with ribbonlike ends which hang free. Husks of field corn taper and cling tightly at top of ear. Color of sweet corn may be either white or yellow, depending on variety.

a. Inspection. (1) A good ear should have fresh, green husks and a cob well-filled with bright, plump, milky kernels just firm enough to offer slight resistance to pressure.

(2) Corn heats rapidly. Heating causes yellowing and drying out of husk and toughening, discoloration, loss of flavor, and shriveling of kernels.

(3) Examine carefully for worm injury, especially along sides of ear. Worm injury at tip is of minor importance unless it extends into kernels.

(4) Quality can best be determined by pulling back husk and examining kernel.

b. Storage. (1) Temperature, 31° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, free circulation of air.

(4) May be stored 1 to 2 days.

27. Cucumbers. *a. Inspection.* (1) Cucumbers for slicing should be firm, fresh, bright, well-shaped, and a good color. Flesh should be firm and seeds immature.

(2) Withered or shriveled cucumbers should be rejected as the flesh is tough and bitter. Overmaturity is indicated by puffy appearance, color is dull and often yellowed, seeds hard, and flesh in seed cavity jellylike.

(3) Decay usually appears on surface as a dark, sunken, irregular area.

b. Storage. (1) Temperature, 45° to 50° F.

(2) Relative humidity, 80 to 85 per cent.

(3) Ventilation, free circulation of air.

(4) May be stored 4 to 6 days.

28. Eggplant. *a. Inspection.* (1) A good eggplant should be heavy, firm, free from blemish, and a uniform dark color.

(2) Wilted, shriveled, soft, and flabby eggplants are bitter and poor flavored.

(3) Decay is indicated by dark-brown spots on surface. Worm injury is apparent on surface.

b. Storage. (1) Temperature, 45° to 50° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, free circulation of air.

(4) May be stored 7 to 10 days.

29. Greens. The most common leafy type vegetables used for greens are beet tops, broccoli, chard, chicory, collards, cress, dandelions, endive, escarole, kale, mustard, sorrel, spinach, and turnip tops.

a. Inspection. Greens of good quality must be fresh, young, green, and tender. Leaves poorly developed, dry or yellow, injured by insects, or showing excessive

dirt, and coarse stems are poor quality. Presence of seed stems indicate age and toughness.

b. Storage. Greens are extremely poor keepers and should not be stored.

30. Lettuce. *a. Classes.* Four classes or types of lettuce are found on the market, crisp-head (iceberg), butterhead, cos, and loose-leaf.

(1) Crisp-head varieties are the most important commercially. Practically all lettuce grown in the Western States is crisp-head. This type is firmer, crisper, and usually larger than butterhead types.

(2) Butterhead is the principal type grown in Eastern and Southern States. Big Boston is the leading butterhead variety grown.

(3) Cos is grown as a market garden crop near large cities. It is easily distinguished from other types by the elongated head, coarser leaf, and stronger flavor.

(4) Leaf is the nonheading type.

b. Inspection. (1) Head lettuce of good quality should be fresh, crisp, tender, and fairly firm (butterhead) to hard (crisp-head).

(2) Lettuce with seed stem has a bitter flavor and is wasteful. A seed stem can be detected by wide spaces between outer leaves at their base and a knob-like swelling at top or side of head. If pressure is applied at this point a hard core will be felt.

(3) Decay is indicated by discolored areas on the leaves and may be trimmed with little waste. At times soft rot is found to penetrate interior of head and in this case the lettuce should be rejected.

c. Storage. (1) Temperature, 32° F.

(2) Relative humidity, 90 to 95 per cent.

(3) Ventilation, free circulation of air.

(4) May be stored 6 to 10 days.

31. Onions. *a. Dry.* (1) *Classes.* Two general classes of onions grown in the United States are found on the market; the large, mild-flavored such as Bermuda and Spanish types, and the medium size, strong-flavored known as domestic or American type.

(a) The Bermuda is flat and found on the market from March to June.

(b) The Spanish or Valencia is large, mild, sweet, yellowish-brown or white in color, and usually globular in shape.

(c) The domestic or late crop onions are practically all globular and have a red, yellow, or white skin. They are good keepers and found on the market the entire year.

(2) *Inspection.* (a) Onions of good quality should be bright, clean, hard, well-shaped, mature, and with dry skins. Those that are mature and properly cured will rattle like blocks of wood when poured from one container to another.

(b) Decay usually appears at the neck or base and may extend well into the center. Moisture at the neck indicates decay.

(c) Freezing may attack certain scales and not affect other scales of the same onion. Those thus affected are often salvaged by drying. Such injury can be detected by cutting at right angles to the scales and examining for dry, brown scale.

(3) *Storage.* (a) Temperature, 32° F.

(b) Relative humidity, 70 to 75 per cent.

(c) Ventilation, free circulation of air around containers.

(d) Late crop, 4 to 6 months. Should be stored in slatted crates or shallow, slatted bins.

b. Green. (1) *Inspection.* (a) Green onions of good quality have green, fresh tops, medium-sized necks well-bleached for at least 2 or 3 inches from the root, and are young, crisp, and tender.

(b) Wilting and yellowing tops as shown by flabby, tough, fibrous necks indicate age.

(2) *Storage.* Green onions should not be stored as they are very poor keepers.

32. Peas. Peas lose their sweetness and delicate flavor as they mature. Whatever the stage of maturity of peas purchased, they should be at the same stage throughout the lot to allow for uniformity in cooking.

a. Inspection. (1) Peas of good quality are young, fresh, tender, and sweet. Pods should be bright green, velvety, and fresh in appearance, and well to fairly well filled. Pods of immature peas are flat and dark green in color. Pods showing maturity are swollen, of poor color, and may be flecked with grayish specks. The peas are tough and of poor flavor.

(2) Decay is evidenced by presence of mold or water-soaked appearance.

b. *Storage.* (1) Temperature, 32° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, free circulation of air.

(4) May be stored 1 to 2 weeks in pods.

33. Potatoes. Potatoes of the same variety may be had as either new or old stock during late spring and early summer. These are dug before reaching full maturity and are marketed as soon as dug. Because of immaturity they will not stand rough handling or storage. The skin is broken easily and presents a feathery appearance. They are more or less soggy when cooked.

Late crop potatoes are usually mature when dug. The skin is firmly attached and has a corky appearance. When cooked they are usually mealy. Potatoes of the late crop are stored for winter and spring markets.

Potatoes are classified according to shape, as long and round varieties, and according to color, as white, brown or russet, and red. Potatoes as purchased must be of "similar varietal characteristics" which means that they will all be the same shape, color, and have similar cooking qualities.

a. *Inspection.* (1) A good potato should be firm, bright, well-shaped, and free from injury caused by dirt, sunburn, growth cracks, insects, or mechanical injury.

(2) Wilted, shriveled, leathery, sprouting, or discolored potatoes should be rejected.

(3) Green color often found on the surface is a condition known as sunburn. It is caused by exposure to light in the field or storage.

(4) Potatoes sometimes have a hollow center known as hollow-heart. Another serious defect known as blackheart is sometimes found, a black, often slimy, center. It is usually the result of poor ventilation in storage or shipping. Hollow-heart and blackheart can be detected only by cutting.

(5) Freezing injury is indicated by the potato being wet and leaky, or when cut it will show a black ring just within the outer surface. Such potatoes are of poor flavor and turn dark in cooking.

(6) Decay may appear as either a wet or dry rot. Potatoes with moisture on the surface should be examined closely for decay or freezing injury.

(7) Defects caused by wireworms are difficult to detect. Affected potatoes show numerous small perforations which may extend well into the potato and cause considerable waste in preparation.

b. *Storage.* (1) Temperature, 36° to 50° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, free circulation of air around sacks or other containers or throw bins.

(4) Mature potatoes, 4 to 6 months. Must be stored in dark room.

34. Radishes. Varieties of radishes vary in color, shape, and size. Most of them mature in early spring and summer. A few winter varieties mature in the late fall. Winter radishes are either blackish or white in color.

a. *Inspection.* (1) A good radish is well formed, smooth, firm, tender, crisp, and milky in flavor.

(2) Old or slow-growing radishes are strong flavored and flesh may be woody. They usually have coarse, dry, or yellow leaves.

(3) Pithiness may be detected by slight pressure with the thumb and finger.

b. *Storage.* (1) Temperature, 32° to 35° F.

(2) Relative humidity, 80 to 85 per cent.

(3) Ventilation, free circulation of air.

(4) May be stored 3 to 5 days.

35. Spinach. a. *Inspection.* (1) Good spinach should have well-developed, stocky plants with fresh, crisp, clean leaves of good green color.

(2) Small, straggly, or overgrown stalky plants are tough and should be rejected. Plants with yellow leaves, seed stems, or very coarse leaf stem are tough and woody.

(3) Decay is indicated by soft, slimy rot.

b. *Storage.* Very perishable and should not be stored.

36. Sweet potatoes. There are two general types of sweet potatoes—dry-meated and moist-meated. Dry-meated are commonly known as "Jerseys." They have yellowish, fawn-colored skin and very light yellow flesh. When cooked they are

somewhat dry and mealy. Moist-meated varieties have skins varying from whitish to a reddish color and flesh varying from light greenish-yellow to a reddish or orange tint. The Nancy Hall and Puerto Rico are the most important varieties. The moist-meated type is commonly called "Yam."

A mixture of varieties is not desirable because of the difference in flavor, flesh color, and cooking characteristics.

a. Inspection. (1) Sweet potatoes of good quality should be smooth, reasonably well-shaped, firm, and of bright appearance.

(2) The most common defects are decay, misshape, bruises, and growth cracks. Badly misshapen potatoes and those with growth cracks are wasteful and undesirable.

(3) Decay imparts disagreeable flavor even if decayed portion is removed. Decay may be found as soft, wet rot, or as dry, shriveled, discolored area usually at the end. It may also appear as greenish to black spots anywhere on the surface, often in bruised and injured places.

(4) Sweet potatoes that appear damp should be examined carefully. They may have been frozen or decayed specimens may be present.

b. Storage. (1) Temperature, 50° to 55° F.

(2) Relative humidity, 80 to 85 per cent.

(3) Ventilation, free circulation of air around and through containers.

(4) May be stored 2 to 4 months. Dry-meated varieties are much better keepers than moist-meated.

37. Tomatoes. Tomatoes shipped long distances are picked when green but mature enough so that they will ripen properly after or during shipment, and are known as "mature green," sometimes called "green wrap" as they are usually wrapped with paper. Those shipped to nearby markets are picked when pink, sometimes referred to as "turning." At this stage color will vary from creamy on the blossom end to half the surface showing pink. They develop a better flavor than mature green.

Ripe tomatoes are shipped locally and should show most of the surface pink or red, be firm, and no indication of softness.

a. Inspection. (1) Good quality tomatoes are mature, firm, fairly well-formed, plump, smooth, of good color, and free from blemish. Catface or scars at the blossom end cause waste in preparation but do not affect flavor. Slicing should show a well-filled seed cavity, thick, meaty wall, and thin skin.

(2) Immature tomatoes appear shriveled, angular in form, and have a poor color.

(3) Puffy or watery fruit has poor flavor.

(4) Decay is indicated by wet break-down and soft, discolored spots on the surface.

b. Storage. (1) Temperature, 40° to 50° F.

(2) Relative humidity, 85 to 90 per cent.

(3) Ventilation, free circulation of air around containers.

(4) May be stored 1 week.

38. Turnips. Early turnips are usually sold with tops attached. Late or main crop are sold with tops removed. Much of the late crop is stored for winter use.

a. Inspection. (1) Turnips of good quality should be smooth, firm, with few leaf scars around the crown, and with very few fibrous roots at the base. Tops should be fresh, green, and young on bunched turnips. Yellowed or wilted tops indicate they have been kept in storage too long.

(2) Large, coarse, overgrown turnips, especially those light in weight, may be tough, woody, hollow, pithy, and strong in flavor.

b. Storage. (1) Temperature, 32° F.

(2) Relative humidity, 90 to 95 per cent.

(3) Ventilation, free circulation of air.

(4) Topped, 2 to 4 months. Bunched, 3 to 6 days.

39. Inspection factor table.

Article	Federal specifications	Inspection factors	Storage conditions
Apples	Y-A-606	Dessert. Good color, flavor, attractive, and appealing. Cooking. Slightly acid, tart, and firm. Examine for scald, rot, over-maturity, and immaturity.	31° to 32° F., 85 to 90 per cent relative humidity. Good ventilation. Fall varieties, 1 to 4 months; late fall and winter varieties, 4 to 6 months.
Avocado ...	None	Bright, fresh appearance; fairly firm. Flesh soft and buttery. Examine for decay, bruised fruit.	42° F., 85 to 90 per cent relative humidity. Good ventilation. 1 week.
Bananas ...	Y-B-91	Stage of ripeness; size; plump; well-filled; firm. Examine for bruises, soft, mushy, or discolored flesh, frost damage.	56° to 60° F., 75 to 85 per cent relative humidity. Good ventilation. Turning ripe; 10 to 14 days.
Berries	Y-B-496	Bright, clean, fresh, plump. Examine containers for stains, mold, soft and leaky fruit.	30° F., 80 to 85 per cent relative humidity. Good ventilation. 1 to 3 days.
	Y-B-426		
	Y-C-651		
	Y-S-726		
Grapes	Y-G-671	Type, fresh, plump, good color and firmly attached to stems. Examine container for stains, frost injury, mold, wet, or leaky berries.	31° to 32° F., 80 to 90 per cent relative humidity. Good ventilation. 2 to 3 weeks.
Peaches	Y-P-151	Class. Fresh with good ground color, firm, and good shape. Examine for worm injury, decay, growth cracks.	31° to 32° F., 80 to 85 per cent relative humidity. Good ventilation. 1 to 2 weeks.
Pears	Y-P-166	Firm, clean, well-shaped. Examine for scald, decay, water-soaked appearance.	31° to 32° F., 85 to 90 per cent relative humidity. Good ventilation. 3 to 4 weeks.
Plums and Prunes.	Y-P-506	Plump, clean, fresh, full colored and soft enough to yield to slight pressure. Moisture or stained containers indicate injury or decay. Sunburned of poor flavor.	31° to 32° F., 80 to 85 per cent relative humidity. Good ventilation. 3 to 6 days.
Grapefruit ..	Y-G-681	Firm, smooth skin, well-shaped, not elongated, heavy for size. Examine for decay, dryness and frost injury.	31° to 32° F., 80 to 85 per cent relative humidity. Good ventilation. 6 weeks.
Lemons	Y-L-231	Firm, smooth skin, good color, heavy for size. Examine for decay, soft or spongy fruit, mold, shriveled or hardskinned fruit.	55° to 58° F., 85 to 90 per cent relative humidity. Good ventilation. 2 weeks.
Oranges	Y-O-661	Firm, heavy, smooth skin. Examine for decay, puffy or spongy fruit.	32° F., 85 to 90 per cent relative humidity. Good ventilation. 4 to 6 weeks.
Asparagus ..	HHH-A-731 ..	Fresh, tender, firm, close compact tips green almost entire length. Angular, tough, woody stalks, undesirable.	32° F., 85 to 90 per cent relative humidity. Good ventilation. 2 to 3 days.
Beans:			
Lima	HHH-B-141 ..	Pods well-filled, clean, bright, fresh and dark green color. Shelled, plump, tender skin, and green or greenish-white color. Dried, shriveled, yellow or flabby of poor flavor.	30° to 32° F., 85 to 90 per cent relative humidity. Good ventilation. 7 to 10 days.
Snap	HHH-B-156 ..	Clean, fresh, firm, crisp, tender, free from blemish. Seed pod immature. Dull, dead, wilted, appearance undesirable.	32° to 40° F., 85 to 90 per cent relative humidity. Good ventilation. 1 week.
Beets	HHH-B-166 ..	Smooth, firm, free from blemish. Rough or ridged are woody. Soft, flabby, shriveled are of poor flavor.	32° F., 85 to 90 per cent relative humidity. Good ventilation. Bunched 3 to 4 days. Topped, 3 to 4 months.
Cabbage	HHH-C-26 ...	Solid, firm, heavy for size and variety. Burst heads, soft or puffy of poor quality.	32° F., 90 to 95 per cent relative humidity. Good ventilation. Early, 10 to 15 days. Late, 3 to 4 months.
Carrots ...	HHH-C-81 ...	Firm, fresh, clean, smooth, good color. Wilted, flabby, soft, shriveled, forked, and rough are undesirable.	32° F., 90 to 95 per cent relative humidity. Good ventilation. Bunched, 7 days. Topped, 2 to 4 months.
Cauliflower ..	HHH-C-101 ..	White or creamy-white; clean, heavy, firm, compact curd, outer leaves fresh and green. Spreading, speckled, smudgy, bruised head with dropping leaves of poor quality.	32° F., 85 to 90 per cent relative humidity. Good ventilation. 10 to 15 days.

Article	Federal specifications	Inspection factors	Storage conditions
Celery	HHH-C-191a ..	Medium length and thickness, solid, brittle. Pithy, stringy, blackheart, seed stem, of poor quality.	31° to 32° F., 90 to 95 per cent relative humidity. Good ventilation. 2 to 4 months.
Corn, Green ..	HHH-C-591 ..	Fresh green husks, cob well-filled, bright, plump, milky, kernels. Yellow, dry husks, tough, discolored, shriveled kernels are of poor quality.	31° F., 85 to 90 per cent relative humidity. Good ventilation. 1 to 2 days.
Cucumbers ..	HHH-C-751 ..	Firm, fresh, bright, well-shaped, good color. Withered, shriveled, puffy, dull, yellowed, hard seed are of poor quality.	45° to 50° F., 80 to 85 per cent relative humidity. Good ventilation. 4 to 6 days.
Eggplant ...	HHH-E-236 ..	Heavy, firm, free from blemish; uniform dark color. Wilted, shriveled, soft are of poor flavor.	45° to 50° F., 85 to 90 per cent relative humidity. Good ventilation. 7 to 10 days.
Lettuce	HHH-L-226 ..	Fresh, crisp, tender, fairly firm to firm. Heads with seed stem and discolored leaves are of poor quality.	32° F., 90 to 95 per cent relative humidity. Good ventilation. 6 to 10 days.
Onions: Dry	HHH-O-531 ..	Bright, clean, hard, well-shaped, mature, dry skins. Decay at neck or root, frost injury, sprouting should be rejected.	32° F., 70 to 75 per cent relative humidity. Good ventilation. Shallow containers, 4 to 6 months. Should not be stored.
Green	HHH-O-541 ..	Green, fresh tops blanched 2 to 3 inches from root, young crisp and tender. Wilted, yellowing tops, tough, fibrous necks, undesirable.	
Peas	HHH-P-156 ..	Young, fresh tender, sweet. Pods bright green, velvety, fresh, fairly well- to well-filled. Flat, dark green pods are immature. Swollen poor colored pods are old and tough.	30° F., 85 to 90 per cent relative humidity. Good ventilation. 1 to 2 weeks in pods.
Potatoes ...	HHH-P-611 ..	Firm, bright, well-shaped, free from injury, insect, or mechanical injury of similar variety. Wilted, shriveled, leathery, sprouted, discolored are undesirable. Examine for hollow heart, blackheart, frost injury by cutting.	36° to 50° F., 85 to 90 per cent relative humidity. Good ventilation. Late crop, 4 to 6 months.
Radishes	HHH-R-86 ...	Well-formed, smooth, firm, crisp and mild flavor. Coarse, dry leaves indicate woodiness. Pithy radish of poor flavor.	32° to 35° F., 80 to 85 per cent relative humidity. Good ventilation. 3 to 5 days.
Sweet potatoes ..	HHH-P-21 ...	Smooth, well-shaped, firm, bright and of similar variety. Badly misshapen, insect and mechanical injury are undesirable.	50° to 55° F., 80 to 85 per cent relative humidity. Good ventilation. 2 to 4 months.
Tomatoes ...	HHH-T-576 ..	Mature, firm, plump, smooth, good color, well-filled seed cavity, thick meaty wall, thin skin. Shriveled, puffy, angular in form, poor color are undesirable.	40° to 50° F., 85 to 90 per cent relative humidity. Good ventilation. 1 days.
Turnips	HHH-T-851 ..	Smooth, firm, fresh green tops. Large, coarse, and light in weight are woody.	32° F., 90 to 95 per cent relative humidity. Good ventilation. Bunched, 3 to 6 days. Topped, 2 to 4 months.

SECTION IV

DRIED FRUITS AND VEGETABLES

40. Definitions. Trade definitions of drying terms in general use are:

a. *Dehydrated.* Fruits or vegetables dried in artificially heated air *under forced draft*.

b. *Evaporated.* Fruits or vegetables dried in artificially heated air *without forced draft*.

c. *Sun-dried.* Food dried entirely by exposure to rays of the sun.

d. *Dried.* All dried foods regardless of means used for extracting moisture.

41. Beans. a. *Types and kinds.* (1) Dry beans can be procured under Federal specifications for Army use in five types, A, B, C, D, and E. Invitation for bids may specify a particular type and further specify a particular kind within a type, for example, type A white, small white; type B, red kidney, Western red kidney. The kinds authorized under each type are named in Federal specifications.

(2) The table given below will assist inspectors in identifying the various kinds of beans named in specifications and standards.

Name	Size	Shape	Color	Source
Great Northern ..	Large	Oval	Pure white	Idaho, Montana, Wyoming.
Large white	Larger than pea ..	Oval	Pure white	California, Idaho, Montana.
Medium white ..	Between small and large.	Oval	Pure white	Michigan, New York, Wisconsin.
Small white	Very small	Oval, narrow ..	Pure white	California, Idaho, Montana.
Pea	Small	Oval, round ...	Pure white	Michigan, New York, Wisconsin.
Red kidney	Twice as large as medium white.	Kidney-shape ..	Red	California, Michigan, New York.
Dark red kidney ..	Same as red kidney.	Kidney-shape ..	Mahogany	Michigan.
California red ...	Medium	Kidney-shape ..	Dark red	California.
Pink	Medium	Flat, oval	Light red	California.
Pinto	Slightly smaller than pink.	Kidney-shape ..	Buff, speckled with brown.	Colorado, New Mexico, California, Idaho, Montana.

(3) There are two kinds of lima beans, regular and baby. Both are flat and round in shape (one large, the other small), and are pure white in color.

(4) Blackeye beans are commonly known as "cow peas." Despite the name it is a bean, and can be distinguished by the black spot or eye on the concave surface.

(5) The commonly used term "Navy bean" is not used in Government publications, being now obsolete. The term "Navy" was and still is used by some to indicate type A. The chief disadvantage of using the term "Navy" is that it fails to differentiate between the various kinds of white beans.

b. *Inspection.* (1) *Type, kind, and grade.* Inspection involves, in addition to the general features of conditions, net weight, etc., two features peculiar to dry beans, the particular type and kind specified, and the grade specified.

(a) *Type and kind.* For type and kind, it is necessary to have either experience or standard samples.

(b) *Grade.* For grade, it is essential that the inspector have a copy of "Handbook of Official United States Standards for Beans." This handbook may be obtained from Agricultural Marketing Service, United States Department of Agriculture, Washington, D. C. The handbook gives allowable percentages of various grading factors, definitions, etc., and should be read carefully. The inspector should also provide himself with a copy of Federal specification for Beans, Dry.

(2) *Shipment.* (a) *Cars and bags.* In inspecting freight shipments, care should be taken to see that cars used were clean and watertight. If soot or dirt was not carefully removed it will sift through the bags and soil beans so that their appearance will be damaged permanently. Leaky roofs result in stained and unsightly beans. Specifications call for new sacks. Stained sacks are often evidence that they have been wet and contents injured. Bags showing moist or discolored spots should have contents carefully examined for damaged beans.

(b) *Samples.* After noting general condition of shipment and carefully inspecting any abnormal portion, a representative sample of the entire lot should be taken. For this purpose bags are selected from various parts of the shipment and samples taken from all parts of bags selected.

(3) *Moisture.* Excess moisture is a serious trouble in new beans. Those with more than 17 per cent moisture are termed "wet" and should not be accepted as they become musty, do not store as well, and do not contain as much food to the pound as dry beans.

Dry beans are plump and firm under pressure; they should not be dented when pressed with the thumbnail. Another good test is to lay beans on a table and try to cut with a sharp knife at right angle to longer axis. If the knife goes through in an easy manner without immediate cracking open, as a rule the bean contains an excessive amount of moisture and the lot should be examined more carefully.

(4) *Physical properties.* Good beans are dry, plump, uniform in color, and have a strong, glossy skin. Those too hard, either because they are old or naturally hard and tough, are undesirable. Small and hard beans require a long time to soak and do not cook well.

(5) *Insects.* Weevily beans are not acceptable under specifications. Weevils deposit small white scales (eggs or excreta) on the outside. These may be seen with the naked eye, but a hand lens aids in recognition. Weevils develop within and eat their way out. Cut the suspected beans open and look for larvae. Before weevils emerge, small spots (1/16-inch diameter) appear and show where they are about to come out. A good test to detect presence of weevils and similar insects is to put a lot in water for about 2 hours. Insects present will come out and float on top of the water.

42. Rice. Like beans, in the inspection and grading of rice it is essential that an inspector provide himself with a copy of Federal Specification for Rice and also a copy of United States Standards for Milled Rice.

Some of the commonly used terms or definitions for rice products are:

a. *Rough or paddy* is the threshed grain firmly enclosed in the hull.

b. *Brown* is rice freed from hulls, but containing practically all bran coats and some germs.

c. *Partly milled, medium milled, under milled* is rice from which a portion of outer bran layers and practically all germs removed, but still containing an appreciable amount of bran layers.

d. *Milled* is rice from which practically all bran layers have been removed.

e. *Unpolished* is milled rice containing considerable portion of bran coats. Brown rice is properly designated as unpolished.

f. *Polished* is milled rice from which all bran coats have been removed.

g. *Uncoated polished* is a completely milled rice to which coating materials have not been added.

h. *Coated* is polished rice to which coating materials have been added such as talc or starch.

i. *Head* is milled rice consisting of a large proportion of whole grains.

j. *Broken* is milled rice containing a large proportion of broken grains.

k. *Second head* is broken rice consisting of comparatively large pieces.

l. *Screenings and brewers' rice or grits* are broken rices consisting of comparatively small pieces.

m. *Wild* is rice which grows in lake and swamp areas and produces a dark, uneven grained, unpolished rice used as an accessory in cooking, especially for wild duck. It has not become a commercial article of great yield and is only procurable at certain times.

n. *Byproducts* are hulls, bran, pearling cone meal, and polish.

For additional definitions, see United States Standards for Milled Rice. The definitions mentioned herein are not shown in United States Standards.

The fact that rice is weevily does not affect the grade. A sample could be weevily and still grade U. S. No. 1. The word "weevily" is added to the grade certificate. Even though a rice graded U. S. No. 1, it could and should be rejected if offered for delivery to the Army under Federal specifications provision which requires that rice be clean and sound.

43. Storage. Insects breed in stored dried vegetables; therefore, if insect-free products are stored in the same warehouse where infested products recently have

been stored, the new products may become infested. To prevent insect pests is a matter of good warehousing, and good preventive measures are:

- a. Pile or stack on dunnage.
- b. Absolute cleanliness. Keep out dirt, allow no accumulation of debris, cobwebs, piles of sacks, papers, and other litter. Dispose of all sweepings.
- c. Cool, dry, and well-ventilated storage. Temperature below 43° F. will prevent development and growth of insects. It is not necessary to maintain temperature below 40° F. for this purpose.
- d. Careful inspection of all newly delivered stores for insects, and isolation and treatment of suspected lots.
- e. Frequent inspection of stock.
- f. Rotation of storage location when practicable.
- g. Prompt attack when insects of any type are found. Insect-infested products should be surveyed with a view to their condemnation and removal.

44. Fruit. a. *Specifications.* Federal specifications have been promulgated for the following dried fruits:

- (1) Apples
- (2) Apricots.
- (3) Currants.
- (4) Dates.
- (5) Peaches.
- (6) Prunes.
- (7) Raisins.

An inspector should provide himself with above-mentioned specifications and study them carefully.

b. *Samples.* Due to variation in quality and to lack of uniform grades for the several products, it is believed that in inspection of dried fruits comparison with sample of known satisfactory commercial quality be made.

In obtaining a sample for inspection, sufficient boxes should be selected at random so that they are fairly representative of the whole shipment. Trade practice is to examine 3 per cent of each shipment. Boxes should be opened by removing bottoms so that appearance of facing, if present, will not influence the inspector in determining actual quality.

For example to be representative of the lot from which drawn, the fruit should be mixed thoroughly, piled in a heap, and quartered. By rejecting opposite quarters, repiling and requartering until a workable amount is obtained, a truly representative sample results.

c. *Inspection.* Actual inspection of any lot is based upon the following factors:

(1) *Textures.* Except for very soft and sugary products such as dates, figs, etc., textures should be springy and pliable. When a handful of fruit is pressed tightly together, pieces should immediately fall apart when the hand is released. It should never be possible to press moisture from any freshly cut surface. If the fruit seems soft, mushy, or wet, and sticks together when pressure is released, moisture content is probably 25 per cent or more. If fruit seems springy and when the pressure is released separates in a few seconds to form pieces of approximately original size and shape, moisture content is about 20 to 24 per cent. In case of doubt as to moisture content, examination should be made in a chemical laboratory. Maximum moisture content for dried fruits allowed by Federal specifications is 24 per cent.

(2) *Color.* Color should be clean, bright, uniform, and typical of the variety. Desirable colors for the several fruits are:

- (a) Apples, fairly white and bright.
- (b) Apricots, golden yellow to orange.
- (c) Currants, purplish-brown but rather dull.
- (d) Dates, lustrous, golden brown.
- (e) Figs, brownish-white for white varieties.
- (f) Peaches, golden orange.
- (g) Prunes, dark brownish-purple to jet black, with or without a bluish luster; meat light to golden brown.
- (h) Raisins, seeded, shiny, purplish-black to dark brown. Seedless, light brown to brown.

Many fruits are sulphured to produce brighter and more uniform color. Un-

sulphured have better flavor than sulphured, but soon become dark and unsightly in appearance.

(3) *Soundness and cleanliness.* Fruit should be free from dirt, sand, leaves, twigs, and other foreign materials apt to be taken up through handling and storage in unclean storerooms. All packages should be whole and intact. Moldy or mildewed products are not acceptable. A few dried fruits, especially prunes, dates, raisins, and figs, will show whitening or yellowish-whitening on the outside of packages or on fruit when stored for some time or in warm places. If hard and crystalline, this is merely natural sugars and flavor of the fruit is not affected. However, this should not be mistaken for mold which is thread-like, fuzzy, and soft.

(4) *Insects.* Dried fruits are attacked readily by weevils, sugar mites, and flies. Infestation on receipt of any shipment can be detected by spreading out contents of one or more packages. Weevils are small and a dark brown color. Their larvae are white and wormlike. Cocoons and a brownish material resembling sawdust will generally indicate that product is infested with weevils.

(5) *Size and form.* In many cases size of fruit and form of pieces determine grade. Broken pieces and uneven halves are always objectionable. Mashed fruit and slabs are generally made from over-matured fruit. These are so soft and sticky that they become mashed together and are always objectionable.

(6) *Odor and flavor.* Odor and flavor should be sweet, fresh, and typical of the variety. Green fruit dries hard and does not have a desirable sweet flavor. While sulphuring affects flavor it is not objectionable unless excessive. Fruits which have a decided sulphur flavor should not be accepted, though the quantity present may not be deleterious. When time is available it is well to stew all samples in order to obtain true odor and flavor.

d. *Storage.* Well-ventilated storage at a temperature of not over 60° F. is essential for proper keeping of all dried fruits. They readily take up moisture in damp storage and excess moisture favors mold growth. Heat favors insect growth as well as mold and bacterial development. Wherever practicable dunnage should be employed. Dried fruit should never be stacked on cement floors without dunnage.

Prunes and whole raisins are the best keepers of all dried fruits due to being whole and having a high sugar content; peaches, apricots, pears, etc., are only medium keepers; while evaporated apples are the poorest. As dates sweat profusely when removed from cold storage and thus destroy appearance of any carton in which they may be packed, it is customary to keep them in a cool, dry place but not in cold storage.

All dried fruits tend to take up odors and hence should not be stored or shipped in proximity to tobacco, kerosene, soap, etc.

SECTION V

LEAVENING AGENTS

45. *Yeast.* a. *Types.* The inspector of subsistence is concerned with two types of yeast, compressed and dried.

(1) *Compressed yeast* is a pure culture of bread yeast grown in large quantities and compressed into cakes. Color is not an accurate guide to quality because material used and production methods affect it.

(2) *Dried yeast* is prepared by mixing yeast with a large proportion of starch or corn meal and drying the mixture at a comparatively low temperature. Under these conditions it will go into spore form where it is inert and will keep under ordinary storage for several months. It can be carried to places remote from transportation and cold storage facilities. Further information on the subject is contained in paragraph 15, chapter 5.

b. *Inspection.* Compressed yeast should feel firm, tough, and springy. It should break with a snap and leave a clean fracture. It should have a good yeasty odor and be practically tasteless. Softness or flabbiness and darkened areas indicate spoilage. Dry and crumbly areas indicate poor storage and age. Yeast injured by frost is soft and watery. Spoiled yeast has a sour or putrid odor.

c. *Storage.* (1) Compressed yeast must be kept under refrigeration. The best

storage temperatures are from 35 to 45° F. Under such conditions it may be stored 1 week.

(2) A good storage maximum for dried yeast is 3 months in a dry, cool place.

46. Baking powder *a. Classification.* Baking powders are classified by the baking powder industry according to their acid-reacting ingredients. These classes are:

(1) *Tartrate powders*, in which potassium acid tartrate (cream of tartar), with or without addition of tartaric acid, is the acid-reacting ingredient.

(2) *Phosphate powders*, in which monocalcium phosphate or monosodium phosphate is the acid-reacting ingredient.

(3) *Sodium aluminum sulphate powders*, in which sodium aluminum sulphate is the acid-reacting ingredient. Also known as SAS powders.

(4) *Combination powders*, in which the acid-reacting component is composed of sodium aluminum sulphate and calcium acid phosphate. Also known as "double-action."

(5) *Pyrophosphate powders*, in which the acid-reacting ingredient is sodium acid pyrophosphate.

b. Action. (1) Tartrate powders are quickest in action. They react very rapidly and completely in the cold and do not require heat to complete evolution of gas.

(2) Phosphate powders are intermediate in action. Practically all gas is evolved in cold dough but evolution of gas is much slower than in tartrate powders.

(3) Sodium aluminum sulphate powders produce very slow reaction in cold dough and require heat to complete action.

(4) Combination powders get their "double-action" from the phosphate which begins to evolve considerable volume of gas as soon as the batter is mixed and this reaction is carried on by the sodium aluminum sulphate during baking.

(5) Pyrophosphate powder greatly resembles combination powder except that in the cold pyrophosphate reaction is slower and more prolonged.

c. Containers. Packaging of baking powder is an important item. The container must be moistureproof and a type that permits closing after each use. The most satisfactory containers are in tin cans with slip covers or friction tops.

d. Inspection. The most important thing to look for is evidence of deterioration. Deterioration is manifested by powder being lumpy or caked. Foreign material may be detected by sifting a representative sample through a very fine mesh cloth. Because of strict enforcement of the Pure Food and Drug laws, the statement of ingredients shown on the label usually is accepted as accurate. In case of doubt as to purity or quality, a sample should be sent to a depot for analysis. Powders containing hard, pellet-like bodies are seriously damaged and should not be accepted.

e. Storage. Baking powders must be stored in a dry place and protected from sudden drastic changes of temperature and contaminating odors. Any well-made baking powder, properly packaged, should keep for 1 year under ordinary storage conditions.

SECTION VI

CEREALS AND CEREAL PRODUCTS

47. Definitions. Cereals are grasses yielding farinaceous grains. Under common usage the term "cereal" is applied to edible products made from such grains. In order of stability in storage, they are classed in this manual as "raw" and "prepared."

a. Raw cereals. Flour, corn meal, farina, rice, rolled oats (regular and steel cut), and barley. Of these, the most perishable is "water-ground" corn meal which has not been degerminated. All these cereals are subject in varying degrees to rancidity development and insect infestation.

b. Prepared cereals. All cereals which have undergone any cooking, malting, artificial flavoring, or treatment with acids or alkalis. This class includes quick-type rolled oats and ready-to-eat cereals.

Inspection revealing any indication of either present or past infestation should result in rejection.

48. Flour. *a. Definition.* The word "flour" unmodified is defined as a product made by bolting wheat meal. The word flour is not used unmodified to identify products made from other grains or vegetables. For example, the product made from bolting rye meal is properly identified as "rye flour."

b. Wheat. (1) *Types.* Flours having varying baking characteristics made from different types of wheat are classed roughly according to their suitability into:

(a) Type A, bread flours, made from blends of hard wheat.

(b) Type B, blends or general purpose flours, made from blends of hard and/or soft wheat.

(c) Type C, soft or pastry flour, made from blends of soft wheat.

These types vary in several respects, the most important of which is variance in proportions of two proteins, glutenin and gliadin, together commonly known as gluten. It is the quality of this constituent which determines whether the flour in question will produce a loaf of bread having good volume and texture. A strong flour is one which has sufficient good quality gluten to enable realization of maximum good effect of the leavening agent in producing a loaf of bread of good volume, texture, and symmetry. A weak or soft flour will produce a product of close, even grain without realization of large volume and is therefore best suited for use in baking cakes and certain other pastry products.

(2) *Purification classification.* Another important factor which will influence ultimate character of the bakery product is degree of purification which the flour has undergone. Flours usually are classified further by their purification of bran particles into patents, straight, clear, and low grade. In simplest explanation it may be said that the higher the grade, the greater the degree of bran removal. Other factors remaining constant, increased bran removal results in general lowering in quantity and rise in quality of gluten. A short patent flour is one in which the most complete refining has been effected. In order of grade, long patent, straight, and clear represent lower grades. Since straight flour which includes short and long patents and first clears will produce a loaf of good volume, color, and texture, it is used as a ration component in the United States Army.

(3) *Age.* Ordinarily, flour is not milled until immediately before delivery. Therefore it is not to be expected that new will produce as good volume and texture in baking tests as will that which is 2 weeks or more old. However, "green" flour, that milled from immature or improperly prepared grain, will not improve appreciably with age and will not produce a loaf of good volume. Green flour is not suitable for Army use.

a. Inspection. (1) *Field.* Field inspection of flour includes:

(a) Condition of truck or car in which flour was transported.

(b) Condition of flour and containers.

(c) Absorption test.

(d) Baking test.

(2) *Car or truck.* Any car or truck used for transporting flour must be clean, free of all odors and of insect infestation. Floors and walls to a height above stacking of containers should be covered with heavy paper which will not permit contents to come in contact with floor or walls. The center section of a car should be so stacked that usual load shifting always attendant with shipping will not cause interference with doors of car or truck. Frequent and annoying damage to sacking may result from such improper loading.

(3) *Flour and containers.* On receiving a shipment, particular attention should be given any foreign odor and attempt be made to identify it. Inspectors must be careful not to confuse characteristic sack odors with foreign odors. Any odor which persists in flour after a thorough airing should be cause for concern. On baking a sample loaf of bread made of suspect flour, if no deleterious effect is noticed the flour should be considered sound. Flours having odors which can be attributed to decomposition, either animal or vegetable in origin, are not acceptable. Sound flour should possess an odor closely akin to that of freshly ground sound wheat. Objectionable odors usually encountered are those resembling garlic or mustiness. A "baggy" odor may result from shipment in outside bags made of burlap. A musty odor is detected more easily in the baked product than in the flour itself.

d. Tests. Flour tests are made by both laboratory analysis and physical exam-

ination. The latter involves a test for gluten, color, absorption, and baking qualities.

(1) *Gluten*. Gluten is a complex combination of two protein substances which on contact with water forms an insoluble mass of matter which, when expanded by development of gas in dough, provides a skeletal support for the carbohydrate substances in bread. Without gluten bread could not be developed. Gluten can be formed and recovered in examinable form by washing starch from flour, using ordinary water as a solvent. The procedure is as follows:

Extract a 25-gram sample of flour to be tested. Add sufficient cool tap water to obtain dough of consistency permitting manual manipulation. Immerse ball of dough in water for 30 minutes. Extract and knead over a fine meshed screen under a stream of cool water. Continue kneading until water passing over dough shows no milky discoloration. Remaining product is gluten, and this is then examined for color, tensility, and stickiness:

(a) *Color*:

1. Hard patent flour, pearl gray.
2. Hard straight flour, dull pearl gray.
3. Hard clear flour, dull gray.
4. Soft flour, light creamy.

(b) *Tensility*. Upon stretching into rectangular shape gluten should permit considerable elongation before holes and tears appear. Lack of stretchability indicates poor quality gluten.

(c) *Stickiness*. Gluten not readily transferable from hand to hand but becomes sticky is not sufficiently good quality to be stable in dough. Production of a well-defined loaf of good volume is not possible with above quality. A straight flour such as commonly used by the Army (extra long patent) of about 97 per cent extraction should yield gluten of a color slightly darker than the pearl gray of hard short patent but not as dark as that of hard clear flour. It should not be sticky and should possess good tensile strength.

(2) *Color*. Color is determined by the "pekar test" (slick test). This test is of more value when made on a comparative basis with a known type. Place sufficient flour on a smooth glass to permit packing into a smooth mass about 2 inches wide tapering in thickness from about $\frac{1}{4}$ -inch in thickness on the more distant side to the thinnest possible film on the forward edge of the glass. A spatula or any smooth piece of metal pressed on top of the sample and drawn toward the forward edge of the glass, using forward edge of the glass to scrape flour from the spatula or metal, will suffice. The sample to be compared should be "slicked" or similarly placed at the side of the first sample and treated similarly so that the two samples are in contact. Any great difference in color is readily discernible by a clear line of demarcation between the two samples. By carefully sliding the glass plate under the surface of still water, the difference in color if any becomes more pronounced. Comparison must be completed before samples dry. Color most desired is a rich, creamy white. Flours of longer separation or patent will contain an increasingly greater percentage of bran specks until the clear grade is reached. In this grade the greater amount of bran blends with the whiteness of the flour to render a product of a decided dark or dirty white appearance.

(3) *Absorption*. Ability of flour to absorb water is of prime importance, both as an indication as to specification compliance and possible alteration in dough formulas used in bakery practice. A type A or hard wheat flour having an absorption power of less than 58 per cent by weight is not acceptable. To determine absorption power, weigh out 25 grams into a suitable container, add water slowly from a graduated burette, stirring with a spoon or the handle of a knife until dough of proper consistency has been obtained. Care must be exercised that no flour is spilled and that no flour or water is left in the dish unincorporated in the dough. Multiply by 4 the number of cubic centimeters of water used. The result is the percentage absorption of the flour.

(4) *Baking*. (a) The final and most important test of flour is the baking test. This test is best conducted by comparison of test loaves until the inspector is expert in bread scoring.

A sample loaf is baked from flour of known quality and is compared with a sample loaf baked from the unknown flour. To be of value these loaves must be produced under identical circumstances. In the instance of varying absorp-

tion ability, a second sample loaf made from the unknown flour with moisture content as determined by the absorption test is also compared. These samples are weighed immediately after being taken from the ovens and the weights compared.

(b) For procedure in baking test, see Chapter 5.

e. *Containers.* Although the 196-pound net barrel is still the unit in flour milling calculations, this container has been almost entirely superseded by the 98-pound sack for bakers' use and small sacks for household use. The 140-pound sack is generally used for export. Some large flour users own their own sacks and use them continually.

f. *Storage.* (1) *General.* (a) Flour should be stored in a cool, dry, well-ventilated room which is open to sunlight. It is very sensitive to odors from other substances and will readily absorb them. It should never be stored in the same room with substances giving off odor.

(b) Being hygroscopic, flour will absorb excess moisture present in the storeroom or lose some of its natural moisture in very dry surroundings.

(c) A uniform and not too low temperature is best. It is desirable to keep the temperature near 70° F. It may be necessary in hot climates to keep flour in cold storage to keep down insects, a temperature of 42° F. being best for this purpose, but the cold storage should be as dry as practicable. A chilled flour should always be brought to near 70° F. before endeavoring to use it in dough, and this should be done gradually by exposure to room temperature. High storage temperature (85° to 95° F.) combined with high humidity, a condition found in tropical climates, is most unfavorable. These conditions are ideal for development of molds and bacteria and action of enzymes. In addition to causing moldiness and mustiness, these organisms tend to break down proteins, thus lowering and eventually destroying its bread-making qualities. Rancidity may also occur, especially in whole grain or low-grade products where fat contents are considerably higher than in straight or patent flour.

(2) *Tropics.* Storage of flour or any other mill product is always a problem in the tropics. In most tropical countries there are two seasons, wet and dry, which vary considerably in their intensity. With the exception of rice, most grain products must be imported.

(a) *Molds, bacteria, and insects.* In addition to development of molds, bacteria, and enzymes, growth of insects and action of natural acids of the products are all favored by the temperatures of from 80° to 90° F. so common in the tropics. Natural humidity of these localities greatly favors development of molds and bacteria, and in addition causes oxidation of meal containers.

Insects, a factor of such a climate, produce very great deleterious effects. They remain dormant at temperatures of 43° F. or below; at 60° to 70° F. grow and multiply slowly; at 80° to 90° F. grow, eat, and multiply very rapidly; in fact, the latter is the optimum temperature for insect growth. The confused flour beetle, the typical insect infesting flour, will probably live one or two generations in the temperate zone and during the winter it will become dormant and die. In the tropics it would probably live four generations, each time multiplying three hundredfold. The same relation exists in growing molds and bacteria, except that moisture is more essential to their growth as they absorb their food by process of osmosis.

(b) *Sacked.* On account of above factors, sacked flour should under no circumstances be held over 2 months during the wet season and 3 to 4 months during the dry season. It is probably 30 days old when received.

(c) *Canned.* It would appear that no reason exists why hermetically sealed canned flour could not be kept almost indefinitely, but it must be taken into consideration that some mold and bacteria exist in all flour. For this reason, it is believed that the 13.5 per cent moisture now allowed for flour is too high for canned flour for tropical use. It provides part of moisture and warmth naturally present. The great deterring factor in storing tinned or canned flour is that inspection has so far been incapable of obtaining flour free from insect infestation. In manufacture, it passes through sieves which are smaller than insect egg and therefore as it leaves the final dressing reel or sieve, if that reel or sieve is free from holes, the flour is free from insects or eggs. Infestation therefore takes place somewhere between that reel and the can in which the flour is packed and sealed. If one pair of eggs or a single impregnated female insect gets into the can, that

can will be infested badly when it is opened 6 to 9 months later. Keeping reserve supplies in the tropics often requires that flour be held that long or longer. If examination of canned flour shows it to be insect infested the purchasing officer should be notified, giving the date and name of contractor so that remedial steps can be taken on future contracts.

It must not be assumed that insect infestation destroys flour. On the other hand, it certainly never helps it and does affect it deleteriously. Unless infestation is unduly severe, it should be sifted (bolted) and used, resulting in some loss. Badly infested flour should be used for other purposes than human consumption.

(3) *Sack arrangement.* Sacked flour should be arranged so as to facilitate proper ventilation, to allow cleaning floors under piles, and to control rats, mice, and insects. There should be an air space between sacks by means of cross-piling. Sacks should be spread over as large an area as possible to insure maximum exposure of each to the air. Stowing flour tightly in high stacks not only prevents access of air to the sacks, but compresses the flour on the bottom of the stack so that it packs down hard and prevents penetration of air into the sacks. Compression destroys baking qualities. This is more serious in case of soft wheat flour as it packs more solidly than hard wheat flour, and is still more serious in case of lower grade flours which tend to heat and spoil more readily. Under unfavorable temperature and humidity conditions such as in the tropics or in the southern parts of the United States, stacks should not be piled higher than six sacks, and under favorable conditions not higher than eight sacks. Stacks should be spaced 18 to 24 inches apart in all directions.

(4) *Keeping qualities.* Age and proper storage have a tendency to whiten flour and improve quality. If properly stored it may be kept in good condition for a year, but storage beyond this time causes a loss of flavor. Patent and straight flours will keep better than those containing outer bran coatings and germ stock. The latter is very oily and prone to rancidity. Graham, whole wheat, rye, and barley flours, bran, and feeds do not keep nearly as well as straight flour unless sterilized package goods. The latter should never be kept on hand over 3 months.

(5) *Rats and mice.* Ordinarily rats and mice will not eat flour as it forms a paste in their mouths. However, they will build nests in sacked flour. This can be prevented by placing paper between the sacks when stowing, as they will use the paper for nests and will not molest the sacks.

49. Corn meal. *a. Definition.* Corn meal is only a refinement of hominy grits (a corn product) as can be seen by the fact that hominy grits, fine, will pass through a No. 16 sieve but over a No. 28, while granulated corn meal will pass through a No. 22 wire sieve and over a No. 72 grits gauze. Granulated corn meal is meal from which the greater part of the germ is removed and which by repeated reduction in roll mills has been reduced to an evenly ground, finely divided state. Any further reduction would result in corn flour.

b. Storage. Corn meal, if kiln dried, will keep 6 months if stored in temperature not greater than 70° F., and provided it is not subjected to infestation while in such storage. Water-ground meal, because of its high oil and protein content, will not keep even under optimum conditions longer than 90 days.

c. Inspection. Granulated corn meal should be free of all pieces of bran, chaff, soft floury material, hulls, germ, or other foreign material. Corn meal, either white or yellow, must be a uniform, bright color. Particles must be clean, hard, flinty, and evenly granulated endosperm.

d. Hominy grits. Inspection factors for hominy grits are identical with those for corn meal except that granulations are larger.

50. Wheat farina. This product must be a uniform, rich, creamy color free from bran specks. It must have uniform granulation devoid of flouriness.

On cooking, resulting product should possess fresh, wholesome, typically wheat flavor and odor. In body, it should be tender but softly granular with good substance. There should be no indication of grittiness or sliminess. It should retain original, uniform creamy color.

51. Rolled oats. Rolled oats, in addition to general requirements of other unprepared cereals, must be a uniformly bright creamy color and flakes should be uniformly large. There should be almost no powder or finely granulated stock. Artificial flavoring is not permissible. The product must be free of rancidity, bitter flavor, musty or other undesirable odors, and must be free from hulls, weeds,

seeds, sticks, stems, burnt flakes, wheat, and barley. Flakes should be uniformly light brown in color. Dark or pale flakes or flakes with frayed or uneven edges are not acceptable quality. Flakes must be sufficiently thick to retain body on cooking. Hard, flinty flakes or thin, fragile, soft flakes are undesirable.

On stirring in boiling water for 3 minutes the product must have a fresh, sweet, true oat flavor and odor. In body, the product must be tender and flaky with substance or body sufficient to afford chewiness. There should be no bitter, rancid, stale, raw, or burnt flavors and no mushiness, excessive sliminess, viscosity or toughness.

Quick-type rolled oats, a partially prepared cereal product, is subject to all inspection factors which are applicable to regular rolled oats. However, it is to be anticipated that quick-type will present a slightly mushier and less flaky appearance on cooking than do regular due to prior processing (partial cooking).

52. Barley. *a. Grades.* Pearled barley is divided into two grades as to quality and five grades as to size. First grade barley has a small area of bran coat remaining in the crease. It is uniformly round and without broken grains. The second grade will have considerable bran coat in the crease and may have a small area of the remaining surface covered by bran. Adulteration by addition of grains other than barley or by addition of any foreign material is not permitted.

b. Sizes. In size barley should be No. 3 or No. 2 as specified in invitation for bids. Sizes are as follows:

Grade number	Approximate size of screens	
	Through number	Over number
3/0	9	11
2/0	8	10
2	7	9
3	6	8
4	6	7

c. Pearled. Pearled barley must be uniform size, light yellow to white in color for portage grade (1st grade) and light yellow to slight brown for chester or pot grade (2d grade). Individual kernels should be unbroken, well-rounded with definite pearling or polishing on all sides. Kernels pearled only on ends are not acceptable. There should be few if any stained or black grains. On breaking, individual kernels should reveal flinty interiors with no tendency toward floury or soft centers.

Cooked barley should possess a fresh, wholesome barley flavor devoid of flat, raw, stale, or otherwise foreign flavor. Cooked grains should be softly granular, tender, well swollen but should retain their original shape. In color, the cooked product should be an even, creamy white.

d. Containers. Containers should be acceptable commercial type or as specified in invitation for bids, but in all instances must provide necessary protection against moisture and insure clean, dustproof packaging.

e. Storage. Barley is subject to infestation and damage by the same agencies which would be harmful to corn meal or oat meal. All these cereals should be stored in a cool, dry, well-ventilated place open to sunlight. Cereals should never be stored near other products known to be infested. Wherever possible dunnage should be used. With exception of rice and barley, cereals showing more than very slight infestation are not fit for human consumption.

53. Prepared cereals and mixes. *a. Cereals.* (1) *Moisture content.* Specifications for ready-to-eat cereals require moisture content not above 5 per cent. Determination of moisture content cannot be made by organoleptic means since crispness, flakiness, and most other physical attributes which are commonly thought dependent on low moisture content do not necessarily hold true. Ready-to-eat cereals of various types, flaked, malted, shredded, etc., all have breaking points at a moisture content higher than 5 per cent and varying in percentage within each type.

(2) *Inspection.* Cereals are inspected most easily in natural light. Inspection must cover odor, taste, crispness, palatability, and general physical condition of

container and contents. To detect off-odors cut a small triangular opening sufficient to permit the nose to come in close proximity to the carton contents. Shake contents well. Immediate smelling will permit detection of any foreign or disagreeable odors. Contents should be protected from glue-bearing surfaces as well as from containers made of low grade carton board by inside protective liners, the only exception being certain shredded wheat products which may be packed in contact with carton board of a type specified by Federal specifications. In appearance contents should be uniformly toasted or cooked and should be practically free of all burned, scorched or pale stock. Foreign material of any type is not permitted. Although rare, insect infestation if present in any degree whatsoever will not be tolerated. Flakes or puffed grains or formed shreds or shredded biscuits should be of uniform size. Excessive finely reduced or powdered flakes or undeveloped puffed grains are cause for rejection. Manufacture of breakfast cereals is a highly developed industry, and it is to be expected that products will be virtually perfect in all respects. Dirty stock will not be permitted in the slightest degree. On tasting the product, a pleasing characteristic flavor should be experienced which after a few moments does not develop any "soapy" or alkaline reaction to the palate. The product should not be tough or flinty but should be crisp and readily chewable. After thorough chewing, the mass of cereal should not adhere stickily to the mouth but should be swallowed easily. A tough cereal ordinarily will become an adhesive mass which resists movement by the tongue in the process of deglutition. A tender and crisp cereal is reduced readily to fine particles in the mouth and in no way tends to be sticky or difficult to swallow. Most breakfast cereals are adversely affected by light and if stored for long periods subjected to light will be discolored or will develop undesirable odors.

(a) *Puffed rice.* Individual puffed grains should be uniform, nicely rounded, smooth-surfaced kernels having a polished white sheen on the surface and a characteristic bean shape. Stock which is mashed, cracked, specked, rough, brown in color, dirty, or uneven in color is not acceptable. Toughness, foreign odor and flavor are cause for rejection.

(b) *Puffed wheat.* Kernels should be uniform light color and size. Toughness, foreign odor and flavor are not permitted. A well-prepared product contains few if any mashed kernels and is reasonably free of chaff. Dirty stock is not acceptable.

(3) *Storage.* Packaging which affords desired protection against moisture, light, and dirt is readily procurable on any market and should offer no obstacles. Cereals of this type are deleteriously affected by exposure to high temperatures and humidity. They should be stored in cool, dry, well-ventilated storage where direct rays of the sun cannot fall on them. Under normal temperature and humidity conditions ready-to-eat cereals may be stored safely from 60 to 90 days.

b. *Mixes.* (1) *General.* Prepared mixes invariably contain some shortening and leavening ingredients. In unfinished form they should not possess offensive or uncharacteristic odors. On sieving a prepared mix if small pellet-like bodies are observed, they indicate an old product in which the leavening agent has been affected injuriously by being withdrawn from mechanical incorporation with the other ingredients. Such mixes will not produce a good product. The final and conclusive test of acceptability is baking. The resulting product should possess characteristic odor and flavor, good volume without excessive shortness or tendency to crumble when cut, and should keep well under normal circumstances.

(2) *Storage.* All prepared mixes, both bread and pastry, are adversely affected by light and high temperatures. They also are highly susceptible to insect infestation and development of off-odors or rancidity. Storage should be dry and at temperatures not in excess of 70° F.

(3) *Inspection.* (a) *Buckwheat pancake flour.* A good product is slightly dark in color and has an even distribution of small dark specks of buckwheat flour. Pale-colored flours are deficient, dark-colored are excessive in buckwheat flour content. Granulation should be uniform with very slight graininess. A mixture of equal quantities of water and the flour should result in a fairly thick batter which does not stick to a properly heated griddle. The cooked cakes should possess characteristic buckwheat flavor devoid of stale, flat, greasy, raw,

burnt, medicinal, or other foreign flavor or color, and should be light, even-grained, and tender. Crust color should be a live, even brown uniformly distributed over the surface.

(b) Inspection factors for other pancake or waffle mixtures are identical to those of buckwheat mixtures except for color.

54. Alimentary pastes. a. Types. Alimentary pastes are products prepared from semolina or durum wheat, from wheat farina, from flour, or a combination of any two or all three. In general, they are of two types, those with not less than 5.5 per cent in weight upon a moisture-free basis of egg and/or egg yolk solids, and those with less than 5.5 per cent on a moisture-free basis of egg and/or egg yolk solids. The first is the egg noodle type, while the other makes up the large field of macaronis, spaghettis, vermicelli, elbows, shells, alphabets, etc.

Higher grade products are manufactured wholly from semolina and, except in the instance of some foreign-made pastes, are differentiated readily from the lower grade pastes made from wheat farina. Use of artificial coloring either in the mixture as a coating or as a stain is considered adulteration when any inferiority is concealed. When there is such concealment of inferiority, the mere statement of artificial coloring having been used does not operate in favor of the product.

b. Inspection. (1) *Egg noodles.* Should be free of dark, brown, dull, gray, or pale colors. There should be no cracking (checking) and a minimum of small broken pieces. Streaking or presence of dirt is not permissible. On breaking the fracture should be a clean, straight break. They should be a rich, bright yellow color.

The cooked product should possess a fresh, rich taste devoid of flat, doughy, stale, or rancid flavors. In texture it should retain original shape but in addition must be light, tender, and flexible without undue tensility, should retain its light creamy yellow color, and should swell or puff slightly. Disintegration is a mark of inferiority.

(2) *Macaroni and spaghetti.* Macaroni which is tubular in shape has a seam along the side. In high quality product this seam seldom splits open at the ends. However, spaghetti which is a solid cylinder does not permit inspection in this respect. A good grade macaroni or spaghetti has a creamy cast speckled with small opaque granules which oftentimes, when on the surface, appear as short, glossy white, or brilliant teardrop-shaped streaks. A product made of flour or farina or a combination of the two is usually a dull, dirty white or gray or may tend to a light brown shade. Because of high tensility of the gluten, a paste made of semolina will permit manufacturing a longer rod or tube than is possible when using flour or farina. Good spaghetti or macaroni is quite hardy and will not break under slight stress. Ordinarily but not necessarily a good quality product will bend considerably before breaking and when it does break it parts with a snap. If grasped at both ends of the rod and bent it will usually break into three or more pieces. Ordinarily the specification requirement of "approximately 11 inches in length" should not be modified since acceptance of shorter lengths of macaroni invites substitution of lower grade goods. Surface of breaks on a good product are clear and glossy. Poor macaroni will break with an uneven, ragged surface on each piece. Checking or cracking apparent on the surface of the raw product indicates poor drying and it will break or splinter at these points when cooked. After cooking, if the product presents an extremely roughened surface it is not acceptable. Flattening after cooking indicates poor quality.

Use of soybean flour will usually produce a reddish shade of color. A product containing soybean flour is not acceptable.

Upon holding a piece of spaghetti or macaroni up to the light, if no specks are visible it is proof that flour has been used; if artificially colored, immersion in water will discolor the water. Alcohol is a better color extractive.

The best test for macaroni or spaghetti is cooking. After being cooked in salty, boiling water until tender (about 25 minutes), it should maintain original form, should swell up to twice original size, and should absorb approximately three times its weight of water without becoming pasty or sticky.

c. Storage. Except egg noodles, alimentary pastes will keep for at least 2 years if stored under ideal conditions. Egg noodles under proper conditions should keep well for about 6 months. Both types should be kept in dry storage

free of odors. High temperatures (90° F. or above) over sustained storage may result in cracking. These products are subject to mustiness in damp storage and are highly subject to insect infestation or attack, particularly by weevils.

55. Crackers. Inspection of crackers is made best by personnel having some knowledge of methods generally employed in their manufacture. The most common factors employed in inspection of this product are organoleptic. However, goods which, because of certain physical attributes outlined below, are suspected of low shortening or high moisture content can be proved of inferior quality in these two respects only by laboratory procedure.

a. Soda and oyster crackers, salted and unsalted. (1) *Aroma.* Goods of this variety are particularly susceptible to odors of fruits, spices, and improper packaging materials. Immediately on opening a container note should be made of any foreign odor not characteristic of prime goods. Off-odors are objectionable and should not be passed on assumption that ventilation will remedy the defect. Crackers made from low-quality shortening, either vegetable or animal, will eventually develop off-odors which in many instances are associated with fat break-down or rancidity.

(2) *Shortening.* Crackers having insufficient shortening tend to be tough and brittle. Increasing shortening content lowers shelf life in direct proportion to amount used. When crushed in the hand crackers should disintegrate in well-defined flakes not of sufficient flintiness to stick into and permit suspension from the hand when it is inverted. When broken across the grain broken edges should reveal a well-developed webbing or loose, open texture. There should be little, if any, close-grained, compact bony areas visible. Failure of docker holes to penetrate visibly through the cracker is often indication of high moisture content, particularly when goods are not hard or brittle.

(3) *Appearance.* Pale appearance may indicate:

(a) Moisture reduction by a drying out process rather than proper baking, or

(b) Acid or raw tasting product.

Some bakeries attempt to conceal this acid condition by addition of corn sugars (dextrose) which will help realize a pleasing, golden brown upper surface or "bloom." When an appreciable percentage of goods is found misshapen, improperly developed, streaked, dirty, burned, or otherwise unappetizing in appearance, such finding is cause for rejection. Particular attention should be paid the bottom side of the cracker. On this side ordinarily will be found indication of insanitary production and handling or improper baking.

(4) *Taste.* Upon tasting a cracker, the piece tasted should be held in the mouth sufficiently long (about 2 minutes) to permit development of a soapy or soda taste if such can be detected. Such taste is evidence of excess soda content. In this respect a large number of cracker manufacturers fail to produce a product meeting specification requirements. In instances where determination of hydrogen ion concentration (pH) can be made, a cracker falling within the bracket (7.2-8.6) usually will be acceptable as to soda content. As the pH drops below 7.2 acidity is accentuated while above 8.6 the characteristic bitter taste of soda becomes so pronounced as to be highly undesirable.

(5) *Container.* While packaging requirements specify commercial packaging, it is not to be assumed that any and every container is acceptable. Good commercial usage requires that there be some wrapper or liner which will protect goods from the carton board. Carton board is made largely from reclaimed waste paper and when of low quality may impart objectionable odors and/or flavors to contained goods. A carton made of new materials and not having any inside liner may not offer required protection to contents against carton board flavors or odors.

b. Sweet crackers. (1) *Graham.* Graham crackers should not be cloyingly sweet but may have flavor reminiscent of honey. Broken surface should reveal open texture without glossy or brittle appearance. On breaking, the piece should break into well-defined pieces and should not crumble apart. Extreme shortness, toughness, marked resistance to breaking, or a tendency toward bending are not permissible.

(2) *Raisin.* Raisin-filled crackers must have been mixed in dough state to extent that raisins are incorporated within the dough. Spreading of raisins as a filler between two cracker surfaces is not acceptable.

c. *Cookies*. Cookies, both plain and filled, represent a field of bakery goods in which low quality ingredients are disguised most easily. Like all bakery products margin of profit on high-grade goods is small and therefore any appreciable spread in price on any particular type can and probably will be reflected noticeably in goods produced. Flavored goods such as ginger snaps, vanilla wafers, etc., where characteristic taste is developed by use of strong flavoring agents are well-adapted to use of inferior ingredients disguised by acid or pungent flavoring agents.

(1) *Ginger snaps*. Ginger snaps should possess characteristic ginger flavor but should not be excessively pungent. They are in some instances byproduct cookies, that is, they may be partially composed of stale, scrap, or otherwise damaged materials reground and compounded with new materials. Snaps made in this manner usually have particles of reused material such as pieces of nut meats, spots of jam-like material, fig seeds, etc. A cookie giving evidence of such materials is not acceptable. The word "snap" implies that the cookie should break briskly with an audible snap but should not bend and tear apart. Apparent brittleness producing a snap is not to be construed as meaning that this product is naturally flinty or tough. Broken surface should reveal a close, even-grained product of uniform color and devoid of dark centers. Burned, misshapen, spotted, or streaked stock is not acceptable. Aroma should be characteristically and pleasingly gingerish. A harsh ginger odor may denote use of inferior ginger and possibly concealed inferiority of other ingredients. Color should be developed evenly and may tend to shade from medium to dark brown.

(2) *Vanilla wafers*. Vanilla wafers should possess characteristic, smooth, pleasing vanilla flavor and odor, and should be tender (short) without excessive crumbling. Presence of snap as in ginger snaps is characteristic of deficient shortening while goods which will permit any considerable bending without breaking are usually tough. Color should be an even, golden brown.

(3) *Fig bars*. Fig bars may be adulterated. However, cheapening of the product will occur most generally by using a cheap grade of fig with an inferior dough covering. The baked cookie covering should have flavor characteristic of a tender, cake-like product and should not be entirely dependent on filling for flavor.

d. *Storage*. All sweet crackers and cookies are subject to infestation and moisture damage. Storage should be in dry and ventilated buildings. Temperatures in excess of 85° F. are to be avoided when possible. Storage should not exceed 6 weeks.

SECTION VII

BEVERAGES

56. *Coffee*. a. *Species*. There are 80 or more species of coffee, though only 3 are of commercial importance, Arabica, Liberian, and Robusta. By far the major portion of commerce coffee is of the Arabica species. This species possesses the singular property of producing a bean of different size, color, and flavor peculiar to the locality where grown. Brazil, Colombia, Venezuela, and Mexico each produce many distinctly different coffees of the Arabica species.

(1) *Arabica* produces an almost infinite number of varieties ranging from the finest coffees in the world to some of the least desirable. Change in climate, altitude, or soil usually works a complete change in appearance, quality, and character, thereby producing a new variety. Arabica varies in size, shape, and color from a small, round, flinty, silvered, grayish-tan to an extra large, elongated, flat, waxy, bluish-green bean. In quality and character it ranges from very poor to very fine.

(2) *Liberian* usually runs true to form in appearance, quality, and character. Beans are medium to large elongated, with the central groove rolled in somewhat resembling a Parker House roll. In quality and character it is strong and harsh. To one accustomed to a soft or mild coffee, the aroma is decidedly harsh and somewhat reminiscent of the odor of scorched leather.

(3) *Robusta* is more subject to variations than Liberian but much less so than Arabica. Beans are small to medium in size, short, and round, with an occasional

flat, elongated bean. Color is gray to grayish-tan. In quality and character it varies from strong and harsh to almost neutral.

(4) *Specifications.* Regulations and Federal specifications require that coffee for the Army will be equal to or better than Santos No. 4, and will be free from Rio or other objectionable flavors. Santos is a variety of the Arabica, while Rio is a variety of the Maragogipe. Quality and character of Rio coffee are harsh and pungent with a distinctive flavor that has been described as sweetish-sourish-bitter. Aroma is very pronounced in the brew after cooling.

(5) *Type or class.* Because of vagueness and lack of uniformity, the New York Coffee Exchange has adopted a definite set of standards for types or classes, and a system of grading which is recognized by Federal and State Governments.

(a) *Factors.* The term "a coffee" refers to a type or class. Factors that fix type or class of any coffee are:

1. Species.
2. Subspecies or variety.
3. Quality.
4. Character.

(b) *Determination method.* These factors are determined by:

1. Species, appearance.
2. Subspecies or variety, appearance and cup test.
3. Quality, appearance and cup test.
4. Character, cup test.

b. *Grading.* (1) *Grade definition and designation.* Grade is a measure of quality agreeing with an established standard or varying therefrom according to a fixed scale of differences. Grades are given numerical designations from 1 to 8. The numerical grade of a lot is only a factor fixing its value for trading purposes.

(2) *Method.* Grading is quite simple as it is purely mechanical; once distinguishing the various coffee imperfections is learned nothing more is needed except good judgment.

(a) *Imperfection calculation.* Imperfection is everything in the coffee which is not a normal, well-formed coffee bean. For counting imperfections the black bean has been taken as the basic unit, and all other imperfections no matter what they may be are calculated in terms of black beans according to the following scale:

Imperfection	Number	Black bean equivalent	Imperfection	Number	Black bean equivalent
Shells or empty pods	2	1	Large stone	1	1
Broken beans	5	1	Large husk	1	1
Scorched beans	2	1	Small husks	2 or 3	1
Soft or badly milled beans .	2	1	Pod	1	1
Small stones	2 or 3	1	Large pod	1	2

(b) *Mechanics.* The simple mechanics consist of weighing out 1 pound of beans, spreading them thinly on a table, then picking out everything that is not a normal, well-formed bean. Imperfections thus removed are separated, counted, and converted into black beans according to the scale above. The number of imperfections per pound that determine numerical grades are as follows:

Imperfections	Grade number	Imperfections	Grade number
None	1	55-60	5
6	2	115-120	6
13	3	200	7
28-30	4	450	8

c. *Quality and character.* While type and numerical grade of a coffee are factors in fixing its value for trading on the New York Coffee Exchange, these classifications do not indicate definitely its suitability for any other purpose. For instance, a coffee may be a Santos and grade No. 4, but that does not mean that it is acceptable as Grade A under the Federal specification. In determining suitability of a coffee for any specific use, *quality* and *character* are the all-important factors; type and numerical grade then merely indicate quality and character to be expected.

(1) *Quality.* There are two kinds of quality, roasting and cup.

(a) *Roasting.* Roasting quality means the kind of roast the coffee will produce. Coffee has good roasting quality when the beans will roast to a uniform color without breaking or splitting, when increase in size is even, and when surface of the beans is bright and pleasing to the eye. Roasting quality is described as:

- | | | |
|---------------|----------|-----------|
| 1. Handsome. | 3. Fine. | 6. Rough. |
| 2. Excellent. | 4. Good. | 7. Poor. |
| | 5. Fair. | |

(b) *Cup.* Cup quality is the combination of sensations that the brew will produce through taste buds of the tongue and the olfactory nerves located in the upper respiratory passages. It is the combined flavor and aroma when sensed simultaneously. The multiplicity of terms used in describing cup quality, both desirable and undesirable, are quite confusing to the novice and to attempt a written description of the sensations these terms signify would be as hopeless a task as trying to describe color to a person born blind. Applying them correctly can be learned only by experience but when once learned they are as definite and as easily identified as the distinctive flavor and aroma of a ripe peach. Desirable cup quality is termed:

- | | | |
|------------|-------------|---------|
| Rich. | Smooth. | Mellow. |
| Excellent. | Heavy body. | Good. |
| Fine. | Good body. | |

Undesirable cup quality takes many forms that result from a variety of causes such as type or variety, climate, soil, method of cultivation, harvesting, curing, and handling. Terms denoting undesirable cup quality include:

- | | | |
|--------|---------------------|----------|
| Rank. | Rioy or rio flavor. | Groundy. |
| Hiddy. | Muddy. | Grassy. |
| Sour. | Bitter. | Flat. |
| Winy. | Medicated. | Musty. |
| Harsh. | Woody. | |

(2) *Character.* Character in coffee is the flavor of the brew as determined by the sense of taste alone. Character is described as acid, bitter, sweet, and neutral.

Human taste buds are sensitive to only four flavors, sweet, acid, bitter, and salt. In coffee the first three only are applicable.

(a) *Acid.* Acid is not, as the term would indicate, undesirable but is highly desirable, though some coffees are too acid to make a satisfactory brew unless blended with one of less acidity. Acidity is best described as a pleasing astringency. Descriptive terms generally used to express degree are high, mild, low, and nonacid.

(b) *Bitter.* All coffees possess bitterness to a certain degree and a limited amount is desirable. It is only when this characteristic is so pronounced as to be objectionable that the coffee is termed "bitter."

(c) *Neutral.* Coffee is neutral when it is neither acid, bitter, or sweet to any noticeable degree.

(3) *Thin.* The term "thin" is often applied to coffee lacking in both quality and character. A thin coffee is best described as one that is entirely neutral in character and without any pronounced aroma. One authority describes a thin coffee as one that lacks everything.

d. *Testing.* The first step in testing is to compare appearance of the green bean of the sample being tested with a sample of known standard value for that particular kind of coffee. The next step is to compare appearance when roasted, then appearance and aroma test when it is ground, and finally the most difficult, trial of flavor and aroma of the liquid. Great care must be given to roasting samples to be examined. Each sample should have the same degree of roast at the same temperature.

(1) *Roasting.* Roasting is carried out at different temperatures ranging from 385° to 500° F. During roasting there is a large loss in water and crude fiber due to the process of destructive distillation which takes place. Loss in fatty substances, ash, and caffeine is quite small. It is well to remember that while weight decreases during roasting, volume increases from 25 to 70 per cent, depending upon degree to which roasting process is carried. When proper roasting point is reached, beans are smelled while still hot, to determine aroma. In some grades it is necessary to smell them frequently as they cool, because aroma changes as temperature drops.

(2) *Cup.* After roasting and grinding, the actual cup test begins. Two methods are employed, the blind cup test in which there is no clue to identity of the kind being tested, and the open test in which the tester knows beforehand particular coffee being tested. The former is the method most generally employed. In both methods amount of ground coffee placed in the cup is weighed carefully (5 grams to an ordinary teacup) so that strength will be standard. Use freshly boiled water. In pouring water exercise care to keep temperature constant in all cups so that strength of all will be equal. This is best accomplished by pouring water from a large kettle holding four or five times amount of water required to fill all the cups. When the water is poured directly on the grounds a crust or scum is formed, and before this crust breaks the tester sniffs the aroma. This is called the wet smell or crust test and is of great importance. The final step, tasting the brew, is the most important. Before actually testing the brew, the tester stirs each cup with a spoon and notes aroma. After this stirring all floating grounds are skimmed off and a spoonful of the brew is sipped and held in the mouth only long enough for the tester to get the full flavor. The tester never swallows the brew, merely rolling it around in the mouth and to the base of the tongue and then spitting it out. When the brew is first sipped the mouth is closed and held closed a few seconds, in this way judging character. The mouth is then opened slightly and some air inhaled through both nostrils and mouth. The tester thus senses flavor and aroma simultaneously and judges quality. After spitting out the brew, the mouth is held closed for a few seconds and lingering flavor sensed. Some testers find it helpful to have a glass of cold water and a lighted cigarette handy, and after tasting each sample, rinse the mouth with water and take a few puffs on a cigarette to remove all flavor and aroma before trying the next sample. During testing to determine suitability of coffees for any particular purpose, a control cup brewed from a sample of known suitable quality and character is kept at hand for comparison with the sample being tested. This procedure is always followed in testing bidders' sample for Army purchases.

e. Adulteration. The Pure Food law requires labeling of coffee compounds to show what the compound contains, and as long as prices are within reason, use of adulterants is not profitable. Therefore, adulterated coffee is not apt to be found in legitimate trade channels. Exceptionally high prices might encourage unscrupulous dealers to mix cereals, peas, beans, chicory, etc., with roasted or roasted and ground coffee, but detection of such adulterants is quite simple. Careful inspection of unground coffee will detect imperfect, split, and defective beans. If these have a hard and polished surface they are probably peas or other legumes. If they can be crushed to a powder between the fingers they are apt to be balls of chicory. Use of a reading glass will aid in detection of adulterants. To detect artificial coloring cut through a bean with a sharp knife. If the color is localized on the surface and not uniform throughout the cross section, the bean has been artificially colored or artificially aged. To test roasted and ground coffee for adulterants, place a spoonful on the surface of a glass of clear water; most of the coffee grounds will float. Chicory will sink and stain the water a brownish red. The coffee bean contains no starch while nearly every adulterating substance does; therefore the iodine starch test is valuable. Stir a spoonful of the sample into a glass of water and then add a few drops of iodine. If starch is present the water will turn blue.

f. Storage. If properly stored, green coffee will improve with age up to about 5 years. After that time it tends to become woody and flavorless, degree of deterioration depending upon climatic conditions. High relative humidity and high temperatures hasten deterioration. Bags in which green coffee is stored should be loosely filled. Should unforeseen circumstances cause absorption of moisture, beans will increase in size and cause tightly filled bags to burst. Prime requisites for good coffee storage are:

- (1) Dryness.
- (2) Good ventilation.
- (3) Absence of contaminating odors such as paints, oils, soap, tobacco, spices, fruits, vegetables, and insecticides.
- (4) Stacking on dunnage at least 4 inches high. Stack so that at least one side of each sack will be exposed.

There will be some shrinkage in green coffee in storage. Under proper storage conditions this will be about 2 per cent at the end of 1 year and about 4 per cent

at the end of 3 or 4 years. Roasted coffee is a highly perishable article and should be used as soon as possible after roasting. Roasted and ground coffee should be used within 8 days. Roasted unground coffee should be used within 15 days.

57. Tea. a. Types and grades. Like coffee, there is a large variety in kinds and grades of tea. However, all commerce teas fall within one of three general classes or types, Black, Green, and Oolong. Each of the three main classifications is subdivided into grades depending upon leaf position on the twig, districts in which produced, quality, time of harvesting, etc.

(1) Black tea leaf grades from highest to lowest are:

- (a) Flowery Orange Pekoe.
- (b) Orange Pekoe.
- (c) Pekoe.
- (d) Pekoe Souchong.
- (e) Souchong.

Separation into various grades results from the three types of plucking employed in harvesting tea and hand-sorting and mechanical sieving during manufacturing process. A "fine plucking" includes only the tip and one or two partly matured leaves, and from this plucking Flowery Orange Pekoe and some Orange Pekoe are obtained. A "medium plucking" includes the first and second matured leaves and from this plucking some Orange Pekoe and the Pekoe are obtained. A "coarse plucking" includes the remaining leaves and this plucking is separated into Pekoe Souchong and Souchong grades.

(2) The principal China green tea grades or styles with the corresponding black grades are:

Green grades:

Black grades

Gun powder Flowery Orange Pekoe.

Imperial Orange Pekoe.

Young Hyson Pekoe.

Hyson Pekoe Souchong.

Hyson Skin or Twankay Souchong.

b. Grade characteristics. Following is a general description of characteristics to be expected of the various grades:

(1) *Gunpowder*. Young leaves small to medium in size, rolled into tight balls running from the size of a pinhead to that of a pea.

(2) *Imperial*. Generally consists of older and coarser leaves. Rolled like gunpowder, but considerably looser.

(3) *Young Hyson*. Prepared from medium leaves about number three on the shoot, tightly rolled and twisted so as to appear like short pieces of wire.

(4) *Hyson*. Prepared from older and coarser leaves of each picking. Leaves are loosely twisted lengthwise and this style bears the same relation to Young Hyson as Imperial does to Gunpowder.

(5) *Hyson Skin or Twankay*. Comprises the oldest and coarsest leaves on each shoot from all pickings that cannot be converted into other styles. Leaves are large, loose, and flat, and vary in color.

c. Testing. In testing, appearance, feel, and odor of dry leaves will give a fairly clear idea of quality that can be expected. Each tea has a certain characteristic flavor, color, aroma, and appearance. It is not difficult to learn these characteristics and place a tea in one of the general classes. An inspector should not be influenced by appearance alone because some of the rough looking teas have the finest flavors.

(a) *Black*. Black teas should be dry and of a uniform color. The leaf as a rule should be thin and tightly rolled. Presence of gray tips adds to quality; sticks, stems, stalks, etc., detract from value and teas containing them are objectionable. A considerable amount of stalks may be expected in cheap teas; this is nothing but wood fiber and is quite evident on infusion.

(b) *Green*. Green teas should be dry and a uniform gray color. No matter what happens to the style, a tightly rolled leaf is generally an indication of young leaves. The finest teas are prepared from the youngest leaves and these are susceptible to being tightly rolled. Large, rough, loosely rolled leaves as a rule do not produce pleasing beverages.

Pick up a handful of leaves; they should be dry and crisp and resist breaking

when gentle pressure is applied. Moist or damp tea if not already sour will soon become so.

Breathe upon a sample of dry tea and quickly inhale aroma. It should be sweet, fresh, and free from obnoxious or foreign odors.

(c) *Cup method.* Weigh out exactly 3 grams (use a dime on a pair of small balance scales), place in an ordinary cup and cover with water which has boiled vigorously for a few minutes. After 3 minutes pour liquor off into a second cup and hold leaves in the first cup with the aid of a spoon or a piece of wire cloth. Aroma from the hot liquor and from the leaves should be fresh, sweet, and characteristic of the kind being tested. Avoid teas with sour, musty, and foreign odors. Take a teaspoonful of the brew and draw it back upon the palate; after a few seconds spit it out without swallowing any. Flavor should be pleasing and characteristic. Determination of quality among teas of the same variety is made by comparison at infusion, and care should be taken to weigh exact amounts and infuse for exactly the same period of time. A very dark to black liquor is an indication of poor quality.

d. *Individual characteristics.* The following indicates individual characteristics after infusion of some of the better known teas:

(1) *India.* Liquor is dark brown with pungent aroma and astringent flavor. Leaves should be a bright copper color.

(2) *Ceylon.* Liquor varies from ruby red to mahogany in color. The bland oil of lemon aroma and flavor are easily detected. Leaves are copper colored but have a greenish cast.

(3) *Congou.* Liquor is a reddish brown in color and generally has a toasty flavor. Leaves are inclined to be a dirty black color.

(4) *Japan.* Liquor is very pale green in color. Some of the finer teas have an aroma like new hay, but all of them are distinguished by the metallic taste. To one unaccustomed to these teas, flavor and aroma are reminiscent of the fishy atmosphere of salt marsh lands. Leaves become nearly natural in shape and color.

(5) *China green.* Liquor runs from a yellow to brownish yellow in color. Aroma and flavor vary with grade and quality. Leaves assume appearance of green leaves, the poor grades showing some black- or brown-edged.

(6) *Formosa Oolong.* Liquor varies from amber to brown in color. Flavor is delicate and aroma very fragrant; both are characteristic. Leaves indicate poor fermenting and poor quality.

(7) *Java and Sumatra.* They are all similar to India teas in growth, manufacture, and characteristics.

e. *Adulteration.* Tea on the American market is no longer adulterated with spent leaves or colored with Prussian blue or indigo because the Federal Government holds all teas in bond until their quality and purity are determined. Those which fail to come up to the standards selected each year are denied entry to the United States. While the Government guarantees purity, when it comes to quality the buyer must take care. Teas which conform to minimum requirements for entry into this country are neither suitable for the soldier nor for the average consumer.

f. *Storage.* Storage is a simple matter under conditions usually found at posts, camps, and stations. If the following precautions are observed no difficulties will be encountered.

(1) Protect from contaminating odors such as tobacco, oils, paints, onions, vinegar, etc.

(2) Avoid dampness. Humidity in excess of 80 per cent will cause mustiness and souring.

(3) Avoid rough handling as this will break leaves and produce dust.

(4) Protect from high temperatures. Excessive heat drives off essential oils and leaves tea flat and lacking in natural flavor.

(5) Containers should be kept tightly closed until ready for use. When tea is to be issued or sold in smaller quantities than the original chests or cans, these should be emptied into a can or bin having a tight-fitting lid and issues or sales made therefrom.

58. *Cocoa. a. Inspection.* It is believed that the Federal specification for cocoa adequately describes characteristics necessary to secure desired material. However, cocoa of the "Breakfast Cocoa" type only is permissible for Army use. The

"German" or "Dutch" types, usually easily distinguished by their darker color, may not be purchased for Army use. Inspection should include:

(1) *Color.* Should be of a rich deep medium brown. Light brown cocoas are usually "stuffed" with sugar, malt, starch, etc. Dark brown cocoa is usually "Dutched," that is, alkaline treated before or during roasting process.

(2) *Texture.* Grittiness or graininess indicates poor or incomplete manufacturing processes or adulteration. Grittiness is not permissible.

(3) *Flavor.* Flavor should be characteristic of unsweetened or otherwise artificially flavored cocoa.

(4) *Lumping.* Lumping to extent of rendering product difficult to use is not permissible.

b. *Storage.* Protect from:

(1) Heat. Temperatures above 75° F. should be avoided.

(2) Light. Light tends to hasten development of rancidity and produces dullness of color.

(3) Moisture. Dampness will cause lumpiness and molding.

(4) Insects. Cocoa is subject to attack by insects that attack food in general. If once infested to any appreciable extent the product is ruined.

SECTION VIII

PICKLES, RELISHES, OLIVES, AND SAUCES

59. Pickles and relishes. a. *Sour and sweet pickles.* Sour and sweet pickles are made from salt stock. In sour pickles salt is reduced by diffusion with vinegar to approximately 5 per cent and in sweet pickles (made from sour) to about 2 per cent or 3 per cent by diffusion with sugar liquor. Salt stock is the clean, sound, immature cucumber preserved in a solution of common salt.

(1) *Dill.* (a) *Imitation.* Imitation dills are also made from salt stock and in consequence can be placed on the market at any time of the year.

(b) *Genuine.* The genuine dill is made from fresh stock by lactic fermentation in a weak brine and therefore lacks the keeping qualities of regular salt stock.

(2) *Mixed.* Mixed pickles usually consist of cut cucumbers, cauliflowers, onions, and a few small red peppers. This product is packed either as sweet mixed or sour mixed with characteristics similar to sweet or sour pickles.

(3) *Chow-chow.* Chow-chow pickles are prepared from small cucumbers, cut cucumbers, onions, cauliflower, and occasionally a few tobasco peppers. The ingredients are processed in brine, made sour, covered with chow dressing, and packed in bottles. Chow dressing may be either sweet or sour.

b. *Relish, sweet.* Sweet relish is made from finely divided cucumbers, cauliflower, green tomatoes, and onions. The ingredients are processed in brine, made sour, and preserved in sweet liquor made from vinegar and sugar.

c. *Inspection.* Care should be exercised that no larger pickle is delivered than the specification size. Individual pickles should be uniform in shape, almost cylindrical with rounded ends, fairly smooth, fairly uniform in color, that is, a bright green. Sweets are darker green than sours. Pickles should be firm, not slippery, and break with a snap. They should be free from hollow or spongy centers. On splitting the cucumber from end to end color should be uniform throughout and there should be no gas pockets.

Containers should be tight and not leaking.

d. *Storage.* Sour pickles in kegs will tend to become soft in 3 or 4 months. In cans they will keep 6 to 8 months. Sweet pickles will keep somewhat longer. Genuine dills are poor keepers. Pickles packed in glass should be kept out of the light.

Pickles should be protected from freezing. Kegs should be treated the same as for vinegar to prevent leaks.

60. Olives. a. *Green.* (1) *General.* Practically all green olives sold in the United States come from Spain. Two varieties are employed in making green olives, the Queen (Sevillana or Gordal) and the Manzanilla. The flesh of the Manzanilla is tender, the skin can be made to feather off, and the fruit is comparatively easy to pit. The Queen is darker green, larger, pointed instead of rounded, flesh

is coarser, more fibrous, brittle, and the pit is difficult to separate from the flesh. For fancy glass-packed fruits, jars are packed by means of a long slender stick called "stick pack" or "placed." "Loose pack" consists of merely dropping olives into the jar and tapping it lightly to settle.

(2) *Inspection.* (a) Care should be exercised that olives are size specified.

(b) A white deposit showing indicates fermentation was not complete during pickling. Olives so affected are not injured but should not be purchased as consumer will refuse to accept them.

(c) A bacterial decomposition known as *zapateria* is indicated by an offensive odor.

(d) Scum on top of liquid indicates slack filling or minute leaks.

(3) *Storage.* Green olives should keep for 1 year in dark, cool storage. In too warm storage fermentation may set in and sufficient gas developed to force the lid. The brine also has a corrosive effect on the lid causing pinholes or rusting of edges where they come in contact with the brine.

b. *Stuffed (pimiento).* (1) *General.* Usually Manzanillas are employed, although occasionally Queen olives are stuffed. Small strips of pimiento are folded and stuffed into the olive by hand. The olives are then placed in brine and left in the sun until the pimientos are cured.

(2) *Inspection.* Same as for green olives. Pimiento should be a bright red and liquid practically free from small bits of pimiento.

(3) *Storage.* Same as for green olives.

c. *Ripe.* (1) *Inspection.* Should be uniform in color, size, and free from marked, bruised, or damaged fruit. Dark color should be localized near skin and flesh should be light colored and tender but not soft. Flavor should be rich and not "scorched," free from bitterness. Varieties that separate readily from pit are more desirable.

(2) *Storage.* Cool. Frequent inspections should be made for pinholes and rust.

61. *Sauces.* a. *Worcestershire.* (1) *General.* Worcestershire sauces are prepared from a base of vinegar and soy sauce. The soy sauce when first mixed with the spices produces a harsh, disagreeable flavor that disappears by aging in hardwood barrels. This harshness can be overcome to a certain extent by long cooking, but best sauces are made by a short cook and long aging.

(2) *Inspection.* Should be compared for flavor with a known acceptable sample. Should be free from harsh flavor of raw soy sauce. Containers should be well sealed.

(3) *Storage.* Will keep in ordinary storage for 1 year.

b. *Mustard (prepared).* (1) *General.* Two varieties of mustard seed used are yellow or white, and black or brown. The blend will vary according to the ideas of the manufacturer.

(a) *English* is made from yellow seed mixed with garlic, vinegar, and black pepper.

(b) *German* is prepared from brown seed mixed with vinegar and salt.

(c) *French* is prepared from yellow seed and mixed with spices and vinegar, with or without salt.

(2) *Inspection.* When mustard flour is used in manufacture of prepared mustard, mustard bran or cornstarch and turmeric are added as a filler. Turmeric is added to give color to cover other defects.

Prepared mustard should have a smooth, heavy body with very little free liquid at top of container. Seeds should have an even and uniform grind, and be free from fiber. Black and white specks indicate an uneven grind or poor quality seeds.

(3) *Storage.* Store in a dark, cool place. Light will bleach color. Warm temperatures will separate ingredients and cause loss of strength.

c. *Tomato.* (1) *General.* In manufacture of tomato catsup, tomatoes are washed, trimmed, and then sent to a pulper which consists of a stationary cylinder screen with holes small enough to prevent any seeds and skin from passing. In manufacture of chili sauce tomatoes are handled in a similar way except that pulpers have screens large enough to allow seed to pass through. The best catsups and chili sauces are made from raw pulp of whole tomatoes and in one cooking.

(2) *Inspection.* Specific gravity of tomato catsup varies from 1.085 for poor grade to 1.17 for a good product. Consistency should be heavy, smooth, and thick. It should show no sign of separating or clotting. A drop of tomato catsup placed on a piece of dry kraft paper will remain globular for several minutes before there is any appreciable absorption by the paper.

The specific gravity of chili sauce should be between 1.14 and 1.20.

Both catsup and chili sauce should have a natural red tomato color. Paleness or any suggestion of yellow indicates use of sun-scald or green tomatoes. Dark red or brown color indicates over-cooking or overprocessing. Paprika added to give color can be detected by spreading a thin layer on glass. The small particles of paprika can be seen by the naked eye. Black neck or darkening at the top of bottles is an indication of improper sealing and is cause for rejection.

Products should have a characteristic catsup or chili sauce flavor free from metallic, medicated, or musty flavors.

(3) *Storage.* Bottled products should be stacked upside down and kept in cases or boxes to protect from light. Good catsup or chili sauce properly packed will keep for 1 year.

SECTION IX

SEASONING AGENTS

62. Salt. *a. General.* Free-running salt for cartons is kept in its finely divided, dry state by use of dries which are usually magnesium carbonate or calcium phosphate, only a fraction of 1 per cent being needed.

Some state health authorities, especially in the so-called "goiter belt" of the middle west, request refiners to add iodine to all table salt packed in retail packages. Iodine is added in the form of sodium iodine or potassium iodide.

b. Inspection. Table salt containing impurities may have an undesirable flavor, off color, or may cake badly.

A simple test for cleanliness may be made by dissolving 5 pounds of salt in 3 gallons of distilled, filtered water. Filter solution through a white filler disc. Any insoluble foreign matter will show on filter disc.

c. Storage. Salt should be stored in a dry place to prevent the absorption of moisture. Salt bags or barrels should be stacked on dunnage to allow free circulation of air. Salt in moistureproof cartons and containing an agent to prevent caking will cake if exposed to moisture-laden air for 3 to 4 months.

63. Vinegar. (1) *General.* (a) *Cider.* Cider vinegar is made by alcoholic and subsequent acetous fermentations of apple juice.

(b) *Distilled.* Distilled vinegar is made by acetous fermentation of dilute distilled alcohol.

(c) *Malt.* Malt vinegar is made by alcoholic and subsequent acetous fermentations without distillation of an infusion of barley malt or cereals whose starch has been converted by malt.

(2) *Inspection.* Vinegar should be examined for the following parasites and defects:

(a) *Mother of vinegar* is a mass of adjoining cells swelled into a cohesive mucilaginous jelly. This formation is due to bacteria present in unsterilized vinegar.

(b) *Vinegar eel* is a long, slender, eel-like parasite infecting only vinegar or other mediums in which acetic acid is present. It is about 1/25 inch in length tapering out to a thread-like tail. It is noticeable to the naked eye as a wriggling, threadlike organism, usually on or near surface of the liquid. Presence of vinegar eels indicates lack of sanitation in manufacture and lack of sterilization in bottling or barreling.

(c) *Vinegar mites* are minute pests not readily detected by the naked eye. In vinegar affected by mites their bodies may show up as fine white specks on the surface. Presence of these mites in quantity imparts a musty odor and flavor.

(3) *Storage.* Where available, basement storage is the best since it is cool and moist. Containers should be protected from extreme heat and direct rays of the sun. They should also be protected from freezing. Ideal temperature is between 40° and 50° F.

Kegs and barrels may be stored on end or on bilge. If stored on bilge, they should be placed with the bung up, but enough to one side to keep bung moist. If stored on end, water should be kept in chimes at all times. Each keg or barrel should be turned or reversed once every 3 weeks. Hoops should be kept tight at all times and painted with red lead to prevent rust. Vinegar flies are a storage pest. The fly is readily distinguished by its large red eyes, long glittering wings, and black and yellow-striped abdomen. It is very small and difficult to keep out. The best means of combating this fly are by cleanliness, light, and fine-mesh screens.

64. Spices. *a. General.* Spices depend upon their essential oils to impart their taste to foods. Essential oils waste away by evaporation at ordinary temperature. When they become thoroughly dried out and odorless they have lost ability to impart their taste to foods.

Grading spices is different in almost every case. The different grades are identified by places of origin or the port from which the spices are shipped.

b. Inspection. Inspection consists of an examination for freshness and a comparison with a sample of known quality for color, quality, odor, and flavor. These samples should be changed every 3 months so that they will be fresh. Oily spices show caking or lumping with age. Certain spices are subject to mold if kept in damp places.

c. Storage. Spices should be stored in a cool, dry place. Evaporation of the volatile oils and insect infestation are the principal causes for deterioration.

Three months is considered a feasible time for storing ground spices under proper storage conditions. Whole spices are better keepers and may be stored for a period of 6 months without loss of flavor.

65. Flavoring extracts. *a. General.* Flavoring extracts are derived from two sources, plants, known as "true extracts," and chemical compounds that produce desired flavor and aroma or any source other than the plant for which the extract is named. Such flavors are called "synthetic" or imitation flavors.

(1) *Concentrated* are extracts in which proportion of menstruum is reduced. It may be either genuine or imitation.

(2) *Nonalcoholic* flavors are made by mixing either a true or synthetic flavor with various carrying agents as cottonseed oil, gums, etc.

(3) *Terpeneless* of lemon and orange is the flavoring extract from which all or nearly all of the terpenes have been removed.

b. Inspection. Inspection is largely a matter of chemical analysis. There are times when circumstances will not permit sending a sample to the depot for analysis. Under these circumstances the most satisfactory method of making a test is by comparison with another sample of known strength and purity. The following tests are recommended for that purpose:

(1) *Vanilla.* Make a 5-per cent solution of unknown and the known samples by adding 6 teaspoonsful of flavor to a pint of water. All ingredients should be at room temperature. Taste samples and compare with flavor of known sample. None of the liquid should be swallowed and the mouth should be rinsed with fresh water after tasting each sample.

(2) *Lemon and orange.* Comparison of aromatic strength of several samples may be made by placing a few drops of each upon clean pieces of white blotting paper and allowing them to stand a few minutes for the alcohol to evaporate. Careful smelling of the different samples will determine which has the strongest aroma. In this test the true extract will show a reddish-lavender ring around the edge and the inner surface of the ring will be comparatively smooth. A terpeneless extract will not produce any discoloration around the edge of the ring and the surface of the blotter inside the ring (drop) will appear roughened and raised.

If several drops of true lemon extract are dropped in a glass of cold water, they immediately produce a slight milky appearance in the water with a whitish vapor visible on the surface. An oily film will appear on the surface. Terpeneless extracts when dropped in cold water diffuse with little or no milkiness.

SECTION X
SWEET PRODUCTS

66. Sirup and molasses. Field inspection of sirup and molasses is confined to Baumé hydrometer readings for sugar content as provided in applicable specifications and to examination for characteristic taste and odor. Sharp acrid or bitter taste is accentuated when lowgrade ingredients are used. Presence of excessive corn sirups in a blend can be detected ordinarily by drawing a knife or spoon through a shallow container to detect characteristic corn sirup rippling on the surface. Presence of foreign materials of any kind is not permissible. Molasses will vary from a golden brown color in better grades to black in lowest grades.

67. Honey. Honey must be of characteristic odor and flavor of the kind it purports to represent. Color will be specified in bids (see F. S. C-H-571). In addition to detailed requirements under applicable specification, presence of comb or sugar crystals is not permissible. Adulteration in honey is confined to artificially prepared invert sugars, cane sugar, gelatin, molasses, and glucose. Honey adulterated with glucose containing copperas reacts to tea or any liquid containing tannin by turning an inky black. Adulteration of comb honey is rare. Adulteration of strained honey is not ordinarily readily determinable except by chemical analysis.

68. Candy. a. Hard. Should be well-flavored, free of excessive misshapen pieces, and should have a high, glossy finish.

b. Filled hard. Should be well-flavored, have thin shells and soft centers. Thick shells and gummy centers indicate inferior goods.

c. Caramels. Should have a definite flavor, smooth in texture, free of graininess indicating sugar crystallization, and not tough or hard.

d. Cream centers. Coatings should be evenly applied and fairly thick. Centers of a bluish or grayish cast or that are soggy indicate poor quality. Centers should part when pulled apart and should not stretch as does gum. Candied cherry centers and centers having various wines as flavoring ingredients are somewhat susceptible to sogginess by their very nature.

e. Chocolate coated. Chocolate used should be mild and pleasant to the taste. Dark coatings harsh and bitter to the taste, when used on a candy not ordinarily bitter by intent, are usually poor quality.

f. Milk chocolate coatings. Should be definitely milky in taste but should not be too light in color. Milk coatings which are sugary are not high quality.

All chocolate coatings should be smooth and bland to the taste and should have a glossy appearance.

Candies which are streaked, faded, crushed, gummy, or mucilaginous to the touch are not acceptable. Hard candies should permit extraction from containers in individual pieces and should not be stuck into a mass not permitting easy extraction.

69. Chocolate. Chocolate which has been subjected to high temperatures is prone to "bloom"; that is, to undergo a separation of fat and nonfatty solids. The fat will rise to the top while other solids will sink to the bottom. Any such damage is cause for rejection. Chocolate evidencing a mottled or speckled appearance has been damaged by moisture absorption and should not be accepted.

Good quality chocolate is firm and smooth in texture and devoid of all grittiness or harsh foreign material. Inspection factors are identical for both plain and vanilla-flavored, sweetened chocolate except taste.

70. Jam. Jams must possess characteristic good flavor and color. Common causes for rejection are poor consistency attendant in runny, "weepy," or watery products, and toughness often due to overprocessing or addition of excess pectin in an effort to bolster up some deficiency known or suspected to exist in raw materials. Jams should be firm but should not offer marked resistance to penetration by a sharp edge. When poured from the can or jar there should be a slight "mounding" or piling up of the product which, after some time, will disappear. Jams should not be transparent as are jellies but should be translucent to a considerable degree. Presence of sugar crystallization is not permissible. Aroma should be pleasant and in no instance foreign to type being examined. Foreign material such as stems, peelings, cores, etc., are not permissible. Scorched products should not be accepted.

Preserves are, in effect, jams in which individual pieces of fruit meats are large or have not been reduced to a pulp.

71. Jelly. Like jams, jellies must possess characteristic good flavor and color. Common causes for rejection are crystals. Jellies are susceptible to crystallization of fruit sugars more readily than jams and preserves. Presence of crystals is recognized readily by touch or by gritting between the teeth. Since jellies are made from fruit juices with possible addition of pectin, there should be no cloudiness or apparent foreign material. The product may be transparent to translucent. It should be of a gelatin-like consistency on removal from the container and should show no excess free liquid. When cut with a knife it should offer but slight resistance and should fall away from the cutting edge without evidence of stickiness or mucilaginous adherence. Toughness is not to be confused with firmness. Toughness is best recognized by tapping the side of the mound or shaped mass with the flat of a knife. When the effect is that of a rubber-like resiliency the jelly is tough. Only extreme toughness is easily recognized when the product is eaten. A jelly of proper consistency will offer some resistance to spreading but is capable of being blended or smoothed over the cut surface of reasonably firm bread without undue effort.

72. Storage. a. Honey and sirup. Honey is subject to deterioration when exposed to light when packed in glass. All sirups, etc., except maple should be stored in moderate storage varying up to 75° F. These products are very stable when not exposed to light and keep well for at least 6 months. Maple sirup should be kept in cold storage when opened. When unopened, it is stable at ordinary storage temperatures.

b. Candy. All candies are deleteriously affected by excessive light and prolonged temperatures above 75° F. A good storage temperature is about 50° F. without excessive humidity. All candies are subject to infestation and must be handled carefully to prevent undue damage. Chocolate candies stored at 50° to 55° F. should be raised in temperature slowly until a temperature of approximately 75° F. is reached. Abrupt rises in temperature usually result in condensation of moisture on surface of candies and a consequent spotting. Hard candies packed in glass will lose external gloss if exposed to sunlight, and are deleteriously affected in storage temperatures above 85° F. Candies having nut meats as an ingredient should be examined systematically for insect infestation. Candy centers containing cordials, for example, chocolate-coated cherries, cannot be stored safely for a period in excess of 45 days.

c. Chocolate. Chocolate, a product which contains a large percentage of fat, is affected adversely by light as is cocoa. Deterioration is accelerated in storage permitting temperatures higher than 70° F. or by subjugation to light over any considerable period of time.

d. Jams and jellies. All these products are deleteriously affected by exposure to light. Those containing seeds are particularly apt to develop hydrogen gas and have side seams of cans forced open. A shipment of jam in which the contents of one or several cans have contaminated other cans should be rejected. When burst cans contaminate stocks on hand, cans so damaged must be removed and all others on which leakage has occurred should be washed or otherwise thoroughly cleaned. Storage temperatures above 85° F. are to be avoided.

SECTION XI

MEAT AND MEAT PRODUCTS

73. Definitions (United States Department of Agriculture). *a. General.* (1) **Flesh** is any edible part of the striated muscle of an animal. The term "animal" as used in this manual indicates a mammal, a fowl, a fish, a crustacean, a mollusk, or any other animal used as a source of food.

(2) **Meat** is the properly dressed flesh derived from cattle, swine, sheep, or goats sufficiently mature and in good health at time of slaughter, but is restricted to that part of the striated muscle which is skeletal or that which is found in the tongue, diaphragm, heart, or esophagus, and does not include that found in the lips, snout, or ears with or without accompanying and overlying fat, and the portions of bone, skin, sinew, nerve, and blood vessels which normally accompany

flesh and which may not have been separated from it in process of dressing for sale. The term "meat" when used in qualified form as, for example, "horse meat," "reindeer meat," "crab meat," etc., is then and then only properly applied to corresponding portions of animals other than cattle, swine, sheep, and goats.

(3) *Fresh meat* is meat which has undergone no substantial change in character since time of slaughter.

b. Meats. (1) *Food animals.* (a) *Beef.* Cattle nearly 1 year of age or older.

(b) *Veal.* Young cattle 1 year or less of age. (Minimum limits governing age or weight or both of veal and lamb have been fixed by certain States and municipalities in the case of calves and lambs to be slaughtered for meat.)

(c) *Mutton.* Sheep nearly 1 year of age or older.

(d) *Lamb.* Young sheep 1 year or less of age.

(e) *Pork.* Swine.

(f) *Venison.* Deer.

(2) *Byproducts* are any properly dressed edible parts other than meat which have been derived from one or more carcasses of cattle, swine, sheep, or goats sufficiently mature and in good health at time of slaughter.

(3) *Prepared meats.* Prepared meat is the product obtained by subjecting meat to a process of comminuting, drying, curing, smoking, cooking, seasoning, or flavoring, or to any combination of such processes.

(a) *Cured meat* is obtained by a process of salting, the employment of dry common salt or of brine, with or without use of one or more of the following: sodium nitrate, sodium nitrite, potassium nitrate, sugar, dextrose, a sirup, honey, spice.

(b) *Dry salt meat* has been cured by application of dry common salt, with or without use of one or more of the following: sodium nitrite, sodium nitrate, potassium nitrate, sugar, dextrose, a sirup, honey, spice; with or without injection into it of a solution of common salt to which may have been added one or more of the following: sodium nitrate, sodium nitrite, potassium nitrate, sugar, dextrose, a sirup, honey.

(c) *Corned meat* has been cured by soaking in, with or without injecting into it a solution of common salt, with or without one or more of the following, each in its proper proportion: sodium nitrite, sodium nitrate, potassium nitrate, sugar, dextrose, a sirup, honey, and with or without use of spice.

(d) *Sweet pickled meat* has been cured by soaking in, with or without injecting into it a solution of common salt, with sugar and/or dextrose, a sirup, and/or honey, together with one or more of the following, each in its proper proportion: sodium nitrite, sodium nitrate, potassium nitrate, and with or without the use of spice.

(e) *Dried meat* is obtained by subjecting fresh or cured meat to a process of drying, with or without aid of artificial heat until a substantial portion of the water has been removed.

(f) *Smoked meat* is obtained by subjecting fresh, dried, or cured meat to direct action of smoke either of burning wood or similar burning material.

(g) *Canned meat* is fresh or prepared meat packed in hermetically sealed containers with or without subsequent heating for purpose of sterilization.

(h) *Hamburg*, "Hamburger steak," is comminuted fresh beef with or without addition of suet and/or seasoning.

(i) *Potted or deviled meat* is obtained by comminuting and cooking fresh and/or prepared meat with or without spice, and is usually packed in hermetically sealed containers.

(j) *Sausage meat* is fresh or prepared meat, or a mixture of fresh and prepared, and is sometimes comminuted. The term "sausage meat" is sometimes applied to bulk sausage containing no meat byproducts.

74. Inspection. *a. Authorized agencies.* (1) The Bureau of Animal Industry, United States Department of Agriculture, makes inspections of all meats and meat products entering interstate or foreign commerce for soundness and fitness for food. All carcasses passed for food are marked on each primal part (wholesale cut) with a stamp bearing the inspection legend "U. S. Inspected and Passed" or an abbreviation thereof, and the establishment number. The inspection legend guarantees that at the time it left Government supervision the meat or meat product was sound, wholesome, and fit for human food. At no time should meats

for Army use be accepted unless they have been inspected ante mortem and post mortem by the Bureau of Animal Industry or other authorized inspection agency.

(2) The Veterinary Corps, United States Army, is charged by regulations with the inspection of meats and meat products purchased for the Army, for compliance with specification requirements. Where possible such inspections are made at the packing plant, and otherwise upon delivery at points where representatives of the Veterinary Corps are assigned.

b. *Grades and standards.* (1) The Agricultural Marketing Service, United States Department of Agriculture, conducts a grading service for fresh carcass beef and wholesale market cuts. Such grading is done in conformity with grades established by that bureau. Department of Agriculture grades are not generally used by packers except where such grading is demanded by consumer or retailer.

(2) Grades for fresh beef have been established by the Institute of American Meat Packers, and are used by practically all members of the institute. They differ from the Department of Agriculture grades in that there are three more grades in the former than in the latter.

(3) Definitions and standards for lard, hams, bellies, and other pork products have been promulgated by Boards of Trade, notably the Chicago Board of Trade. These standards govern quality, style of cutting, etc., of such products dealt in on such boards.

(4) Packers have adopted brand names for carcass beef, lard, smoked meats, canned meats, etc., each brand name designating definite qualities, standards for which are set up by individual packing plants. Since brand names are copyrighted and adapted to products of individual firms, they are of little value to the inspector unless he is familiar with the standards set for such brands.

c. *References.* Wherever possible inspection of meats and meat products for compliance with specification requirements and suitability for service use should be made at the packing plant. Since this inspection is a function of the Veterinary Corps, inspection procedure is not given here. Personnel interested in this phase of inspection are referred to the following publications:

Military Meat and Dairy Hygiene—Eakins.

Subsistence Bulletin No. 18—Fresh Meats.

Subsistence Bulletin No. 5—Packing House By-Products.

Subsistence Bulletin No. 17—Cured and Smoked Meats.

United States Department of Agriculture:

Circular No. 228, Market Classes & Grades of Pork Carcasses and Fresh Pork Cuts.

Circular No. 208, Market Classes and Grades of Yearling Beef.

Circular No. 103, Market Classes and Grades of Calves and Dressed Veal.

Bulletin No. 1246, Market Classes and Grades of Dressed Beef.

Bulletin No. 1470, Market Classes and Grades of Dressed Lamb and Mutton.

Institute of American Meat Packers, Standard Beef Grading System.

d. *Equipment.* Reinspection of meats at delivery point should be made by a representative of the Veterinary Corps where one is available; where none is available, that duty usually devolves upon the Quartermaster Corps. Reinspection is concerned most particularly with soundness, net weight, condition, etc. The following inspection equipment is required for reinspection of meats:

(1) *Fresh meats.* Platform scale for weighing heavy commodities such as beef quarters, etc.

(2) *Smoked meats.* Meat trier, a polished steel blade about 7 inches long and about $\frac{3}{8}$ inch thick at the base and tapering to a blunt point at the free end, set securely in a wooden handle. A pitchfork tine makes an ideal trier blade.

(3) *Canned meats.* (a) Can opener, either stationary or portable.

(b) White enamel lined pans or other suitable containers to display can contents.

(c) Refrigerator to chill certain products designed for slicing.

(4) *Sausage.* Sharp knife.

(5) *Lard and lard substitutes.* (a) Stove or gas or electric plate or burner with which to melt and heat product.

(b) Bottles of clear glass in which to inspect for color.

75. Beef. Reinspection of fresh beef at delivery point should take into consideration net weight of quarters or wholesale cuts or packages, equal numbers of hinds and fores, proportionate weights of hinds and fores and of wholesale market cuts, and freedom from bruises, sliminess, sourness, or other evidence of deterioration.

a. Net weight. Quarters, wholesale cuts, and packages of fresh or frozen beef are weighed at time of packing and net weight applied by means of a stencil on coverings or by an attached card. Beef suffers progressive shrinkage in the cooler or freezer. When held for a considerable time before delivery, there may be considerable discrepancy between marked net and actual weight. For quarters held in a freezer for a period of 6 months, this discrepancy may be as much as 3 per cent. In fresh chilled beef the difference should not exceed one-half of 1 per cent. At delivery time all meats should be weighed and weights checked with the marked weights. Test of a representative number of units (quarters, etc.) should be made to determine average tare (covering). When purchased subject to acceptance at delivery point any shortage should be claimed by the Government.

b. Number of hinds and fores. When purchased in quarters, equal numbers of hinds and fores should be delivered. The hind quarter carries a higher percentage of more valuable cuts and has less inedible portion (bone, tendons, etc.) than does the fore quarter, hence it is more desirable in the kitchen and is in greater demand in trade. Reinspection should insure delivery of hinds and fores in equal numbers.

c. Proportionate weights of hinds and fores and of wholesale cuts. Because of greater market value of hind quarters care should be taken to check proportionate weights of hinds and fores delivered. Specification PP-B-221 sets forth proportionate weights of hinds and fores under various methods of ribbing. When hinds of minimum weight are delivered corresponding fores should be of minimum weight also. The same is true of wholesale beef cuts. Subsistence School Bulletin No. 33, Fresh Meats, lists beef cuts in the order of their usual normal market value and gives proportionate weight of each cut. Where use of all cuts is contemplated they should be in proportionate weights as found in carcass.

d. Coverings. The purpose of covering beef is to protect it from contamination by dirt, filth, insects, etc. Coverings for Army delivery should be ample and of such quality that complete protection is afforded. Heaviest coverings are necessary for frozen beef because of the harder usage they receive. Coverings for fresh beef may vary from none to complete wrapping or sewing in paper, stockinette, muslin or burlap, varying with length of haul, number of handlings, exposure to air, length of storage, etc. Coverings should be those prescribed in invitations for bids.

e. Soundness and condition. (1) *Bruises.* Soundness and condition refer to presence or absence of such factors as bruises, sliminess, sourness, blood clots, flesh firmness, etc. Bruises occur before the animal is killed and consist of injured tissues and ruptured blood vessels with infiltration of blood into the bruised area. Bruises are important because they result in waste since bruised areas must be trimmed away, and because the blood in bruised areas is not stable and decomposes sooner than sound tissue. Bruises are usually the result of rough handling and are found most commonly on prominent body parts such as point of the hip. While small surface bruises are easily trimmed away without appreciable loss, all bruises should be viewed with suspicion and bruised carcasses accepted with caution. For example, a bruise at the hip point may result in infiltration of blood along the pelvic bone and into the loin muscle. Bruises that require much trimming result in decreased percentage of edible portion and corresponding increase in proportion of bone. Such carcasses and cuts should be rejected when offered for Army use. Rounds or other beef cuts showing large blood clots should be rejected.

(2) *Spotters.* "Spotters" are beef carcasses in which small blood spots appear throughout muscle tissue. The spots occur only in carcasses of better grades, and are the result of rupture of muscle fibers due to unusual muscular effort put forth during loading, unloading, and marketing of the cattle. Spots may vary from the size of a pinpoint to as much as $\frac{1}{2}$ inch in diameter. In the uncut side it is best observed in the flank or the skirt; after ribbing, in the eye of loin or rib; after cutting, on any cut surface. In the uncut side spotters can be overlooked easily.

Spotters should not be accepted for Army use unless the spots are small and very few in number. While not injurious to health, presence of blood reduces keeping qualities of the meat.

(3) *Sliminess*. Sliminess is the result of bacterial growth and is evidence of lack of proper temperature and moisture control in the refrigerator. Sliminess is usually first noticed on those parts where circulation of air is most restricted such as underneath skirt and hanging tenderloin, and on the inside of the flank. Sliminess is evidenced by moist, sticky surfaces accompanied by a distinct odor which in advanced cases may become very offensive. When offered for Army acceptance slimy beef should be rejected since it indicates faulty handling. However, sliminess is a surface condition and when developed on beef in organization ice boxes, unless extensive or of long standing, is of little importance since it can usually be washed off. At the worst a small amount of surface trimming will usually remove evidence of slime. The seriousness of surface slime lies in evidence that the meat has not been properly handled and as a result, internal deterioration not evident on the surface may have taken place.

(4) *Sourness*. Beef does not become sour readily if properly chilled promptly after slaughter. However, if chilling proceeds slowly or the meat is cut before thoroughly chilled, and especially if piled up instead of being hung separately, it is apt to become sour. Sourness is largely confined to the hind quarter and particularly to the round. Because of the greater thickness of the round, this cut chills less slowly than other parts of the carcass, and the deep tissues along the thigh bone (femur) and around the hip joint may become sour before chilling is completed. Sourness results in offensive odors, the extent of which depends upon the extent or degree of sourness. Sourness is ascertained by means of a long, steel trier which is inserted into the round to a point near the hip joint. Sourness can be detected by smelling the trier immediately after it is withdrawn. Ordinarily there is so little sourness that inspection therefor is not carried on as routine procedure. Upon cutting, if sour areas are discovered they may be trimmed away, or if sourness is extensive, the quarter may be returned to the contractor. However, it is necessary that the sourness be determined definitely.

(5) *Firmness*. Even with modern refrigeration equipment and methods, beef does not become well chilled in less than 36 to 48 hours. When carcass beef is cut before it is well chilled and muscles set, quarters and wholesale cuts lose their shape. While cuts that are misshapen are as nutritious as those that are symmetrical, they are not so attractive in appearance and are more difficult to cut satisfactorily. Their chief importance is in the implication that the meat was inadequately chilled and therefore more prone to early deterioration than well chilled beef. Beef showing evidence of inadequate chilling when received should be inspected carefully for soundness.

f. *Tests for frozen beef*. Reinspection of frozen beef should cover completeness of freezing and evidence of refreezing. Completeness of freezing may be determined in one of three ways, by:

(1) Striking quarter or wholesale cut with an iron bar. If solidly frozen, bar will rebound and a resonant sound will be heard; if not solidly frozen, bar will not rebound and a dull sound will be given off.

(2) Boring into meat at thickest part with an augur which will penetrate as far as the meat is solidly frozen, but will stop when an unfrozen area is encountered. The augur will not penetrate bone and in boring process bones should be avoided.

(3) Sawing through quarter or cut at thickest part. If solidly frozen, a smooth, hard surface resistant to penetration of a trier or other sharp instrument will be exposed; if not solidly frozen, cut surface will be ragged and any unfrozen areas can be penetrated easily with trier.

Inspection of frozen meat for condition other than freezing can be done only after thawing.

g. *Color and texture*. Color and texture of beef are closely allied to quality, condition, and tenderness. Only by experience can an appreciation of the proper color of beef be acquired. Normal color of veal is pale pink; as age increases flesh becomes a deeper color. Color of mature beef is influenced by sex condition, kind of feed received prior to slaughter, condition of animal at time of slaughter, temperature at which meat is held, length of time held, and exposure to air.

Steers and heifers usually have maximum fine color (light red). Meat of bulls is dark red, while that of stags is intermediate between that of bulls and steers. Cow meat usually is a light red resembling that of steers and heifers, but fat of cows is always yellow, varying from a tinge to a deep shade. Fat of steers and heifers is usually creamy white. Grain feeding, particularly corn, results in firm flesh with lively bloom, and firm, white or creamy white fat, while feeding oil meal, soybeans, and other oily feeds results in dull, reddish-brown color and soft texture of both flesh and fat. Carcasses from cattle fed on grass usually have a reddish (fiery) appearance. The grass grown in some districts produces firm, white fat, but usually grassfed beef is not as firm nor as white as corn-fed.

Animals in high stage of excitement or with high temperature at time of slaughter do not bleed well and produce dark meat.

Freshly cut surface is somewhat dark but becomes a lighter color when exposed to air for an hour or so. When exposed to air in a cooler over a period of several days, the cut surface gradually darkens and becomes quite dark after 3 or 4 weeks of aging. When kept at a warm temperature, beef darkens more rapidly than at cooler temperature. The cut surface of meat dehydrates and becomes a grayish color when exposed to the cold and relatively dry air of a freezer. Extent of dehydration and depth of decoloring depend upon length of time in the freezer. After 6 months in a freezer the dehydrated area may reach a depth of $\frac{1}{8}$ to $\frac{1}{4}$ inch. "Freezer burnt" beef is dry, lacks palatability, and has an unattractive appearance.

"Lively" color and fresh "bloom" usually indicate tenderness, while a dark color usually indicates toughness. This is not always true, since at times well-fed steer carcasses cut dark and yet may be tender. However, prejudice against dark beef reduces grade of dark-cutting, sometimes as much as three grades. Bull meat is always dark in color and is always tough.

Fat of frozen beef changes but little in color and texture during the first 6 months in the freezer. After 6 months the fat becomes brittle, crumbles easily, loses its bloom, and becomes dull in appearance.

In reinspecting beef for color, consideration should be given to storage conditions (temperature and humidity), length of time cut and exposed to air, whether fresh or frozen, etc. If any doubt exists as to class, grade, and condition, a thin slice should be cut from the cut surface and color underneath noted.

With few exceptions fine texture accompanies good color; dark color is frequently accompanied by coarse texture. Fine texture is smooth, silky and moist to the touch, while coarse texture is rough, coarse, and frequently gummy or sticky. Texture is determined on the freshly cut surface. In determining texture, consideration should be given to all muscles of the carcass or cut. Muscle fibers of the skirt, hanging tenderloin, flank, and neck are large but should not be considered coarse unless the other muscles are coarse also. Coarse beef is undesirable for Army use.

h. Transportation. Fresh and frozen beef are perishable products and should be kept under refrigeration until prepared for use in the mess. For other than local deliveries refrigerator cars or refrigerator trucks are essential to keep product in good condition. For long hauls fresh beef should be hung from overhead racks by means of hooks. Frozen beef is piled upon floor racks. Fresh beef should never be piled for long hauls. For railhead distribution fresh beef may be piled on truck floors but the depth should be kept as shallow as possible. Under-chilled meat should never be piled.

i. Handling. Beef, either fresh or frozen, should never be piled on a dirty floor. Trucks to be used for fresh meat transportation should be scrupulously clean, and floors covered with paper or clean canvas. All trucks used for hauling fresh meats should be covered with tarpaulins to exclude heat, dust, flies, rain, etc. In hot weather, showering truck coverings with water tends to prevent a too abrupt rise in temperature. Beef handlers should wear clean clothing, and all benches, cutting blocks, tools, and equipment should be scrupulously clean. Beef that becomes wet or contaminated with dirt spoils more readily than dry, clean beef. Surface of all contaminated beef should be trimmed as soon as possible.

j. Storage. Beef has excellent keeping qualities. Under proper storage it will remain in good condition for a longer period than any other fresh meat. For best storage condition, it should be hung so that there is good circulation of air

entirely around each cut in a cooler temperature of about 36° F., and relative humidity sufficiently high to prevent excessive drying and not so high as to permit meat becoming wet. The relative humidity that can be maintained safely in a storage room depends upon constancy and velocity of air circulation. In constantly moving air a relative humidity of 90 can be maintained safely, but in still air a much lower relative humidity is necessary to prevent wet surfaces and resultant bacterial growth (sliminess). The more restricted the circulation of air and the higher the temperature, the shorter will be the safe storage time. Beef is the one class of meat that improves in tenderness and flavor with age. Fresh beef is practically always tough. Tenderness increases for a period of 2 weeks or more in proper storage, and flavor and palatability increases for a period of a month or more. Aging is not essential for Army use since fresh beef is usually at least a week old before it reaches the mess table and has attained sufficient tenderness and flavor for use. Beef not more than 1 week old seldom needs any **trimming** while well-aged frequently must be trimmed. Trimming results in losses not contemplated in Army messes. Growth of mold is of no particular significance or importance. Meat molds are not harmful when eaten. If extensive, they may impart a moldy flavor unless carefully washed off or trimmed away.

76. Pork. a. Sex. In grading fresh pork but little distinction is made with regard to sex. Male hog (barrow, stag, and boar) carcasses can be distinguished from female (gilt and sow) by presence of a cartilaginous button (pizzle-eye) at the posterior end of the aitchbone and a streak of lean in the cut edge of the belly of all male and their absence from female carcasses. Stags and boars are very coarse in quality and dark in color, and sows have considerable development of the mammary glands (seeds). Boar carcasses and cuts practically always carry a strong (sexual) odor which is particularly prominent when the meat is heated. Grading is based more upon quality than sex.

b. Quality. Quality is based upon color and texture of skin, flesh, and fat, and color and size of bone. Good quality is indicated by soft, flexible, white skin free from wrinkles and bristles; firm flesh of a lively light red color and fine texture; firm, white fat; and small, red bone. Oily feeds produce pork that is oily in appearance and touch, not firm, and that loses its lively color and becomes dull. Stags and boars always produce flesh coarse in texture and dark in color, and skin that is coarse, thick, and lacks flexibility. Carcasses and cuts that lack good quality as indicated by color and texture should be rejected. Large, white, hard bone indicates age, and flesh attached to such bone is invariably tough. Spareribs and loins that show rib bones of this character should be rejected as not good quality. In inspection of carcasses presence of well-developed mammary glands should be cause for rejection since it results in considerable waste. Mammary glands (seeds) are found along edge of the belly in tissue surrounding the teats. Seeds are practically absent from barrow bellies, small and usually white in gilt bellies, and large and either red or black in sow bellies.

c. Bruises. Pork is very susceptible to bruises. However, bruises are largely superficial and confined to the skin and underlying fat. Whip marks confined to the skin alone are of little importance, but when deeper tissues are involved with blood infiltration, bruises become important since they represent a direct loss, and such areas decompose more rapidly than healthy tissue. Bruised carcasses and cuts should not be accepted for Army use.

d. Storage. Compared to beef, pork has very limited keeping qualities. It does not improve with age either in tenderness or flavor. The fat is not as stable as that of beef, and early deterioration is usually first noted in the fat which tends to break down with liberation of fatty acids under influence of warmth, light, moisture, and air. Bacterial growth on the surface produces slime. Pork must be chilled thoroughly and quickly, and must be kept under refrigeration until prepared for use. Fresh pork should be marketed as soon as possible after it is cut. If it must be held for as long as a week, it should be frozen to prevent deterioration. If handled promptly it seldom becomes moldy. Sour meat is not often found.

e. Condition. For Army acceptance cuts should be clean, fresh, sweet, a good color, and free from sliminess. Frozen cuts should be delivered solidly frozen and should not show excessive freezer burn or evidence of thawing and refreezing indicated by loss of bloom. Cuts should be individually wrapped in greaseproof

paper or packed in boxes or other substantial containers lined with greaseproof paper.

f. Cuts. With exception of a small percentage of shipper pigs for special trade, fresh pork is marketed in the form of cuts rather than carcasses. Army messes utilize cuts to better advantage than carcasses. A regular ham should have the foot cut off through or above the hock joint, and have entire back covered with the skin. The shank of a skinned ham is cut in the same manner as for regular hams, but the skin is removed from the back to within 4 inches of the shank, and much of the fat trimmed away. Skinned hams are more economical for use in Army messes because of the greater waste on regular hams. A fresh shoulder, hock on, should have the foot removed above the knee joint; a shoulder, hock off, should have the leg removed at approximately the elbow joint. A skinned shoulder should have the skin removed from the back to within 4 inches of the shank and have excess fat removed. Skinned shoulders have the hock on.

77. Veal. *a.* United States Department of Agriculture Standards defines veal as meat derived from young cattle 1 year or less of age. Many States also have established definitions for veal. By general acceptance the trade considers genuine veal to be derived from young calves fed on whole milk or that have suckled their dams. Such veal has flesh of a light pinkish-brown color, fine, delicate texture, firm, white fat, and red bones with glistening white cartilage. Calves fed on skim milk do not produce fat that is so white, firm, or abundant. Calves approaching 1 year of age and given feed other than milk gradually lose the light pinkish-brown color and assume the darker red of mature beef. Since veal carcasses have little or no outer covering of fat, they are dressed skin on to prevent excessive drying and darkening. Some carcasses are shipped with skin on to protect them further during transportation. However, most carcasses are skinned before they leave the packing plant. For Army use veal should never be accepted skin on, and final acceptance on initial inspection should never be made until after the skin is removed because of prevalence of bruises. Veal tissues are tender and easily bruised. Bruised carcasses should not be accepted for Army use because of waste involved. Because of lack of fat covering, veal cannot be aged like beef since it dries out excessively with age. In addition, veal is invariably tender and does not need aging to make it tender, nor does it improve in flavor. Veal should be used as soon as possible after it is chilled thoroughly to avoid discoloration, or it should be frozen for holding. Veal is never marbled as is mature beef.

b. Reinspection of veal at delivery point should include determination of net weight, sufficiency and condition of coverings, condition and soundness. Net weight should be exclusive of coverings. Coverings should keep meat clean and should restrict circulation of air and thus preserve surface color. Veal should not show surface moisture, stickiness, or slime, all of which indicate improper temperature. A dark surface color indicates excessive drying. Veal that has lost its bloom should be rejected. Firmness is largely dependent upon presence of fat. Veal that has firm, white fat covering the kidneys, in the pelvic cavity, in the lumbar region, and a covering over the outer surface is invariably firm. Absence of fat in those regions indicates poor feeding, the meat is soft, flaccid, and has inferior food value and palatability, and such veal should be rejected. Milk-fed veal is seldom obtained in weights prescribed by Federal specifications.

78. Lamb. The United States Department of Agriculture defines lamb as meat derived from young sheep 1 year of age or less. Lamb is meat derived from immature sheep, and is characterized by red bones, white cartilages, small compact carcasses, a light reddish meat color, and presence of the breakjoint. No distinction is made in sex.

a. General. Bones of young lambs are red in color. This is best observed in the cut bones of the brisket, in the ribs in the inner wall of the thoracic cavity, and at the breakjoint. This redness diminishes as the lamb nears maturity. Cartilages of young lambs are glistening white, but lose some whiteness and size with maturity. Practically all lambs marketed in the United States are produced on the range from mutton breeds which produce lambs that are short-coupled, blocky, and compact. The meat is a pinkish-red color which deepens with approach of maturity. Hind feet are removed at the fetlock joint. Front feet are removed just above the fetlock joint at what is known as the breakjoint. The

articular surface of the shank bone is removed with the foot, leaving a broad surface with eight raised eminences.

b. *Breakjoint*. In young lambs the breakjoint is red in color and smooth to the touch; as the animal approaches maturity the redness disappears and the broken surface becomes rougher. In mature sheep (more than 1½ years old) the breakjoint is ossified and does not break, leaving the rounded articular surface on the end of the foreshank. Sometimes attempts are made to make an artificial breakjoint by cutting or breaking off the end of the shank, but this is readily detected by its white appearance and rough and splintered surface. Sheep are considered by the trade to be lambs so long as they show a well-defined breakjoint.

c. *Market*. Some lambs in the Southern States are dropped (born) about the New Year and reach market as "hot house" lambs about Easter. These are small, very immature lambs for which there is very limited trade. They are usually dressed "pelt on" to preserve color. Range lambs are usually dropped during March and April and begin to move to market about July 1. Young lambs are plentiful during the fall and winter. Those reaching market during late winter and spring are really yearlings, but are considered lambs if the breakjoint is in evidence. During this period it is frequently difficult to obtain lambs of weights prescribed by specifications.

d. *Dressing*. In commercial practice the spleen is allowed to remain with the carcass. It is found loosely attached to the diaphragm (skirt). Federal specifications require that all viscera, including the spleen, be removed. Before the World War practically all lambs were "caul dressed," that is, the belly edge of the carcass was spread wide and held in place with cross sticks across the back, and the caul was spread over the face of the lamb to give it a fatter appearance. This also allowed disposal of cheap caul fat at lamb prices. Caul is the wide, lace-like, filmy fat attached to the paunch. "Round" lambs are simply lambs that have not been spread as above. All lambs are now round-dressed, caul dressing having been discontinued. Because of protection afforded by the pelt, bruising is much less common than in pork, veal, or beef.

e. *Storage*. Lamb does not improve in tenderness and flavor with age. Aging is not practiced commercially. It is best while still possessing bloom of freshness. Lamb to be held for periods longer than a week or two should be frozen and it should be kept under refrigeration until used.

79. *Mutton*. a. *Definitions*. (1) *Mutton* is meat derived from sheep nearly 1 year of age or older.

(2) *Wethers* are male sheep castrated when young.

(3) *Ewes* are female sheep and the term is usually applied to mature sheep.

(4) *Bucks* are mature male sheep.

(5) *Dry ewes* are ewes not producing milk.

b. *General*. Mutton is characterized by whiter and harder bones, deeper red color of meat, less compact conformation than lamb, and absence of the breakjoint and presence of a rounded articular surface at the end of the foreshanks.

c. *Carcass*. Cut surfaces of brisket bones of mutton usually have lost their soft texture and red color and are hard, brittle, and reddish-white to white, depending upon age of the sheep when killed. Ribs on inner surface of the thoracic cavity are white and large. Meat is a deeper red than that of lamb. In the United States the only mutton that reaches market is from breeding stock, largely ewes and a small percentage of bucks. Practically no wethers are held beyond the lamb stage. Because they have been used for breeding purposes, old ewes are less compact in form than lambs, and are rangy, lanky, and ribs are distended (barrel-shaped). Because they have given birth to young, the vent is much larger than on lambs and bucks. Usually no udder tissue is present on the dressed carcass but is cut away on the filling floor. The neck of a ewe is usually long and slender and hip bones prominent. While some fat ewes reach the market, most ewes are thin, poor in flesh, and poorly covered. Bucks usually show masculine characteristics of the entire male animal, thick, short neck, heavy shoulders, little or no cod fat, and an open inguinal canal. The breakjoint is absent in all mutton.

d. *Delivery requirements*. Federal specifications for mutton prescribe that deliveries consist of not more than 50 percent ewes. The balance must be well-matured wethers. Since wethers are practically never grown to full maturity

but are marketed as lambs, inspection and reinspection of mutton should be largely concerned with the percentages of wethers and ewes delivered. Buck carcasses are invariably coarse and tough and for that reason are undesirable. They should be excluded from delivery. Wether carcasses lack masculine characteristics of bucks and have an abundance of cod fat depending upon degree of fattening, and there is no evidence of an open inguinal canal. Necks of wethers are short and plump but the shoulders and necks are not massive as in bucks. Cod fat should be abundant. In the inspection of ewes care must be exercised to secure prescribed quality. Very few ewes have compactness of form, quality or finish required by specifications.

e. Storage. Mutton does not improve in flavor or tenderness with age. While mutton may be kept in a chilled state for 2 weeks or more, it is not improved by such storage. Mutton is best while possessing the bloom of freshness. When kept for longer periods, it should be frozen. Frozen mutton does not deteriorate appreciably during the first 6 months in cold storage. It loses its bloom after that period, the fat becomes crumbly and a dull color, and because of the considerable surface exposed to air drying is inevitable. Frozen mutton should be checked carefully for net weight.

80. Specialties. *a. General.* Meat specialties are perishable products and should be chilled promptly, kept under refrigeration at all times until used, and frozen solid if not used promptly. For prompt chilling, beef hearts, livers, tongues, and oxtails are hung from hooks, while kidneys, sweetbreads, brains, and sheep and hog hearts are spread on trays. The more promptly and completely they are chilled, the better will be their keeping qualities. In reinspection at delivery, consideration should be given to proper identification, quality, and condition.

b. Hearts. Purchases are restricted to beef hearts. In official establishments all beef hearts are cut open for inspection purposes. Should whole hearts be delivered, the inspector should suspect that they may have come from an unofficial establishment, and should look for the inspection mark which should be branded on each by means of a burning brand. They should have the heart caps (auricles) removed since these are thin-walled, fibrous, and of inferior food value. Hearts from young cattle have a small piece of cartilage embedded in the muscle tissue. In those from old cattle this cartilage may have turned to bone. Hearts from grain-fed beef cattle are thick-walled, meaty, and have a collar of firm, creamy white fat around the base and along the seam between the lobes of the heart. Hearts from dairy cows and from underfed cattle have less fat, and it is not so firm nor so creamy white in color. Calf hearts have much the same characteristics as beef except that they are smaller, are frequently sold cap on, and amount, firmness, and color of fat will depend upon feed the calf received. Hog hearts are smaller, fat is much whiter and less firm than beef, caps are not removed, and they have a softer, oilier feel than beef hearts. Sheep hearts are much smaller than hog, and fat is much firmer. To meet specification requirements, beef hearts should be strictly fresh, firm, thick meaty, surface free from moisture or slime, free from blood clots, have a lively red color of meat, and fat should be abundant but not excessive and of firm texture and creamy white color.

c. Livers. (1) *General.* Federal specifications provide for purchase of calf, beef, and lamb livers. Since these represent a considerable range in quality and market value the inspector should be able to recognize kind and quality offered. Calf livers have the highest market value.

(2) *Veal and calf.* In many markets distinction is made between veal and calf livers. Both should weigh not to exceed 3½ pounds. Veal livers are from young, milk-fed calves and are a light chocolate color, while calf livers frequently are from older calves or from those not fed on milk, and are a darker brown color, some being almost black. Veal livers are always tender, have very little tendinous structure, and have the most desirable flavor and appealing color. Calf livers compare very favorably with veal in tenderness, but because of the difference in feed the calf received are not so palatable in flavor, have less nutritive value, and are not so attractive in color.

(3) *Yearling.* "Yearling" is the term commonly applied to bovine livers weighing 3½ to 7 pounds; those over 7 pounds are called beef. Yearling livers are from young beef cattle, have good conformation and color, and are very desirable because of their appearance and good flavor, and because they have de-

veloped little tendinous structure. They are second to veal and calf livers in market value.

(4) *Beef.* Beef livers are designated as steer and cow livers and vary greatly in market value. They weigh over 7 pounds. Steer livers are short, plump, very thick at the large end and taper gradually to a very blunt edge at the opposite end (see Plates 1 ① and 2). Cow livers are usually elongated and are usually thin in the middle and large at each end (see Plates 1 ② and 3). The color may vary from a very light straw to almost black. Very light-colored livers are always very friable and easily broken down. While some straw-colored livers are taken from fat steers, most of them come from cows nearing parturition. Cow livers are usually very dark in color. Dark-colored beef livers are invariably tough. The surface of cow livers is frequently uneven and sometimes pitted. For Army use beef livers should be plump, firm (without being flabby or hard), short, of light mahogany color, and have smooth, unblemished surfaces. Mutilated (cut or torn) livers should not be accepted.



① Steer.

② Cow.

Plate 1. Beef liver.

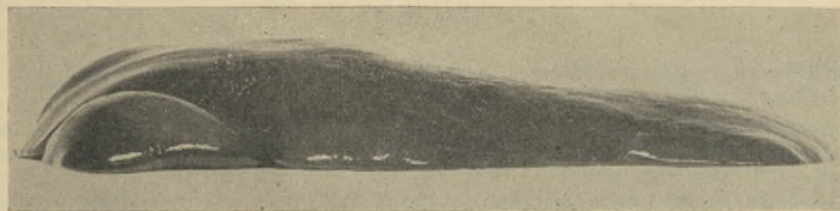


Plate 2. Steer liver (side view).

(5) *Lamb.* Lamb livers are smaller than veal, are invariably a dark mahogany color, and differ in conformation. Calf livers have two main lobes and a third smaller lobe. When held with the large end upward, the two main lobes hang one below the other in almost straight lines, with only a small notch on one side to indicate the division between the two main lobes (see Plate 4 ①). Lamb livers have a very deep notch (extending almost half way across) which divides it into two distinct lobes, and the lower lobe has a distinct twist to one side (see Plate 4 ②). In both veal and lamb livers the third lobe is attached be-

hind the upper main lobe. Sheep livers can be differentiated from lamb only by size. Little or no distinction is made between the two by the trade. Lamb livers lack the flavor characteristic of veal and good beef.



Plate 3. Cow liver (side view).

(6) *Hog.* Since hog livers are inferior to either lamb, veal, or beef in flavor, tenderness, and market value, the inspector should be able to differentiate between them. Hog livers are divided into four lobes of about equal size by three deep notches (see Plate 4 ③). When laid flat these lobes spread out fanwise and the free edges of the lobes are very thin. Hog livers are invariably dark in color. They should never be accepted in lieu of veal, beef, or lamb.

The gall bladder should be removed from all livers delivered under Federal specifications.



① Veal liver

② Lamb liver.

③ Hog liver.

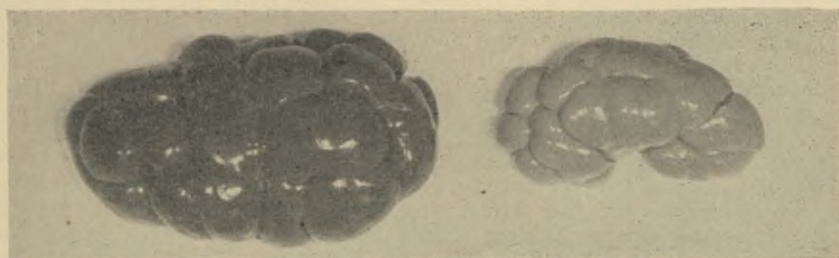
Plate 4.

The difference in shape and conformation of veal, beef, sheep, and hog livers is shown in Plates 1, 2, 3, and 4 above.

d. Kidneys. Beef kidneys vary in color from a sickly yellowish-white to almost black. Steer and heifer kidneys usually have a light or dark mahogany color while cow kidneys vary greatly. The difference in texture also varies greatly; steer and heifer kidneys are usually firm and well shaped while those of a cow may be misshapen and are usually soft and flaccid. Beef kidneys are divided into many irregular lobes by deep fissures (see Plate 5 ①). These lobulations are characteristic of bovine kidneys. To meet specification requirements beef kidneys should be plump, firm, and a mahogany color. Beef kidneys are differentiated from those of other food animals by their size, shape, and presence of lobes. Calf kidneys are lobulated but are smaller than beef (see Plate 5 ②). Hog kidneys are smaller than calf, are elongated, and are not lobulated (see Plate 5 ④). Sheep kidneys are much smaller than hog, have a smooth surface (not lobulated), and have a distinctive kidney bean shape (see Plate 5 ③).

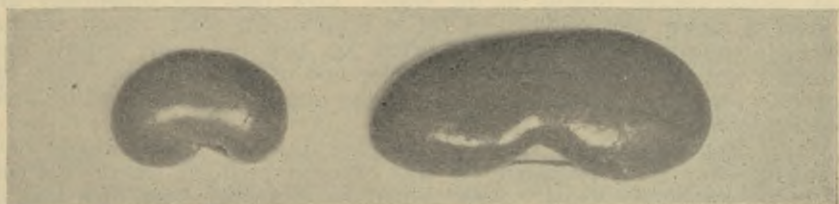
e. Sweetbreads. Sweet breads are the thymus glands of young bovines. The gland lies along the left side of the throat and extends into the thoracic cavity.

It is largest in veal calves and is still of considerable size in yearlings. The gland is divided into two parts, the one from the throat being elongated and the other at the thoracic end being rounded and about the size of the palm of the hand. Calf sweetbreads are large, very tender to the touch, and almost white in color. They are the most desirable from the standpoint of tenderness and flavor, and sell at a much higher price than beef. Beef sweetbreads are smaller than calf, are much less tender to the touch, and are of a reddish tint. Calf sweetbreads are usually sold in pairs, that is, both throat and thoracic portions wrapped together



① Beef.

② Veal.



③ Lamb.

④ Hog.

Plate 5. Kidneys.

in waxed paper. Sweetbreads are chilled by spreading on trays. If they are not to be marketed at once, they are packed in tin pails of about 5 pounds net weight and frozen. Sheep sweetbreads are very small and are packed in molds and frozen in blocks of about 1 pound. Inspection should determine class and condition. There are no grades within classes. Sweetbreads should have a fresh, wholesome aroma, be free from sliminess, and have good color characteristic of the class.

f. *Brains.* Inspection of brains is chiefly for class differentiation and condition. Federal specifications provide for use of calf and hog brains. Calf brains are much larger than hog or sheep but smaller than beef. Calves are not usually stunned before slaughter and the brains are therefore seldom clotted with blood. With exception of Kosher, beef cattle are always stunned, resulting in blood clots in practically every beef brain. Clotted blood is undesirable since it reduces keeping qualities. Calf brains should be firm but tender, and should have a creamy white color slightly tinged with red. Hog brains are small when compared with calf or beef. They are very soft in texture and are difficult to remove from the skull in whole condition. When placed on trays they flatten out and when handled are broken easily. The two lobes are separated easily. The cerebellum (second brain) seldom remains attached to hog brains. They are about the same size as sheep, but the latter are firm and very compact. The two lobes do not separate easily and the cerebellum is usually attached. When placed on trays sheep brains retain their plump, rounded contour. Sheep brains usually have a whiter color than hog. Since sheep brains have a higher market value than hog, there need be no fear that they will be substituted for hog. It is difficult to differentiate between a large calf and a young beef brain, but this is of little importance if they are in good condition. Brains should have a good color, have characteristic texture of the class, and have a fresh, wholesome aroma and appearance.

g. *Tongues, beef.* Federal specifications require short-cut beef tongues. Long-

cut beef tongues have attached the larynx, the epiglottis, two or three rings of the trachea, and fat. Most of these are inedible or of little use in an Army mess. Short-cut tongues have all of these appendages removed. Inspection should include trimming, quality, and condition. Closely trimmed tongues have all inedible (cartilage) parts and excess fat removed. Quality is indicated by size and texture of the tongue and color and texture of fat. Cow tongues are usually small and are hard and tough to the touch, and fat is usually scanty, of soft texture and a yellowish cast. Good beef tongues are plump, meaty, tender to the touch, and fat is abundant, of white color and firm texture. Fresh beef tongues retain their mucous membrane covering (skin), and are characterized by their roughness, having large papillae near the base and along the sides, and very hard, rough, but small papillae near the tip. Calf tongues have the same characteristics as beef except that they are smaller. Hog tongues are much smaller than beef. They are always short-cut but retain the epiglottis. The mucous membrane of hog tongues is always smooth, and that at the tip is usually loosened due to the heat in the scalding vat. Hog tongues do not have the fine flavor of beef or calf and are much less desirable. Sheep tongues are very small. Beef tongues are subject to injuries. In inspection for the Army, any tongue showing scars of injuries or abscesses or having cuts or bruises should be rejected. Tongues should have a fresh appearance and aroma and be free from sliminess. Weight is of considerable importance in selection since the better quality is usually the heavier.

h. Oxtails. Oxtails should be selected for color, meatiness, and texture. Tails from all cattle become oxtails in the trade. Cow tails are practically always bony, meat is scanty and tough, and fat is a yellowish color. Such oxtails are undesirable. Oxtails from young beef cattle are plumper, more meaty, meat is more tender, and fat is creamy white in color and of firm texture. Such oxtails are desirable. In a large measure, texture of the meat can be detected by pressure with the thumbnail.

i. Storage. Meat specialties have poor keeping qualities. They should be kept under refrigeration until prepared for use. Frozen products should not be defrosted until just before using. They should be protected from dust and insect contamination by suitable wrapping or packaging. Defrosting frozen products is done most safely in a refrigerator.

81. Cured and smoked. *a. Cured.* (1) *General.* Cured meats have better keeping qualities than fresh. Curing also changes the flavor by addition of salt and other curing agents and by enzymic changes taking place during curing process. Cured meats are very seldom frozen. Meats should not be cured until they are ready to be consumed as such or as preparation for smoking.

(2) *Fat backs, dry-salt.* Good quality fat backs are indicated by soft, white, smooth, flexible skin and firm, white fat. Fat backs have no bone and very little lean meat. They are brushed as free of salt as possible for shipment and have salt crystals over entire surface. If delivered with excess salt, a tare test should be made by weighing before and after brushing with a broom. Yellow or a rusty color fat indicates keeping in cure for a long period.

(3) *Pork bellies, clear, dry-salt.* The term "clear" means removal of all bones. Commercial practice sometimes leaves a small portion of sparerib on the brisket end, but Federal specifications require entire clearance of bone. Quality and surface salt are determined in the same way as for fat backs (see (2) above). Dry-salt bellies are made from heavy and from coarse bellies. All good quality weighing under 12 pounds are made into smoked bacon. The best dry-salt cured bellies are made from barrow and gilt weighing 14 pounds and up. Practically all old sow bellies are dry-salt cured and are invariably seedy. Those that are large and coarse and that have large nipples (teats), or with evidence that large nipples have been cut away may be expected of being from old sows. By cutting into tissues underneath and near the nipples presence or absence of seeds may be determined. Seeds are mammary gland tissue and are neither meat nor fat. Seeds that have been lactating (producing milk) are reddish brown in color. Size (extent) of seeds depends upon number of litters the sow has borne. They usually are not extensive after the first litter but increase in extent with each successive litter. Black seeds result from deposit of black pigment in mammary gland tissue, and are frequently found in dry sow bellies. Old sow bellies are undesirable because they are coarse and wasteful, and their acceptance is forbidden under Federal specifications. Barrows and gilts have rudimentary nipples

and small, insignificant seeds or none at all. Gilt seeds, if present, are usually colorless (white). Barrows sometimes show traces of black seeds. Dry-salt are seldom trimmed as carefully as bacon bellies. Old sow bellies, particularly, are seldom cut square but are irregular in outline (see Plates 6 to 11, inc.).

(4) *Beef, corned, bulk.* Bulk corned beef is pickle cured. During curing process the beef absorbs moisture as well as curing agents, and when taken from pickle will weigh from 5 to 8 percent more than the green weight. When cured corned beef is allowed to drain for a few hours after being taken from pickle it loses approximately 4 percent of its cured weight. In packing barrels or smaller containers for curing, only sufficient green meat is put in the container to produce prescribed net weight after draining. If delivered in pickle, the proper net weight should be ascertained by pulling and draining the meat for at least 2 hours, or making a deduction of 4 percent from the pulled weight. If delivered dry it should be taken at delivered weight. Federal specifications permit delivery in commercial containers. Both methods are used in commercial practice. Brisket corned beef must have all bones and deckel removed. Deckel is a layer of muscle and fat on the outer surface of the brisket. Plate (naval end) beef retains all bones. Commercial practice allows two or three vertebrae to remain on the rump, but Federal specifications require removal of all bones. Corned beef from steer and heifer carcasses are thick-meated and fat is white or creamy white, while that cut from cow carcasses is not so thick-meated and fat is usually not so firm and has a yellowish cast. Notwithstanding that corned beef has been cured, it should be kept under refrigeration until used. In pickle in tight containers it will keep for a longer time out of refrigeration than will the dry product, and will not ordinarily spoil until the pickle spoils. Kept in pickle, particularly in warm temperatures, it will absorb salt rapidly and become very salty. A rusty color denotes age.

b. *Smoked.* (1) *General.* Cured and smoked meats have good keeping qualities. Ordinarily they do not need chillroom refrigeration but keep best at temperatures between 50° and 60° F. Good smoking is indicated by dry surface, shrunken skin, and a bright, light cherry color. Pale color, soft, flaccid skin, and soft, moist meat indicates insufficient smoking. Such meat does not store well, particularly if wrapped or piled, since moisture in undersmoked meats furthers mold and bacterial growth. For satisfactory smoked products, meats must be properly cured before smoking, as undercuring and insufficient chilling before curing frequently result in sourness.

Sourness occurs most frequently in thick pieces and those that contain bones, such as hams, shoulders, etc., and is determined by use of a trier which is inserted into the meat at points most likely to show sourness, and is smelled as soon as it is withdrawn. A good trier will carry to the nose any odor of decomposition. Meat should never be tried in rapidly moving air since the odor is carried away before the trier reaches the nose. Triers must be made of good, highly polished steel. Iron triers do not carry odors accurately.

Commercial smoked meats usually carry the brand name, and each piece should carry inspection legend and establishment number. Smoked meats are usually wrapped. Only net weight should be paid for, and test for tare should be made on all shipments of wrapped products received. Wrapped hams, bacon bellies, etc., have the net weight stamped on the wrapper taken at time of wrapping.

Smoked meats are subject to shrinkage when held for sometime and if not kept dry are prone to mold, particularly if kept wrapped. Mold is not harmful to health but if extensive may impair a moldy taste to the meat, and it usually is removed readily by wiping with a dry cloth, by washing in salt brine or vinegar, or by trimming. Products that are moldy at time of delivery should be rejected. Removal from wrappings and hanging in good air circulation retards or prevents mold growth, but it also furthers shrinkage.

Smoked meats kept in a cooler usually lose some of the smoked color and bloom. Those removed from a cooler and placed in warm temperatures will sweat, and this surface moisture furthers mold and bacterial growth and reduces color. Smoked meats should be kept dry.

(2) *Hams.* Ham inspection should be for type, grade, and condition.

(a) *Cut.* American short-cut hams have the foot removed through or above the hock joint. Sometimes this cut is so high that the marrow canal of the shank bone (tibia) is open. Both regular and skinned hams are short-cut. Regular

hams retain skin and fat over the back while skinned have skin removed to within 4 inches of the shank and surface fat trimmed off, the fat remaining being evenly tapered to the lean at the butt end. Skinned hams are more economical than regular in an Army mess unless skin and excess fat can be utilized to advantage. Regular hams with 1½ inches or more of fat at the butt end are quite wasteful. Such hams are seldom made into first grade regular hams but are skinned or placed in lower grades.

(b) *Grade and quality.* Grade is indicated by conformation and quality. Good grade hams are short, plump, and thick, with short shanks, giving the highest percentage of good quality edible meat. Good quality is indicated by thin, smooth skin, firm fat, meat of fine texture and lively color, and small bone. Smoked calas or picnics which are made from shoulders should not be mistaken for hams. They are inferior in texture and tenderness, and have a higher percentage of bone and tendinous tissues to edible meat. The cut surface of ham meat usually shows a phosphorescent sheen. This is not a defect but a natural result of curing and smoking processes. A well-smoked ham is firm, the skin shrunken and not soft and flaccid. The best place to observe degree of smoking is on skin of the shank. If this is well-shrunken, firm, and good smoked color the ham has been properly smoked. Stockinnetted hams do not show as deep smoked color as those smoked naked.

(c) *Trier inspection.* The trier should be inserted successively in the marrow canal of the shank bone (if it is open), into the shank near the stifle joint, along the thigh bone (femur), and under the aitchbone. Expertness in trier inspection results only from considerable practice. The sense of smell first must be trained to determine the natural aroma of sound smoked hams. Sourness is any variation from soundness including any putrefactive process, formation of gas, rancidity of fat, etc., and varies greatly in degree. The aroma of sound hams varies also. The inspector must learn to differentiate these various odors, and this is acquired only by experience.

(d) *Boned and rolled.* Boned and rolled hams are prepared by boning the cured hams, tying tightly with string, and smoking. Some are stuffed into artificial casings instead of being tied. A recent development in smoking is pre-cooking during the smoking process. Such hams are subjected to smokehouse heat to cook sufficiently to make them tender and also render them safer for eating by destruction of any trichinae that might be present. Such hams are usually labeled to indicate pre-cooking and need only warming to prepare for the table. Since only a small proportion on the market are pre-cooked, all hams prepared in Army messes should be cooked to insure safety from trichinosis.

(e) *Storage.* Keeping qualities depend upon kind of cure, extent of smoking, and moisture content. Mild-cured hams ordinarily do not keep as well as hard-cured. The longer the smoking process and the hotter the temperature during smoking, the drier the hams become and the better their keeping qualities. A recent development in curing is artery pumping, that is, pumping pickle is forced into all parts of the ham through blood channels. With artery pumping more pickle is introduced and retained in the ham. Because of their higher moisture content, such hams do not keep as satisfactorily as those cured by other methods. Practically all smoked hams produced in official establishments are now artery pumped. Under-dried hams are apt to mold. Commercially smoked hams are not designed for long keeping. They should be consumed within 2 weeks after smoking for best results. Army commissaries and messes should not stock smoked hams for more than a maximum of 1 month; 2 weeks would be safer.

(f) *Oversea shipments.* Hams prepared for oversea shipments by heavier smoking have better keeping qualities. For shipment to the tropics many are wrapped in an asphaltum covering which excludes air, moisture, and light. Those packed in asphaltum covering receive a hard cure and a heavy smoke. They keep well for months with very little mold growth because of the small amount of air present. Army hams are sometimes packed in airtight, hardwood quarter or half barrels. They are packed naked and all spaces around the hams are filled with dry salt. At time of packing the salt is practically free of moisture but it rapidly draws moisture from the meat and becomes moist. If such packages are allowed to remain in one position for a month or two the salt in the bottom becomes wet. Hams packed in salt lose weight, and also absorb salt and become

salty in taste. The smoked color is bleached by the salt and they become pale in appearance. Those in contact with wet salt become soft and flaccid. Such hams are not ordinarily transported and held under refrigeration. Salt prevents surface mold but it does not prevent internal souring.

(3) *Bacon.* (a) *General.* Clear bellies are free of bones. However, the cartilages (featherbones) embedded in meat at the ends of the floating ribs are not bones and are not removed. Bacon bellies cannot be rejected because of presence of featherbones. Good quality is indicated by soft, smooth, thin skin, firm white fat, and firm meat of lively color and fine texture. After smoking, the skin is no longer soft and flexible but should be thin and smooth, and good qualities of fat and meat should be evident. Thick, rough, wrinkled skin; soft, oily fat of brownish color; and soft, oily meat of dull color or coarse, dark-colored meat indicate poor quality, and bacon with such characteristics should be excluded from deliveries.

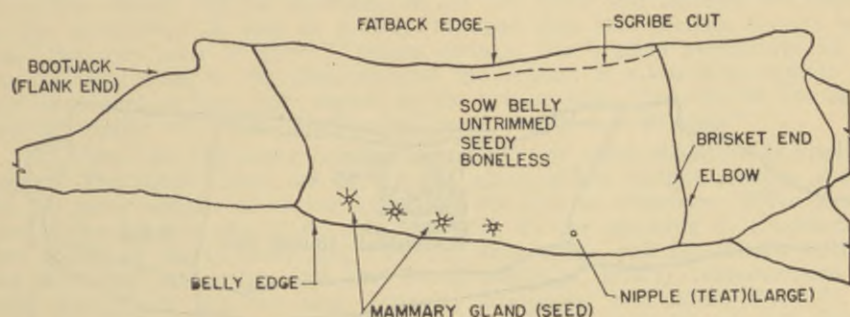


Plate 6.



Plate 7.

(b) *Trim and cut.* Trimming varies with the grade, being greatest in Type I, grade 1. The extent of trimming is illustrated in Plates 6 to 11, inclusive. In commercial practice the shoulder is cut from the side immediately behind the elbow joint. The skin at this point is soft and contracts considerably during the smoking process. The brisket is the forward part of the belly, and extends as far back as there is evidence of soft tissues behind the elbow. Type I, grade 1 bacon should have the brisket completely removed (see Plate 8). It is not necessary to remove the brisket from Type II (dry salt-cured). Type I, both grade 1 and grade 2, must be seedless. In commercial practice the belly edge of both barrow and gilt is cut back close to or beyond the line of nipples to insure removal of all seeds. (see Plates 8 and 9). Barrow bellies for Type II (dry salt-cured) bacon are not cut back to remove the nipples but gilt or sow bellies must be cut back to insure that they are seedless (see Plates 10 and 11). All bacon delivered under Federal specifications must be square-cut which requires removal of the "bootjack" and the "backstrap" (see Plates 6 to 11). In cutting pork middles a scribe saw is used to separate spareribs from loins. At times this scribbling cut may be so deep as to mutilate tissues underneath. After loin and spareribs have been removed from the middle, the fat back is severed from the

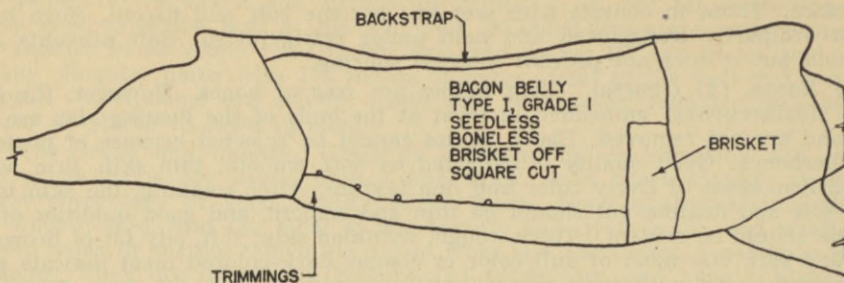


Plate 8. Cut for Type I, Grade 1, Bacon.

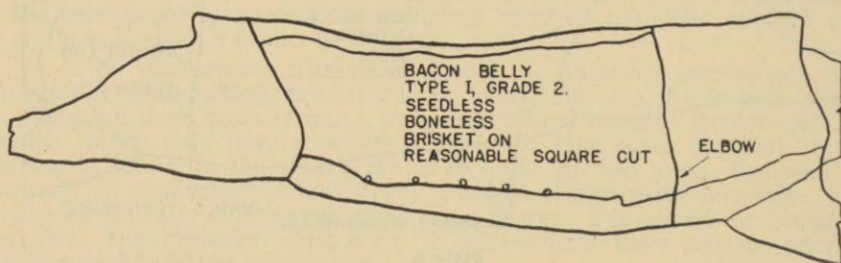


Plate 9. Cut for Type I, Grade 2, Bacon.

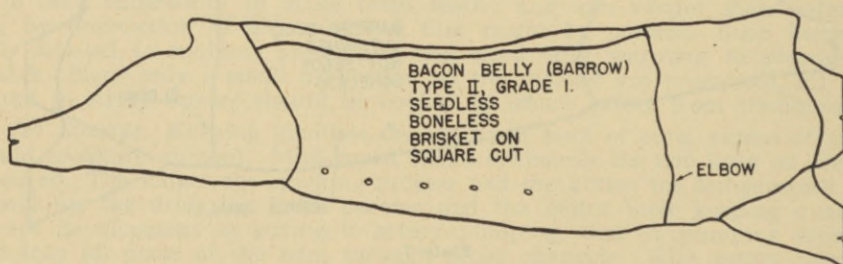


Plate 10. Barrow Belly Cut for Type II, Grade 1, Bacon.

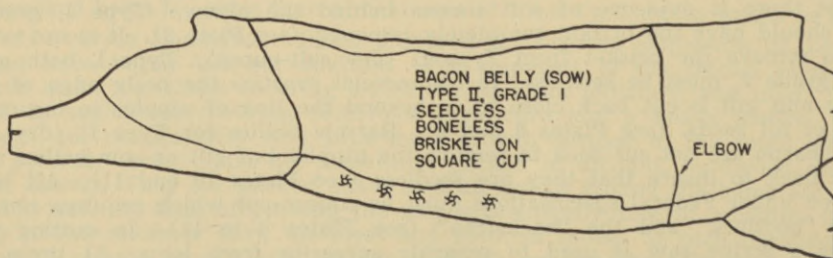


Plate 11. Sow Belly Cut for Type II, Grade 1, Bacon.

clear belly on a line from $\frac{1}{2}$ inch to 2 inches beyond the scribbling cut, leaving any mutilated tissues on the belly. Bellies should be properly trimmed or backstrapped to remove any evidence of such injuries. If not they should be rejected. Backstrapping consists of removing the strip of fat and skin along the fat back edge of the belly to make it square cut.

(c) *Quality.* Bacon bellies of good quality have thickness proportionate to their length and width. Abnormally thin bellies usually are not good quality and are placed in lower types and grades of bacon. Trimming for Type I bacon reduces length and width but not thickness. However, since such bacon is made largely from bacon type hogs, thickness is usually not out of proportion to width and length. Proportions of lean and fat vary with sex and extent of trimmings. Barrows have an extra streak of lean in the belly edge. The greatest amount of lean is in the belly edge; there is none in the fat back edge. When the belly edge is trimmed back to make seedless, a large percentage of the lean is removed. Such bellies should not be rejected. If cut too wide and include too much fat back the proportion of lean is greatly reduced and such bellies should be rejected. Barrows used in Type II bacon contain the highest percentage of lean. When cut very close to the shoulder and the brisket is allowed to remain on, a rather large area of lean may appear in the brisket end. This should not be construed to comply with the requirement "well streaked with lean."

(d) *Cure.* In dry-sugar box-cure no pickle or other moisture is applied to the meat. The meat comes out of cure at about green weight, having absorbed about the same weight of curing agents as the loss in moisture. When properly smoked Type I bacon should be firm and dry. Proper smoking is indicated by a golden brown or cherry color and firm, dry skin, meat, and fat. Bacon with soft, flaccid skin and pale color, and that bends easily is usually undersmoked or is inferior quality, or has not been properly dry-sugar box-cured. Type II, dry-salt cured bacon loses about 3 percent in cure and from 9 to 12 percent additional smoke. Such bacon is very dry and firm.

(e) *Storage.* Keeping qualities of bacon vary with kind of cure and degree of drying during smoking. Commercially smoked dry-box cured bacon is not designed for long storage, but should be consumed if possible within 2 weeks. Army organizations should not stock such bacon beyond a maximum of 1 month; 2 weeks would be safer. Bacon smoked for 48 hours has much better keeping qualities. Type II, dry-salt cured bacon has excellent keeping qualities and will remain in good condition for 6 months or longer when packed in crates, and from 1 to 2 years in cans. Sliced bacon, because of the much greater exposure to air, has lessened keeping qualities. Bacon fat becomes yellow with age due to oxidation and disintegration of the fat, and acquires an acrid (acid) flavor.

(f) *Condition.* Bruises are sometimes difficult to detect in fresh bellies but become very prominent after smoking due to dark discoloration of blood in the bruised area. Bruised bacon bellies should be rejected. Trier inspection of bacon bellies should be along the line of featherbones and in the brisket end. Type II bacon, which is hung for smoking by means of strings through the flank end, sometimes shows sourness in and around the string holes. Sourness is much more prevalent when hung by the brisket end. Mold on bacon is of little importance unless it penetrates beneath the surface in crevices or torn places. However, bacon that is moldy at delivery time should be rejected since it is evidence of age or improper handling. Bacon kept where air can circulate freely about each piece does not mold appreciably, but it will shrink in weight.

(g) *Style.* Canadian style bacon is made from the eye of heavy loins with a thin layer of fat from back attached, and is very lean. It is dry-cured, and usually smoked in stockinettes or artificial casings. Briskets are dry-cured and smoked on wire screens. They present a higher proportion of lean than bacon bellies, and when cut sufficiently wide are desirable. They are cut in varying widths from 2 to 5 inches. Squares are cut from the jowl, and are cured in dry-cure or dry-salt cure, and are smoked in the same way as briskets. They contain very little lean meat and are not desirable as breakfast bacon.

(4) *Beef, dried.* (a) *Cuts.* Dried beef is made from the three divisions of the round, inside, outside, and knuckle (beef hams). The inspector should be able to identify cuts as well as slices made from them. The inside is the largest of the three cuts and is composed of one group of muscles of the same color and tex-

ture. Naturally, the inside terminates at the shank and in a triangular point, but commercial practice now molds the inside into a more compact form (see Plate 12) that results in more slices of uniform size and shape. The outside is much smaller than the inside, is narrower, and much thinner. It is composed of two groups of muscles which differ in color and texture. The shank end of the outside terminates in a more acute triangular point than the inside (see Plate 13). The knuckle is shaped like a mule's foot, compact and rounded, and the group of muscles of which it is composed is divided into three divisions of about equal size. The knuckle bone (patella) is present in the small end of commercially dried knuckles (see Plate 14).



① Not molded.

② Molded.

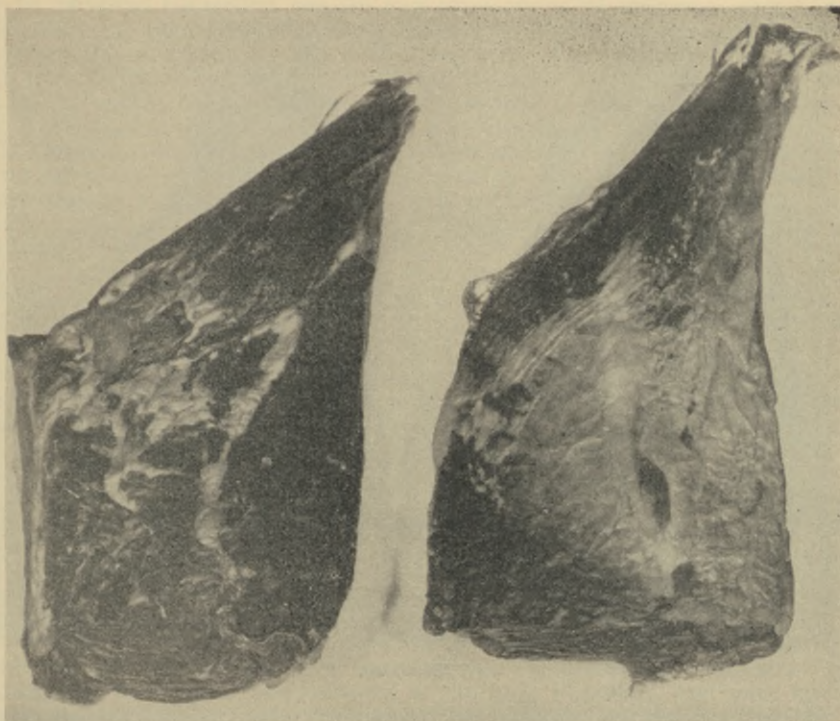


③ Slices.

Plate 12. Dried Beef Insides.

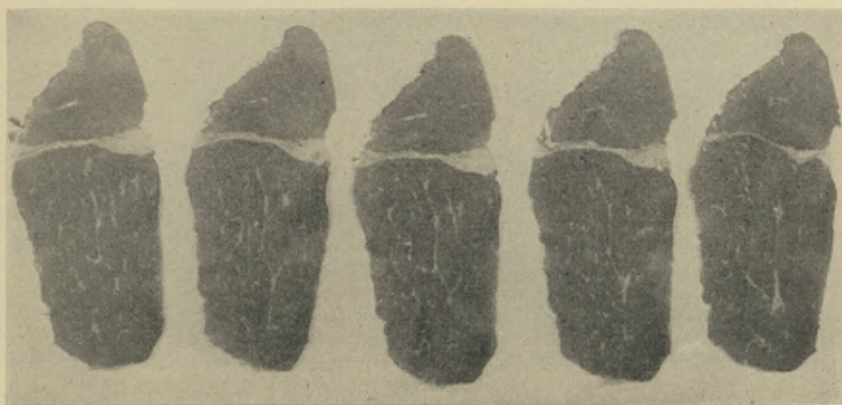
(b) *Slices.* Sliced dried beef is just as distinctive as the cuts. Slices from the inside are large, oval in form, of uniform color and texture throughout. Very delicate connective tissues may divide the slice into two or three indistinct sections (see Plate 12). Slices from outsides are narrow and long, and are divided into two distinct sections by a layer of connective tissue and fat. The two sections differ distinctly in color and texture. The smaller section has very light color and fine, delicate texture and gives appearance of having been sliced across the grain, while the larger section is much darker in color, has a coarser

texture, and gives appearance of having been sliced with the grain (see Plate 13). Slices from knuckles are rounded or roughly triangular in outline and are divided into three almost equal parts by two layers of connective tissues, all sections having the same color and texture (see Plate 14). Knuckles are darker



① Inside view.

② Outside view.



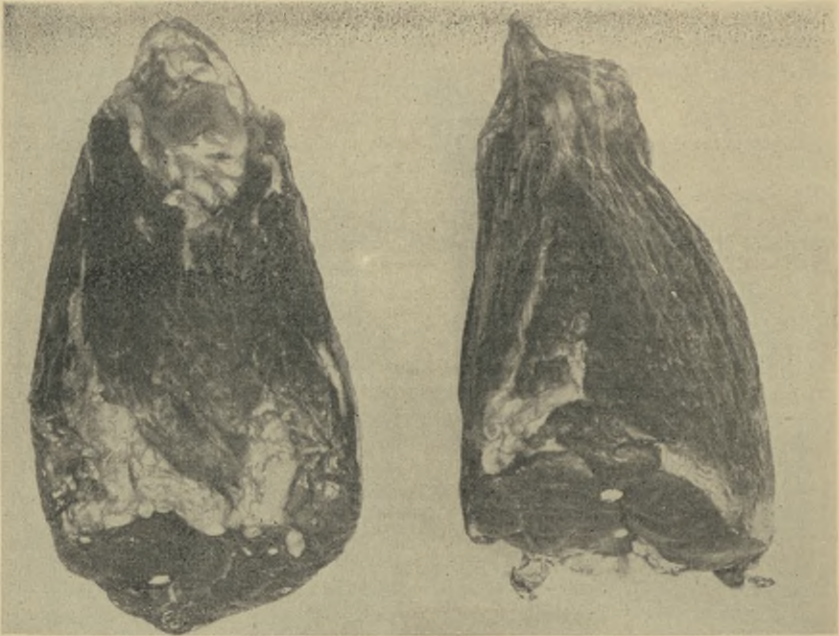
③ Slices.

Plate 13. Dried Beef Outsides.

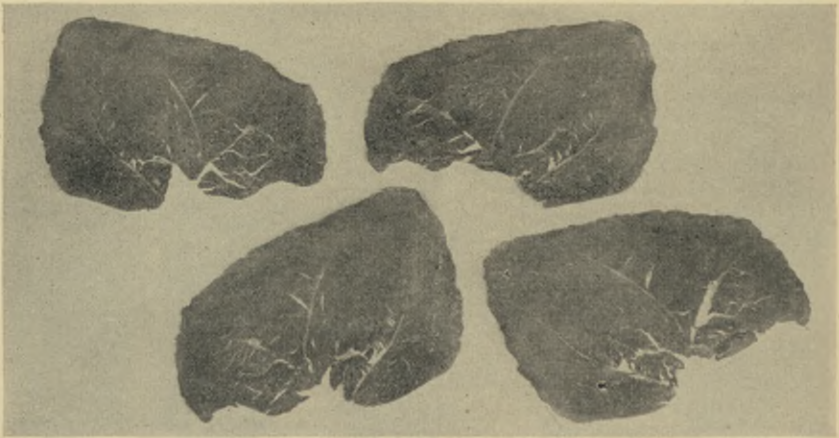
in color than insides, much darker than the light colored end of outsides and about the same color as the darker end of outsides. The cut surface is frequently phosphorescent.

(c) Quality. Dried beef is made from canner and cutter grades of cows and from low grade bulls. Very dark meat indicates bull meat. The meat is hard cured, and dried for a period of from 4 to 7 days. Smoking is no longer commer-

cially practiced. The beef loses from 35 to 45 percent of its weight in drying process. Dried beef cuts (unsliced) should be firm and dry, and have a bright mahogany or cherry color. A dry, lifeless ("perished") surface appearance (particularly outsides) indicates poor quality. While presence of fat indicates better



① Knuckles.



② Slices.

Plate 14. Dried Beef Knuckles.

quality, fat is undesirable since it deteriorates rapidly. Surface fat and fat in grooves between muscle bundles should be trimmed away before delivery.

(d) *Storage.* Dried beef hams can be kept for a considerable time, but are best when sliced and used within a month or two. Sliced dried beef has limited keeping qualities. Packed in boxes or cellophane-wrapped, it keeps well for 2 to 4 weeks. Packed under high vacuum in hermetically sealed glass or tin containers, it keeps well for several months. However, all sliced beef acquires an old flavor with age, and in sealed containers may be edible after a year but not palatable.

82. Sausage. a. General. Federal specifications prescribe ingredients and proportions thereof that enter into manufacture of various kinds of sausage for Army use. The only way these can be assured is by inspection at time of manufacture. In finely chopped sausage especially it is impossible to determine accurately by physical inspection quality and proportions of materials used. Inspection at delivery point should include net weight, kind of casings, number of links to the pound, condition, and if not inspected at origin, quality.

(1) *Net weight.* Net weight should be exclusive of wrappings. Dry sausage is not apt to shrink after it is packaged for shipping but fresh and smoked may shrink if exposed to warm temperatures and moving air.

(2) *Casings and links.* Casings are either natural or artificial. Natural casings are derived from animal tissues (intestines, etc.) and are digestible, while artificial casings are made of cellulose and are not digestible. Artificial casings are made in sizes to resemble natural, are usually transparent, and have a glossy appearance. Natural casings are duller in appearance and vary from near transparency to opaque. Pork sausage in casings and frankfurter style are linked, size and length of links varying with size of casings. Since these products are consumed largely by number rather than by weight, the number of links per pound is important.

(3) *Condition.* Condition of sausage is important, particularly in fresh, smoked, and cooked type, and refers to deteriorations due to growth of bacteria and molds resulting from contaminated materials, too high temperature and humidity, too long storage, etc. Three conditions in particular that the inspector should observe are external slime, external mold, and internal greening.

(a) External slime results from bacterial growth. Slimy sausage when offered for delivery should never be accepted because it indicates faulty handling. Slime may at first be colorless but in later stages may turn gray or faintly green. When confined to surface of sausage in casings, slime can be removed by washing and gentle scrubbing. Usually the sausage inside is sound, but very slimy sausage ordinarily should not be used.

(b) External mold is common on dry sausage (cervelat, etc.), but is undesirable on other types. Its presence indicates contamination with mold spores and storage at too high a temperature, in too high humidity, and with too little circulation of air. Fresh, smoked, and cooked sausage delivered in moldy condition should be rejected. When held a few days in a mess icebox, these types may acquire a growth of mold. This mold is harmless and can be easily washed away if confined to the casing. Mold that penetrates through breaks in the casing may impart a moldy flavor but it is not injurious to health.

(c) Internal greening is caused by bacterial growth. The green areas may be in rings or in spots, in outer layers, or in the center. To detect internal greening the sausage should be cut across its long axis with a sharp knife. Any showing green areas should be rejected upon delivery and should not be eaten. Gray rings found beneath the casing in the outer layers differ from greening in that they are usually caused by abrupt temperature changes during manufacturing processes. They are harmless but detract from appearance.

All sausage should be clean. Contamination with dirt, filth, insects, rodents, etc., is inexcusable. Sausage should not be cut until all surface slime, mold, or dirt has been removed. A sharp thin knife should be used, and cut surface should be uniform in appearance throughout. The inspector should be familiar with factors that stand for good condition in the various kinds, and any deviation from any appearance of freshness, bright color, and fresh odor typical of the variety is sufficient ground for rejection.

(4) *Quality.* Quality is indicated by the appearance and feel, and more particularly by appearance and texture of cut surface. Use of fresh meats produces sausage of bright color while stale meats result in dull, lifeless color. Fresh meats have good binding power and cut surface of such sausage is cohesive and continuous, while that made from stale meats and from offal (tripe, etc.) is not cohesive but crumbles easily. Appearance of the cut surface reflects proper or improper methods of chopping and stuffing the meat. Dull knives shred meat instead of cutting it; imperfect removal of sinew and gristle is indicated by presence of small pieces of gristle or connective tissues on cut surface; excessive use of water may result in soft texture or excessive shrinkage and shriveling in smoked and cooked; stuffing too loosely results in air pockets; all of which are undesirable.

b. Pork. There is no standard of fineness for pork sausage. It is made commercially by grinding or chopping and may be coarse or fine. Specifications require use of trimmings with not more than 40 percent trimmable fat. The only way this may be determined is by testing the meat before it is ground. Trimmable fat is fat that can be removed by careful hand-trimming. However, pork muscle usually contains varying percentages of fat so that laboratory determination of fat in the finished sausage is not indicative of trimmable fat in pork trimmings used. The specification as amended permits a maximum of 45 percent fat in the finished product. Pork sausage should have sufficient fat to make it juicy and palatable but not be too wasteful when fried. It should have a bright color, a dull color and crumbly texture indicating stale or frozen trimmings. It is packed in bulk in cartons and in tin containers, and should be packed as compactly as possible to reduce area exposed to air. It is also made in the form of patties and in bricks or bars that may be cut to suit individual taste. These are protected from air by waxed paper wrappings or paper-lined cartons. It is stuffed in either hog or sheep casings. Hog casings are much wider than sheep, and links are shorter than sheep. Unless frozen, it has very limited keeping qualities and should be kept under refrigeration constantly until cooked. It should be consumed within 24 hours after received, and should be received in a thoroughly chilled, dry state. It soon loses its bloom and acquires an acrid flavor due to deterioration of fat and liberation of fatty acids. Frozen pork sausage should not be defrosted until ready for use. Except the canned products, it is always delivered in an uncooked state.

c. Bologna style. Bologna sausage is a finely chopped product stuffed into casings, smoked, and cooked. The commercial product may contain cubes of pork fat, cheek meat and meat products, and be stuffed in beef middles, beef bungs, weasands, or artificial casings. Under Federal specifications only pork and beef trimmings are allowed, and the sausage is stuffed into beef middles. Commercially, beef middles may be single or sewed. Single casings vary from 1½ to 2½ inches in diameter, while sewed casings vary from 2½ to 4½ inches in diameter. Middles are usually cut 18 to 20 inches in length. Artificial casings may be of any desired diameter. Bologna offered for delivery should be free of slime or mold, have a bright smoked appearance, and the casing be plump, full, and free from breaks. The cut surface should have uniform pinkish-red color and fine texture free from air pockets and coarse pieces, or pieces of gristle or coarse connective tissue. Nonuniform or faded color, green rings or green centers, and soft, friable texture is cause for rejection. It has better keeping qualities than fresh pork sausage, but requires refrigeration and should not be stored for more than a week unless frozen.

d. Frankfurter style. This is another smoked and cooked sausage made from finely chopped meat, and stuffed into hog or sheep rounds or artificial casings. Hog casings are tougher than sheep which run approximately 2/3 of an inch to 1 inch in diameter; hog from 1 to 1-2/3 inches in diameter. Artificial casings are usually of one size approximating medium or wide sheep casings. Length of links should vary with size of casings. Bureau of Animal Industry regulations permit artificial coloring but it must be confined to the casing. However, Federal specifications prohibit delivery of artificially colored sausage. Frankfurter style offered for delivery should be in clean, sound packages, be dry and clean, free from mold and slime, and have a bright smoked appearance. Broken casings are undesirable. Links should be full, plump, firm, and not wrinkled. Internal condition and quality is best ascertained by breaking a link across the long diameter and by cutting it lengthwise with a sharp knife. The meat should be very finely chopped, be free from coarse pieces and pieces of gristle or coarse connective tissue, be juicy without being watery, cohesive, and have a uniform pinkish-red color throughout. Crumbly or very friable meat indicates use of stale or frozen meat or offal. Links should withstand considerable bending without breaking, and when broken across the surface should be rugged but cohesive, and not crumbly. Faded areas or discolored rings, spots, or centers, and large air pockets are undesirable and sausage showing such defects should be rejected. Frankfurter style has approximately the same keeping qualities as bologna. It should be under refrigeration until used. The fresh product should not be stored for more than a week without being frozen. Sausage in cartons kept in an ordinary icebox is almost sure to become slimy or moldy within a week.

e. Liver sausage. Liver sausage is cooked, finely chopped, and stuffed in hog bungs or other casings of animal origin. Braunschweiger is smoked liver sausage and is almost invariably stuffed in hog bungs. Artificial coloring is not permitted under specifications. Fresh liver sausage is highly perishable and suffers considerable fading and discoloration when held. It should have a clean, bright exterior, and cut surface should present a bright, uniform, grayish-pink color. When exposed to air the cut surface rapidly becomes a dull gray. Braunschweiger has a smoked appearance externally and a higher meat color. A dull, lifeless color indicates staleness and such should be rejected when offered for delivery. A faded ring just inside the casing soon develops when liver sausage is held for a short time, and it should be ordered for delivery only for immediate use. It should not be stored for more than a few days. Federal specifications prescribe delivery in hog bungs, beef rounds, or beef middles. Hog bungs are about 30 inches in length and vary considerably in size. They are largest near the crown end and gradually taper to the small end. Size is designated by the diameter about 18 inches from the crown. They may be either whole (unsewed) or sewed. Whole bungs run from 1 to over 2 inches in diameter and hold from 1½ to 4½ pounds. Sewed bungs run from 2½ to over 3 inches in diameter and hold from 5 to 7 pounds. Beef middles are 18 to 20 inches long. Single (whole) middles run from 1½ to 2½ inches in diameter, sewed run from 2½ to 4½ inches in diameter and may be cut in any desirable length. Beef rounds are always single (not sewed).

f. Cervelat. Cervelat is a dry sausage. The meat is chopped fine, stuffed in hog bungs or beef middles, and smoked. Some soft forms are also stuffed in artificial casings. It does not contain garlic. There are two distinct types, dry and soft. Dry cervelat is airdried for 60 to 90 days; is firm and dry, and is not cooked. Gothaer is a high-grade dry cervelat. Other dry cervelat is put out under brand names. Soft cervelat is not air-dried but is smoked at a temperature that cooks the meat. It is sold as fresh summer sausage. Thuringer is a soft type. Dry cervelat has excellent keeping qualities. It does not need refrigeration, but should not be exposed to high temperatures. It will keep for months if properly cared for. Soft cervelat and all other varieties of soft summer sausage have limited keeping qualities. They may be kept for 1 or 2 weeks under refrigeration, but because of higher moisture contents are apt to mold. Federal specifications stipulate that the dry sausage be delivered which excludes Thuringer and other soft forms. During the long drying period dry sausage usually becomes moldy. Before shipment this mold is washed off. A slight growth of fine mold that can be washed off on the surface at delivery time is of little importance. However, wet or slimy or very moldy sausage should not be accepted. Casings should be unbroken. The cut surface should be firm and of a bright color. Federal specifications permit delivery in hog bungs only.

83. Lard and lard substitutes. *a. Lard.* Lard is rendered hog fat. Two types are purchased. Type I, open kettle-rendered, has dark cast, grainy appearance, and aroma is that of fresh pork frying in an open pan. The dark cast is that of unbleached lard, and the grainy appearance results from slow chilling without agitation. Any lard may be made smooth (not grainy) by agitation during chilling or by very rapid chilling. Because it is made of the hardest hog fats, it has a higher melting point than refined steam lard. Open kettle-rendered lard should have characteristic color, appearance (grain), and aroma of this type, be free from any rancidity or foreign odor, and texture should be firm but somewhat crumbly, but not sticky. Type II, refined steam lard is rendered from less hard fats under steam pressure and in presence of moisture; it is bleached and chilled quickly under agitation. Refined steam lard is slightly less hard than open kettle-rendered, is smooth (without grain), has a bluish-white color, and an aroma similar to that of pork cooked in water. Refined steam-rendered lard is usually marketed under the name of "pure" while Type I is usually designated "open kettle-rendered" though both are equally pure. Refined steam lard should have characteristic appearance and aroma of this type and be free from any sour, rancid, or off-odor, and should not be sticky or gummy. Good steam-rendered lard can be made only from fresh hog fat. Use of pickled fats gives dark color, off-odor, and less desirable texture. Texture is ascertained by pressure with the finger. While degree of resistance to pressure will vary with temperature, lard should be plastic and flow away smoothly from the finger on pressure. When the finger is removed it should not stick but fall away cleanly. Inspection

should be made at room temperature. Aroma should always be determined in still air since a draft may carry away the odor. If any doubt exists concerning aroma, product should be heated. Color of the melted lard can be ascertained best in a clear glass bottle by holding the bottle of melted lard up to the light. Lard has a much greater range of plasticity than lard substitutes; that is, it remains in a firm or plastic state without melting over a greater range of temperature than do substitutes. Free fatty acids are easily ascertained by a simple laboratory test, and the content should not exceed 1 percent. In good, fresh lard it is much less than that. Lard is a perishable product, deteriorating rapidly in warm temperatures, in direct sunshine, and in presence of moisture and air. Therefore it should be stored at temperatures near 40° F. in opaque containers, and shielded from air and moisture by protective paper wrappings or in tight containers. Repeated warming and chilling make it deteriorate rapidly. At a constant temperature of 40° F. and in protective containers, good lard will keep for months. It is produced whenever hog fat is available for rendering.

b. Substitutes. Lard substitutes are made from animal and vegetable fats or from vegetable fats alone. They are made to resemble lard in consistency and appearance and are used for the same purposes. However, they differ from lard in color, texture, aroma, and plasticity range. Type II which contains oleo stearine has a somewhat yellowish or creamy-white cast, Type I a white to creamy-white color. None resembles closely the dull white to bluish-white color of lard. When properly chilled, substitutes are more brittle than lard; under pressure by the finger the product does not flow away smoothly. In aroma they are very bland or odorless, and lack the outstanding and characteristic lard aroma. If chilled too much they are not worked easily, and when warmed they soften up and become oily much more rapidly, and their plastic and workable range is much shorter than that of lard. Lard substitute should have characteristic color and texture of the type to which it belongs. Aroma should be bland and free from rancidity or foreign odor. Hydrogenated substitutes have excellent keeping qualities. Some keep well even without refrigeration. Type II substitutes require the same degree of care and refrigeration as does lard. A transparent or translucent appearance of either lard or lard substitute is evidence of breaking down of fat, liberation of fatty acids, and rancidity. Such lard or lard substitute is inedible.

84. Canned meats. Inspection of canned meats for quality of materials and percentage of ingredients used must be made before and at canning time. Reinspection at delivery point or in storage includes packaging, condition and soundness of containers, condition and, in some instances, quality of can contents.

a. Packages. For use within the continental limits of the United States cases are made almost entirely of corrugated fiber board. For oversea shipments wooden boxes either of veneer or sawed construction are used because of their greater stability. When delivered or when stored, cases should be sound, clean, and unbroken. Broken cases indicate rough handling. Because of means used in loading and unloading vessels, cases of meat shipped overseas are frequently broken. All broken cases should be opened and condition of cans noted. Rarely can much damage be done to cases without some damage to cans also. All cans should be removed from broken cases and carefully inspected. Cases containing broken or leaky cans should never be placed in storage. All broken cans should be removed and disposed of. Any cans stained or smeared by contents of broken cans should be cleaned, and if necessary, relacquered before placed in stock.

b. Containers. (1) *Condition.* Cans should be inspected for cleanliness, lacquer coating or label, and soundness. They should be free from dirt and grease. Practically all meat contains fat and in the packing process some grease is almost sure to be smeared upon surface of cans. Greasy cans are unpleasant to handle. In commercial practice such cans are washed in an alkali bath, and those so treated show some mottling of the tin. Unless this has progressed too far it is of little importance, and is not evident after the cans are lacquered. If grease is not removed, lacquer does not adhere. Canned meats designed for oversea shipments are invariably given an outer coating of lacquer to protect the tin against rust. Lacquer should be evenly applied and completely cover the can. It should be of sufficient flexibility and tenacity that it will not chip or break when the cans are handled. Inspection should ascertain that cans are lacquered properly. Cans protected by labels should have the labels neatly and securely

attached. They should bear true name of product, net weight, name of canner, inspection legend, and establishment number. All meat cans prepared under Army inspection also bear month and year of canning. The above data may appear upon the label, but establishment number and date of packing are usually embossed in the tin of the can top. Products packed under inspection usually have all pertinent data embossed in the tin either in the body or the cap of the can, and no label is used.

(2) *Soundness.* Soundness of cans is ascertained by touch or by percussion. For the inexperienced inspector the former method is recommended. In inspecting cans by this method they are taken in the hands one by one and felt for loose tin or convex surfaces. All meats are canned under vacuum and ends of round and all six surfaces of pyramidal or square cans should be concave and closely contact the product within. Any loosening of tin on any surface that should be concave can be detected readily by touch. Slightly loosened tin may be indicative of low vacuum, but ordinarily convex surfaces or loose tin indicates leaky cans or development of gas within the can. There are two exceptions to this general rule. Cans packed at low altitude may show loose tin when taken to high altitudes because of decreased external air pressure. When cans are filled by power stuffers such as are used in canning corned beef, the pressure exerted within the can by the plunger sometimes forces the bottom of the tin into a convex shape that does not become concave even under vacuum. If doubt exists as to can soundness under either of these conditions a few should be incubated at a temperature between 90° and 100° F. for 10 days. If sound they will remain in their original state, but if leaky or not sterile, fermentation and swelling will ensue. A little practice will enable the inspector to differentiate between sound and unsound cans. In the percussion method, cans are struck on the flat surface, particularly the ends, with a metal rod or wooden stick. Sound cans with proper vacuum give an unmistakable tense sound when struck. Leaky cans, short vacuum cans, springers, flippers, and swells give forth an entirely different sound. However, considerable experience is necessary to be able to differentiate between the various sounds. Inspection by touch is less rapid but more accurate. If doubt exists as to can soundness, it is best to err on the safety side. No cans with loose or distended tin should be passed for food unless proved sound by incubation or otherwise.

(3) *Contents.* Products which are to be sliced and eaten cold such as corned beef, ox tongue, etc., should be chilled before opening for inspection. Others should be at room temperature. Inspection should be made if possible in natural light away from drafts, and in air free from foreign odors. A vacuum gage to determine extent of vacuum may be used but is not essential. If all flat surfaces are concave and closely contacting contents, the number of inches of vacuum is of little importance. Vacuum varies greatly in different products. Sliced dried beef in glass is usually sealed in about 28 inches of vacuum, while Army Type II bacon in 12-pound cans is sealed in about 15 inches of vacuum. In the latter case a greater vacuum would result in buckling. Altitude also affects vacuum registered on a vacuum gage.

Some cans are provided with key-opening bands and, when present, should be opened by this means. Others are opened by means of a can opener by cutting around edge of the cap. For pyramidal and conical cans, the large end should be removed. The end should be removed as smoothly as possible to allow easy removal of contents, especially on products such as ox tongue which should be retained whole. As soon as the cap is removed aroma of contents should be noted. It should be typical of the product and free from any sour rancid, or foreign odors. Containers are designed to hold definite weights of various products, and trade practice has established desired fill. They are filled as full as compactness of the product and drawing of proper vacuum will permit. Under-filled cans are undesirable. Color, texture, compactness, quantities of gelatin or moisture, and flavor should be typical of the product being inspected. Canned meats that have been stored several months may show iron sulphide discoloration. This is practically always confined to the surface and can be scraped or trimmed off. Army canned meats in storage for a considerable length of time should not be condemned for iron sulphide discoloration, but those showing this defect on delivery should be rejected. Use of enamel-lined cans eliminates this defect.

c. *Storage.* Canned meats have excellent keeping qualities, and do not require

refrigeration. With the exception of sliced dried beef and sliced bacon, those purchased for Army use will keep well for a year or more. Canned corned beef has been known to remain in excellent condition for more than 10 years. They should be stored, if possible, in dry storage at a temperature not over 70° F. Temperatures below 60° F. enhance keeping qualities while temperatures above 90° F. lessen storage life.

SECTION XII

DAIRY PRODUCTS

85. General. *a.* Inspection of dairies, creameries, and cheese factories, and of fresh, malted, condensed, evaporated, and dry powdered milk, butter, cheese, and ice cream is a function of the Veterinary Corps of the Medical Department. The following publications embody the customary procedure in dairy products inspections and standards:

- (1) Military Meat and Dairy Hygiene, Eakins.
- (2) Subsistence Bulletin No. 14—Dairy Products.
- (3) United States Department of Agriculture Revised Tentative United States Standards for Quality of Creamery Butter.
- (4) United States Public Health Service Milk Ordinance and Code.

b. The prescribed examination and testing of herds which are the source of military fresh milk supply can be conducted only by accredited or authorized veterinarians. Cattle testing and dairy inspection procedure is described in a (1) above. Pasteurization procedure is described in a (2) above. Pasteurization of milk can be ascertained only at the pasteurization plant by observation of time and temperatures. No laboratory test of milk after pasteurization provides an accurate determination of correct pasteurization. Bacteriological, Babcock (butterfat), lactometer (to determine total milk solids), sedimentation (to determine gross dirt), acidity, and other laboratory tests are described in (3) above. These tests require equipment seldom found except in laboratories equipped for testing dairy products. However, there are other tests than can be made without use of laboratory equipment.

86. Milk. *a. Fresh.* (1) *Containers.* Fresh milk for Army use is delivered in glass bottles or fiber containers. Glass bottles are easily inspected for dirt, extent of cream line, and color of the milk. Bottles should be scrupulously clean showing no sediment in the bottom, and be sound without any broken or chipped edges, especially around the mouth. Broken glass is dangerous and is difficult to clean. Color of milk varies with breed of cattle and nature of feed. Jersey and Guernsey cattle produce milk of deeper yellow color than other breeds. Green and succulent feeds produce milk of deeper yellow color than dry feeds. Therefore, milk usually has a deeper yellow color during spring and early summer. The cream line is a fairly accurate indication of butterfat content but it is influenced by pasteurization. Cream line, color, and gross dirt in milk are not readily ascertained in fiber containers. Milk bottles and fiber containers should be closed with clean stoppers which show day milk was bottled or delivered. Certified milk bottles have hooded caps which are printed to show name of product, name of producer, and license number under which producer operates.

(2) *Quality.* In consistency milk should pour smoothly and evenly from the container. Any stringiness observed on pouring should be grounds for rejection. Colostrum in milk is readily detected by boiling a small quantity. If colostrum is present it will curdle. Milk should have a sweet, pleasant aroma and flavor. During spring months garlic odor and flavor is frequently present, and such milk should be rejected. It should have a temperature not above 50° F. when delivered. Higher temperatures indicate improper handling and such milk should be rejected.

(3) *Storage.* Milk should be stored under refrigeration. Fresh clean milk will keep for several days without spoiling, but for Army use it should not be stored for periods longer than 36 hours.

b. Evaporated. Inspection of evaporated milk should include inspection for consistency, flavor, color, separation, grainy sediment, and curdy, curdled, and fermented milk.

- (1) *Consistency.* In consistency evaporated milk is much denser and more

viscous than fresh, but should be entirely fluid, even and smooth, and not show any curd specks. The latter is tested by means of a spoon which is dipped into the milk and gently raised above the surface with the convex surface of the bowl of the spoon upward. The milk should flow off the spoon without leaving any curd specks. Another method consists in tilting the opened can until the milk just touches the edge of the can opening. By inserting the spoon on its edge and slowly raising the bowl, keeping the spoon handle in touch with the milk, a film of milk is drawn up in the triangle between spoon bowl, spoon handle, and surface of the milk. This film should not show any curd specks.

(2) *Flavor.* Flavor should be clean and free from any disagreeable or foreign flavors. It differs greatly from that of sweet milk because of sterilizing process to which it is subjected. The inspector should be familiar with the normal flavor of evaporated milk in order to ascertain presence of off-flavors.

(3) *Color.* Color varies with desire of individual manufacturer. Some brands are almost as white as fresh milk, but most evaporated is much browner. Some manufacturers believe that the latter has a richer, more cream-like appearance. Unless very brown, in which instance it is apt to have a high cooked or burnt flavor, no distinction should be made between brands of different color.

(4) *Separation.* The chief defect is cream separation or creaming, resulting from long standing in one position. The butterfat gradually separates and is forced to the top by the heavier, denser milk serum, and may adhere to top and side of the can. Cans which stand still in one position for several months are bound to show some separation. If extensive, it may interfere with pouring from the can. However, such milk is usually sound and its food value is not altered. It can be used for cooking purposes about as well as the unseparated product, but not as well in coffee or on cereals. Evaporated milk showing this defect upon delivery should be rejected. When the condition is found upon reinspection in storage, it should not be condemned.

(5) *Grainy sediment.* Grainy sediment is found frequently and appears as small, rough, very hard granules, sometimes loose and sometimes adhering to the bottom of the can. If incorporated in food they are unpleasant when bitten but otherwise are of no importance. Grainy sediment is undesirable, and lots showing a considerable number of cans with this defect upon delivery should be rejected. When found in cans in storage, such lots should not be condemned.

(6) *Curds.* Curdy milk results from precipitation of curd because of faulty manufacture. The curd appears as flakes or lumps. There is no off odor or flavor. This milk is not injurious to health, but because of its similarity to sour curdled milk, it should be rejected upon receipt and should not be used if the condition is found after storage. Sour curdled milk is due to bacterial action resulting in acid curdling. It is inedible and should be rejected when offered for delivery and condemned when found in storage.

(7) *Fermentation.* Fermented milk results from leaky cans or incomplete sterilization. It results in brown or swelled cans. It is inedible and should be rejected or condemned whenever found.

(8) *Storage.* Evaporated milk in cans has excellent keeping qualities. Under fair storage conditions it will keep for a year without developing defects other than cream separation. However, it must be stored away from heating coils or radiators or immediately under galvanized iron roofs. As it is produced in great quantities throughout the year there is little need for long storage.

(9) *Standards.* Federal standards have been established, and all manufacturers produce milk just meeting minimum requirements of the standards. Very seldom is any found that does not meet those standards. Determination of milk solids is a laboratory procedure and requires special equipment not available in the field. Dirt and other sediment may be determined by the sedimentation test, and acidity by titration. These also are laboratory tests and require laboratory equipment.

c. *Sweetened condensed.* This product is inspected for consistency, flavor, color, and soundness.

(1) *Consistency.* Because of its high sugar content, sweetened condensed milk is quite dense and viscous. The freshly made product is a very dense fluid and when poured from the can considerable quantities adhere to the tin. It should

be smooth to the touch without any evidence of grittiness. Sandy or gritty milk results from crystallization of the milk sugar, resulting in very hard, rough sugar crystals which feel like grains of sand between the teeth or between the fingers. Sandy milk is not inedible and is not injurious to health, but that offered for delivery should be rejected. Settled milk results from settling of sugar (sucrose) upon long standing. Being heavier than the watery constituents of the milk, the sugar gradually settles to the bottom. It is somewhat difficult to reincorporate the sugar with the milk once it has settled out. Such milk can be used for cooking and baking purposes. Settled milk should be rejected if offered for delivery, but should not be condemned if found in storage. Sweetened condensed milk is not sterilized in the can as is evaporated, depending upon its sugar content for preservation. Because of its nonsterile condition, the chief defects arising in this product are lumpy and thickened (cheesy) milk. Lumps and buttons are produced by molds and bacteria resulting from use of poor milk and from insanitary equipment and methods of manufacture. Such milk should be rejected upon delivery. However, this defect is largely confined to the surface and when removed the milk may be used with safety. Thickened and cheesy milk results from age or use of insufficient sugar. It may become custard-like or have the consistency of soft cheese. It is not harmful but not desirable, and should be rejected.

(2) *Color.* The color of freshly made sweetened condensed milk is creamy white. A brown color develops with age, particularly if it is not stored in a cool place. Old milk has a deep brown color. While browning is not harmful it is undesirable. Milk offered for delivery that shows browning should be rejected.

(3) *Flavor.* Since condensed milk is not heat-processed, it does not have the cooked flavor characteristic of evaporated milk. Flavor should be clean and free from any foreign taint. In storage it may develop rancid or metallic flavors. The former is due to fat-splitting bacteria and the latter results from faulty manufacturing methods or equipment. Both are undesirable and their presence warrants rejection. Gaseous fermentation produces swelled cans. Such milk is inedible.

d. *Dry powdered.* The laboratory procedure for examination of powdered milk is described in detail in Federal specifications. These tests depend entirely on laboratory equipment and technique, and are not adaptable to field inspection.

(1) *Color and texture.* Inspectors should be familiar with the difference in color and texture of skimmed and whole milk powders and of spray-dried and film-dried powders. Skimmed milk powder is of a light creamy white color while whole milk powder has a distinct creamy or yellowish cast. Spray-dried powders have a very fine, fluffy appearance and feel, and require no grinding in preparation for market. Film-dried powders come from the drums in broad, thin sheets that must be ground and bolted in preparation for market. Film-dried is granular in consistency.

(2) *Storage.* Keeping qualities of powdered milk depend upon exclusion of air, light, and moisture. Because of its low fat content, skimmed milk powder is not readily oxidized, but whole milk rapidly deteriorates due to oxidation. Rancidity rapidly develops in whole milk powder exposed to air. When milk powder is exposed to air, it absorbs moisture and caking ensues. Moisture absorption also furthers bacterial action, and renders the powder less soluble. The only solution for these defects is hermetic sealing in vacuum or in inert gas. A vacuum can be maintained and use of inert gas (nitrogen) is possible only in hermetically sealed containers. Containers with friction plugs or cover are not hermetically sealed. In hermetically sealed containers either in vacuum or in inert gas, milk powders keep well for months. They should be stored away from heat. The best storage temperature is 35° to 45° F., but these powders stand up well at room temperature.

87. Butter. a. *General.* Butter inspection procedure is outlined in Subsistence Bulletin No. 14—Dairy Products. Butter grades and butter scoring factors are given in the above bulletin and in U. S. Standards of Quality of Creamery Butter. Tests for butterfat, salt, and moisture are simple laboratory procedure. Compliance with specification requirements for quality of cream, percentage of acidity

in cream, and pasteurization can be determined definitely only at the creamery before or at churning time, but grain and flavor reflect cream quality and handling methods. Grades are based on factors ascertained by physical examination. Flavor is ascertained by smelling and tasting; body, by feel and appearance; color, by visual examination and by use of a standard butter-color rod; salt, by taste; and style, by visual examination. For tub butter a long butter trier is essential; for smaller packages a cheese trier is better adapted. A plug is drawn by inserting the trier as nearly through the sample as possible, giving the trier a turn and withdrawing it. From the plug the inspector makes his determination of flavor, body, color, and salt, after which the plug is returned and the trier withdrawn. The chief grading factor is flavor. Only a very small percentage of market butter shows serious defects of body, color, or salt. The inspector should remember that most market butter falls within a very narrow score range. Very little market butter scores higher than 93, and that scoring less than 89 has such serious defects, particularly of flavor, as to be undesirable for table use. Butter scoring 90 possesses aroma, flavor, body, and color that make it satisfactory for table use as well as for cooking or baking. Butter scoring 92 or higher must have highly desirable qualities of aroma, creaminess, freshness, and palatability, and be almost perfect in body, texture, color, salt, and style. Butter of higher score only possesses higher aroma and flavor. It must be kept under refrigeration at all times. Good butter will keep well in an ordinary ice box for a month if protected from foreign odors. If it is to be kept for a longer period, it should be frozen and held at a temperature not higher than 0° F.

b. *Rating.* The rating of the various factors used in scoring butter as given in United States Department of Agriculture Department Circular 236, is quoted below:

Five Classes of Defects in Quality

In the inspection of butter its quality is considered from the standpoint of flavor, body, color, salt, and package. In determining the final score, each of these factors is rated separately, with the following number of points given to each: Flavor, 45; body, 25; color, 15; salt, 10; and package, 5; total, 100. The ratings given to each factor are governed by the absence or presence of certain defects. A careful reading of the following rules used by the Federal Bureau of Agriculture Economics in the inspection of butter under the food products inspection law, will indicate the effect of defects on the rating given each factor and the final score of the butter:

The Rating of Flavor

The rating given to flavor shall be determined by the flavor characteristics as follows:

A. Desirable flavors, minimum rating of 37 points.

(a) Butter that is fresh, fine, sweet, mild and clean in flavor, and has a certain creaminess or richness that gives it a particularly pleasing taste and aroma, shall receive a rating of 40 to 45 points, inclusive.

(b) Butter that is fresh, fine, sweet and clean in flavor, if of fresh make, or fine, sweet, and clean, if storage, shall be given a rating of 38 to 39 points, inclusive.

(c) Butter that is fresh, sweet and clean in flavor, if of fresh make, or sweet and clean, if storage, shall be given a rating of not less than 37 points.

B. Objectionable flavors.

(a) Maximum rating of 36 points. Butter that is free from "foreign" or "off" flavors, but which shows any of the following taints or flavors, shall receive a rating of 36 points or less for flavor, according to the degree of defect, and shall receive a maximum of 36 points, provided the flavor is only slightly objectionable:

(1) Mechanical taints—flavors having their origin in the process of manufacture or in the conditions under which the butter is held after manufacture, but not indicating aged or stale cream: Burnt, oily, heated, mealy, frozen cream, greasy, lardy; also storage and fruity flavors in Held butter.

(2) Bacterial taints—flavors having their origin in bacterial development, but not indicating aged or stale cream: Cowy, barny, acid, yeasty, summery, cheesy, curdy.

(3) Feed taints—flavors having their origin in feed conditions at the point of production, but not indicating age or stale cream: Weedy, frosted feed.

(b) Maximum rating of 35 points. Butter showing the following objectionable flavors shall be given a rating of 35 points or less, according to the degree of defect: Metallic, wintry, bitter; also "old" flavor in Held butter.

(c) Maximum rating of 33 points. Butter showing the following objectionable flavors shall be given a rating of 33 points or less: Unclean, musty, distinct lime or alkaline flavors.

C. Foreign flavors.

(a) Maximum rating of 33 points. Butter showing a taint of gasoline and having no other objectionable flavor, shall be given a rating of 33 points or less.

(b) Maximum rating of 32 points. Butter showing garlic or wild onion flavor, shall be given a rating of 32 points or less.

D. Off flavors, maximum rating of 32 points. Butter that shows any of the following flavors, ordinarily termed "off" flavors, shall be given a rating of 32 points or less, depending upon the extent of the defect: Fishy, tallowy, unclean, stale cream, stale oily, stale metallic, stale sour, stale cheesy.

The Rating of Body

Butter receiving the maximum rating of 25 points for body must have a firm, waxy texture and a perfect grain, as indicated by a jagged or irregular toothed edge, when the butter is broken apart. It must be free from salviness or excess free moisture, and must not show a milky brine.

The Rating of Color

Butter receiving the full rating of 15 points for color must be free from all foreign color specks, waviness, streaks or mottles, and must be uniform in color in all parts. The ratings given to the various degrees of uniform color shall be as follows:

A. Light color: Butter having a light straw color shall be given the full rating of 15 points.

B. Medium color: Butter having the color of the natural grass product, without the use of additional color, shall be given the full rating of 15 points.

C. High color: Butter having a color higher than that of natural grass butter shall be given a maximum rating of 14 points.

The Rating of Salt

Butter which is not excessively high in salt, and which shows no undissolved salt, and in which the salt is uniform, shall be given the maximum of 10 points for salt. The ratings given butter showing different amounts of salt properly dissolved, shall be as follows:

A. Unsalted butter shall be given the full rating of 10 points.

B. Light salted butter, that contains $1\frac{1}{2}\%$ or less of salt and has a very slight salty taste, shall be given the full rating of 10 points.

C. Medium salted butter, that contains over $1\frac{1}{2}\%$ and not above $3\frac{1}{2}\%$ of salt, and has a mild and yet distinct salty taste, shall be given the full rating of 10 points.

D. High salted butter, that contains over $3\frac{1}{2}\%$ of salt and has a sharp, briny or pronounced salty taste, shall be given a maximum rating of 9 points.

The Rating of Package

Butter receiving the full rating of 5 points for package must be neatly and properly packed in sound, uniform packages, which are clean and entirely free from mold.

88. Cheese. Inspection and grading procedure, grades, grading factors, and definitions of terms used in grading American Cheddar cheese and Swiss cheese are given in Subsistence Bulletin No. 46—Cheese. The inspector should be familiar with terms used in cheese grading. Familiarity with the characteristics of texture and flavor resulting from aging is acquired only by experience. Other grading factors are not difficult of understanding and application. Cheese improves in flavor with age if kept at proper temperatures. It is never frozen but should be kept under refrigeration. At room temperature or in summer heat, it has limited keeping qualities. In an ordinary ice box and protected from drying, Cheddar and Swiss will ordinarily keep well for weeks. Cottage cheese is highly perishable and should not be stored longer than 36 hours.

SECTION XIII**POULTRY AND EGGS**

89. Poultry. The classes of poultry purchaseable under Federal specifications are dressed chickens, fowl, ducks, geese, and turkeys. Inspection of poultry embraces determination of class, grade, and condition.

a. *Chickens.* (1) *Classes.* The classes of chickens are based on age, size, weight and sex. Broilers are young chickens of either sex weighing $2\frac{1}{2}$ pounds or less, fryers $2\frac{1}{2}$ to $3\frac{1}{2}$ pounds, dressed. Roasting chickens are young cockerels weighing $3\frac{1}{2}$ pounds and up, dressed. Fowl are mature female chickens weighing $3\frac{1}{2}$

pounds and up, dressed. Stags are male chickens older than cockerels but not fully mature. Cocks are mature male chickens. Stags and cocks weigh 3½ pounds and up. Capons are male chickens that were caponized (castrated) when young. Age of dressed chickens is indicated by size, condition of flesh with regard to tenderness or toughness, flexibility or hardness of cartilages, smoothness or roughness of legs, and extent of spur development. Young chickens (broilers and fryers) are small; older chickens increase in size. In broilers, fryers, capons, and roasting chickens the flesh is tender and can be cut easily by pressure with the thumb nail. Flesh of fowl is less tender. Flesh of stags and cocks is dark in color and hard and resistant to pressure. The cartilage at the rear end of the keel of young chickens is soft and flexible; that of fowl, stags, and cocks is hard and inflexible. Legs and feet of young birds are smooth and shiny while those of old birds become roughened, being scaly and gnarly in very old birds, and lose their shiny appearance. Broilers have no perceptible spur development; fryers have perceptible but very small spurs; capons and roasting chickens have small spurs that are short, wide, rounded, and not horny; fowl have very narrow, short spurs; stags have pronounced straight but rounded spurs; and cocks have long, hard, curved, pointed spurs. Size and weight develop with age. There is little to differentiate sex in young chickens, but as the birds near maturity definite sex characteristics develop. Male chickens (cockerels, stags, and cocks) develop more luxuriant plumage, larger combs and wattles, larger heads, larger legs and wings, and greater spur development than do females (pullets and hens), and body development is uniform, remaining narrow and shallow in the rear. Female chickens are characterized by small heads, small combs and wattles, small wings and legs, rudimentary spur development, and the body becomes deep and wide especially in the rear.

(2) *Grades.* Grades of dressed chickens are based on color, fatness, freedom from blemishes (torn skin, broken bones, crooked breasts, etc.), absence of pinfeathers, bruises, and engorged blood vessels. Color refers to color of skin, legs, and fat. Color is a breed characteristic and is also influenced by feed. Broilers and fryers are frequently produced from the egg breeds (leghorns, etc.), which have comparatively white skins. Roasting chickens and fowl are produced largely from the dual purpose breeds which have yellow legs and yellowish skins. Milk feeding produces white or creamy white fat while corn feeding produces fat of a yellow cast. Fatness depends upon the quantity and distribution of fat. Practically all broilers, fryers, and roasting chickens are milk-fed just before slaughter. Fattened fowl usually have considerable fat deposited in and around the abdominal cavity. While blemishes may not reduce food value of chickens, they detract from appearance. Imperfect bleeding is indicated by engorged blood vessels along neck and near thighs, and may appear on other parts of the body. Engorged blood vessels appear as reddish streaks in or underneath the skin. Torn skin is the result of careless handling during dressing. Bruises are a source of waste and further early deterioration. Crooked breasts are deformities and detract from appearance and also interfere with carving. Black pinfeathers detract from appearance of dressed chicken, particularly if the skin is white.

Fancy grade includes chickens with good color, tender flesh, meaty breasts, free from such defects as crooked breast bones, broken bones, torn skin, bruises, black pinfeathers, etc., and with evenly distributed fat of good color.

Choice chickens must have good color, tender flesh, and fairly meaty breasts but may have a small percentage of birds with small skin tears, an occasional broken wing or leg if the edible tissues are not injured thereby; and small superficial bruises. In commercial practice the crops of undrawn birds are emptied by cutting a hole through the skin and crop. These holes are not sewed up.

(3) *Dressing.* Chickens are dressed by slack scalding or hot scalding. Dry picking is no longer commercially practiced. Slack scalded birds are immersed in water at a temperature not higher than 130° F. Practically all broilers, fryers, roasting chickens, and fatted fowl are slack scalded. Slack scalding leaves the skin soft, flexible, and unshrunk, and not water-soaked. The feather follicles are closed and the skin is without tears and has a bright bloom. Slack scalded birds are air chilled in refrigerated rooms. Hot scalding consists in immersing birds in water at a temperature of about 180° F. Stewing hens, cocks, and birds prepared by local markets are largely hot scalded. Hot scalding shrinks the skin, leaving it tightly drawn over the flesh, water-soaked, and it tears easily. Feather

follicles are open and skin has lost its bloom. Scalded birds are usually chilled by immersing in cold water. Chickens may be undrawn or drawn. Undrawn birds have all internal organs intact and head and feet remain on. Under specifications all frozen chickens are undrawn, though freezing drawn chickens is increasing commercially. Under the specification "drawn" means full-drawn, that is, head, feet, and all viscera, including crop, gullet, lungs, windpipe, abdominal viscera, and oil sac should be removed. Gizzard, heart, and liver (free of gall bladder) are wrapped in nonabsorbent paper and returned to the abdominal cavity or delivered in separate package.

(4) *Production.* Production of dressed poultry is seasonal. Broilers are produced largely from middle of June to early August, fryers from late July to October, and roasting chickens from October to late December. At other seasons only frozen chickens of these classes are available.

(5) *Storage.* Frozen chickens keep well from one season to the next. Storage defects are freezer burn, shrinkage, and loss of bloom. Freezer burn is dehydration of the skin in small areas usually around feather follicles. It gives the skin a pockmarked appearance, though it detracts little or none from food value. It is largely prevented by proper wrapping and packaging. Shrinkage of chickens in cold storage is negligible. Chilled chickens, both drawn and undrawn, have limited keeping qualities. In undrawn birds contents of the digestive tract are apt to ferment unless temperatures close to freezing are maintained. The open visceral cavity of drawn birds offers a good surface for bacterial growth. Inspection of undrawn, chilled chickens should include observation for protruding and discolored vents, and sliminess and bad odors underneath wings and thighs. The visceral cavity of drawn, chilled chickens should be carefully inspected for sliminess and bad odors. Fresh (unchilled) chickens have very limited keeping qualities. They should be prepared for cooking as soon as possible after killing and drawing. Unchilled chickens should never be piled in deep layers. Aging does not improve tenderness and flavor of chickens.

b. *Ducks and geese.* With the exception of green ducks which are produced to a limited extent near some large cities, marketing ducks and geese is seasonal. They are not found on the market except in cold weather, particularly near the holidays, and are sold fresh almost exclusively. Only those not consumed during the holidays are cold stored. No distinction is made in sex in ducks and geese, as no difference in conformation, quality, tenderness, or edibility exists. Age of dressed ducks and geese is determined by condition of the trachea (windpipe). In young birds the cartilages of the trachea are soft and yielding, while in old birds they are hard and resistant to pressure. Old birds have darker flesh than the young but this is usually difficult to determine in the dressed birds because of the fat covering. Dressed birds should be plump and breasts should be full and rounded. Protrusion of the breastbone above surrounding meat indicates poor condition. Federal specifications permit purchase of fancy grade only. Fancy ducks and geese have good color, bright bloom, are plump and meaty, well-covered with fat, and free from such defects as bruises, torn skin, broken bones, pinfeathers, etc. Yellow-skinned birds are more attractive than white-skinned.

c. *Turkeys.* The classes of turkeys are young and old toms, young and old hens. Toms are male turkeys and hens are females. The distinctive differences between toms and hens are the same as between cockerels and hen chickens, and in addition the nose wattle (the fleshy wattle over the beak) is larger and longer on the male, and the beard (bunchy growth of hair on breast) is larger on a tom than on a hen. Under Federal specifications only young toms and young hens may be purchased. Age differentiation and grading factors for turkeys are identical with those for chickens. Fancy young turkeys must have an attractive bloom; be plump with well-rounded breasts; soft meat; well covered in and beneath the skin with white fat; be free from bruises, torn skin, broken bones, and pinfeathers; head wrapped in paper; feet clean, smooth, and a bright color; have little or no spurs; have soft, flexible cartilage at end of keel; and be in prime condition as evidenced by dry skin free from any sliminess or off-odor. Choice young turkeys must have the same characteristics as to age and condition, but may have slight bruises, slightly torn skin if not on the breast, and may not be so full meaty or so well covered with fat as turkeys of fancy grade. Turkeys have the same keeping qualities as chickens under the same conditions, and the same principles of storage and preparation apply. Frozen poultry is best defrosted in a refrigerator, the same principles applying as for frozen beef.

90. Eggs. Inspection of eggs includes determination of net weight and quality or grade.

a. Net weight. Bulk eggs are delivered in cases of 30 dozen each. Cases are made of wood divided into two compartments each having five sets of fillers holding 3 dozen eggs each. Egg cases vary slightly in weight with the kind of wood, dryness, etc., but average between 7 and 8 pounds per case. Several forms of fillers and flats are used. Fillers are usually of the "honeycomb" type and are made of hard calendered cardboard. Flats may be of flat, hard calendered cardboard or made of pulpwood and be in cup shape to retain eggs in a vertical position (mapes flat). Fillers and flats weigh from 4 to 5 pounds. The tare on eggs will vary from 11½ to 13 pounds per case. Federal specifications prescribe net weight per case required during various months for various grades. All cased eggs should be weighed upon receipt to determine net weight. An occasional test of weight of cases, fillers, and flats will establish tare.

b. Cases. Cases need not be new, but they should be sound, clean, and free from stains and bad odors. Fillers and flats should be sound, clean, sweet, and free from any soiling. For Army deliveries new fillers and flats are prescribed.

c. Classes. Three classes of eggs are specified by Federal specifications: fresh, storage or refrigerator, and processed (oil treated). Fresh eggs are those that have not been in cold storage, the term not necessarily meaning that they have been laid recently. They may be 30 days or more from laying time. They must show certain definite quality characteristics as revealed by candling. These characteristics are set forth in the publications referred to in f (2) below. Storage or refrigerator eggs are those which have been in cold storage and may be from 1 month to 9 months from laying time. Processed (oil treated) eggs are those treated by dipping momentarily in hot oil to seal pores of the shell, thereby retarding shrinkage and also destroying molds and bacteria, thus enhancing keeping qualities. Shells of processed eggs usually have an oily feel, and small spots of oil stain usually may be found on flats where the eggs have rested. Processed eggs may be either fresh or refrigerator, the latter being processed while fresh. For delivery under Federal specifications, refrigerator eggs should not be processed after being under refrigeration. Only strictly fresh eggs should be processed.

d. Infertile eggs. Infertile eggs cannot be determined by candling. Fertile eggs that have been exposed to heat usually show some development of the "hatch spot" (germ), but infertile and strictly fresh eggs should show no such development. To secure infertile eggs, it is necessary to obtain them from flocks known to keep hens separated from cocks and cockerels.

e. Washed and sandblasted eggs. Washed eggs are undesirable in that they have limited keeping qualities because water penetrates pores of the shell carrying with it any bacteria or molds that may be on the shell or in the water. Eggs are washed only when too dirty to sell as is. Sandblasted eggs are undesirable chiefly because they indicate that the eggs were dirty. In sandblasting the bloom and outer layer of the shell is worn away by attrition from a flow of sand. Excessive sandblasting weakens the shell and makes it more fragile. Sandblasted eggs lose their protective outer covering and are less resistant to invasion by bacteria.

f. Grade. (1) *Determination.* Grades are based on quality and condition. Quality and grade in eggs are determined by candling. Loss in eggs is based on defects which lessen or destroy food value. All inedible eggs (rotten, broken (leaking), spots, broken yolk, frozen (split), hatched (blood veined), and sour eggs) are counted as full loss, while small, dirty, checked, badly stained and seconds are counted one-third loss. The grade of a lot of eggs is based largely upon loss established in candling one-half case from each of a representative number of cases taken at random from the lot. Under Federal specifications no loss from inedible eggs is allowed, but a tolerance is allowed in each grade for loss other than inedible eggs. In order to understand grading factors and tolerance terms, the inspector must be familiar with trade terms and definitions as outlined in the United States Standards and Grades for Eggs.

(2) *Equipment.* Inspection personnel should provide themselves with the following:

United States Standards and Grades for Eggs, United States Department of Agriculture.

Subsistence Bulletin No. 16, Poultry and Eggs.

Air Cell Gage, United States Department of Agriculture, and egg candling device.

United States Standards and Grades for eggs defines terms used in candling as well as United States grades and factors upon which those grades are based. Subsistence Bulletin No. 26, Poultry and Eggs, describes candling procedure and gives commercial grades established by certain commercial exchanges. An air cell gage is desirable in determining degree of shrinkage. A candling device is essential. A portable candling device may be purchased or a satisfactory one may be made. The best light is electric, but a candle or other light may be used.

SECTION XIV

FISH

91. Fish. Inspection of fresh fish is concerned with variety, style of dressing if any, and condition upon delivery.

a. Variety. No restriction is made by Federal specifications as to variety. The varieties available vary with the section of country in which purchased. Inspectors should be familiar with varietal characteristics. No attempt will be made in this manual to describe the many varieties which may be purchased.

b. Dressing. Commercially, fresh fish may be delivered round or gutted, heads on or off, gills in or out, scales on or off, skin on or off, split or unsplit, in sides, chunks, slices, and filets. Trade custom prescribes form in which ordinarily marketed. Proposals for bids should state definitely the form desired.

c. Condition. (1) *Stage.* Condition refers to freshness or lack of it. Three stages of condition are recognized, fresh, stale, and putrid.

(a) *Fresh.* Fresh fish are characterized by a bright appearance, glittering scales that adhere tightly, surface slime natural to the species that is free of decomposition odors, bright, shiny, outstanding eyes, bright red gills that are free of off-odors, closed mouth and gill covers, firm, elastic abdominal wall free from evidence of bloating, flesh that is firm and resilient, bright red blood in the abdominal wall particularly under the backbone, and a fresh odor characteristic of the species. When laid across the hand a fresh fish bends but little.

(b) *Stale.* Staleness is indicative of deterioration and results from bacterial and enzymic action. It is characterized by a dull appearance, dullness and slight loosening of scales, change in natural slime to greater stickiness or dryness, somewhat sunken and less brilliant eyes, dull-colored gills, abdominal wall somewhat soft and flaccid and may be slightly distended, flesh that does not pit on pressure but is less resilient, blood turning a brownish color, and development of a slight off-odor. A stale fish laid across the hand is less rigid than a fresh.

(c) *Putrid.* Putrid fish are characterized by a very dull appearance, lack of brilliance, loosening and falling off of scales, complete dryness or an extreme slipperiness of slime accompanied by a putrid odor, eyes sunken or entirely disintegrated, gills a dull brown color and with a putrid odor, open mouth and gill covers, soft, spongy abdominal wall frequently with bloating and protrusion of the vent, flesh that has entirely lost its resiliency and in which pitting produced by pressure remains, blood of a dull brown color, and a general odor of decomposed flesh. When laid across the hand a putrid fish sags at all unsupported points.

(2) *Delivery.* A putrid fish is unsafe for eating, and putrid fish and those showing advanced staleness should be rejected. While fish showing beginning staleness might be used without danger, safety requires that such be rejected. Only strictly fresh fish should be accepted. They should be delivered thoroughly chilled and iced, and any delivered without ice should be viewed with suspicion. Frozen fish should be delivered solidly frozen, and those delivered in a partially thawed condition also should be viewed with suspicion. They should be delivered in sufficient time to allow defrosting. Fresh fish should be delivered only in sufficient time to allow preparation before cooking.

SECTION XV

EXCERPTS FROM FEDERAL FOOD, DRUG, AND COSMETIC ACT

92. Excerpts from Federal Food, Drug, and Cosmetic Act (act June 25, 1938 (52 Stat. 1040)).

Sec. 201 (f) The term "food" means (1) articles used for food or drink for man or other animals, (2) chewing gum, and (3) articles used for components of any such article.

(k) The term "label" means a display of written, printed, or graphic matter upon the immediate container of any article; and a requirement made by or under authority of this Act that any word, statement, or other information appear (ing) on the label shall not be considered to be complied with unless such word, statement, or other information also appears on the outside container or wrapper, if any there be, of the retail package of such article, or is easily legible through the outside container or wrapper.

Sec. 402. A food shall be deemed to be adulterated:

(a) (1) If it bears or contains any poisonous or deleterious substances which may render it injurious to health; but in case the substance is not an added substance such food shall not be considered adulterated under this clause if the quantity of such substance in such food does not ordinarily render it injurious to health; or (2) if it bears or contains any added poisonous or added deleterious substance which is unsafe within the meaning of section 406; or (3) if it consists in whole or in part of any filthy, putrid, or decomposed substance, or if it is otherwise unfit for food; or (4) if it has been prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health; or (5) if it is, in whole or in part, the product of a diseased animal or of an animal which has died otherwise than by slaughter; or (6) if its container is composed, in whole or in part, of any poisonous or deleterious substance which may render the contents injurious to health.

(b) (1) If any valuable constituent has been in whole or in part omitted or abstracted therefrom; or (2) if any substance has been substituted wholly or in part therefor; or (3) if damage or inferiority has been concealed in any manner; or (4) if any substance has been added thereto or mixed or packed therewith so as to increase its bulk or weight, or reduce its quality or strength, or make it appear better or of greater value than it is.

Sec. 403. A food shall be deemed to be misbranded:

(a) If its labeling is false or misleading in any particular.

(b) If it is offered for sale under the name of another food.

(c) If it is an imitation of another food, unless its label bears, in type of uniform size and prominence, the word "imitation" and, immediately thereafter, the name of the food imitated.

(d) If its container is so made, formed, or filled as to be misleading.

Sec. 406. (a) Any poisonous or deleterious substance added to any food, except where such substance is required in the production thereof or cannot be avoided by good manufacturing practice shall be deemed to be unsafe for purposes of clause (2) of section 402 (a); * * *.

WAR DEPARTMENT THE ADJUTANT GENERAL'S OFFICE WASHINGTON

AG 400.163
(9-5-41) MO-M

September 12, 1941.

SUBJECT: Inspection of Butter, Eggs, Cheese, and Poultry Purchased by Quartermaster Marketing Centers.

TO: The Commanding Generals of all Corps Areas.

1. Quartermaster Marketing Centers, in addition to purchasing fresh fruits and vegetables, are now making purchases of butter, eggs, cheese, and poultry for various Army posts and camps in the 1st, 2d, 5th, 6th, and 7th Corps Areas, and it is contemplated expanding this service to the other corps areas in the near future.

2. In connection with the procurement of butter, eggs, cheese, and poultry by the Quartermaster Corps Marketing Centers the contractor, when Veterinary Corps point

of origin inspection is not provided, frequently engages an inspector of the Agricultural Marketing Service, U. S. Department of Agriculture, to grade the products prior to shipment. On arrival at the Army post the Veterinary Corps makes an inspection covering condition of the food and its fitness for human consumption as well as for its compliance with contract and Federal specification requirements.

3. There have been some instances where the veterinary officer making inspection at point of receipt has not been in agreement with the grading of the product as initially made by the Agricultural Marketing Service inspector prior to shipment by the contractor. With perishable food items, especially such as butter and eggs, it is entirely possible for grades to change between the time of inspection at point of shipment and that made at point of receipt, particularly when the foodstuffs have been subjected to unfavorable conditions during transit. Thus, it does not necessarily follow that in all such cases an error in grading has been made either at point of origin or at point of receipt. It is a fact, however, that when these instances do occur and a contractor has a shipment of butter, eggs, cheese, or poultry graded by an Agricultural Marketing Service inspector at point of shipment rejected on a grade basis following inspection at point of receipt, a controversy frequently develops. Proper settlement of these cases is important because under present conditions the shipments are usually large and considerable money is involved.

4. In order to arrive at a satisfactory and equitable means of promptly settling such of these cases as may arise, the following plan has been approved:

Where any of the food items indicated above are inspected at point of origin by an inspector of the Agricultural Marketing Service and are found on inspection at receipt to be not the grade contracted for, the vendor will be notified and, if he so desires, may request a reinspection. In such event, the Quartermaster Marketing Center which made the contract will be immediately notified. On request of the Officer in Charge of the Marketing Center the Agricultural Marketing Service of the U. S. Department of Agriculture will send a qualified representative to the camp, post, or station to reinspect the shipment in question. At the same time, the Officer in Charge of the Quartermaster Marketing Center will immediately make request to the Commanding General of the corps area in which the post or camp is located for the detail of a specially selected and qualified veterinary officer to make a reinspection at the same time as that to be made by the representative of the Agricultural Marketing Service.

While the Agricultural Marketing Service representative and the veterinary officer will make their inspections independently, it is expected that they will compare notes of their findings and discuss same before rendering their reports. The result of this reinspection will be accepted by the receiving Quartermaster as being conclusive as to grade unless it should happen that the Agricultural Marketing Service representative and the veterinary officer making the reinspection do not agree. In this event the receiving Quartermaster will consider the certificate rendered by the representative of the Agricultural Marketing Service and the report of the veterinary officer and make final decision as to whether he will accept or reject the contested shipment.

In all cases where the reinspection by the Agricultural Marketing Service representative and the veterinary officer substantiate the station veterinarian in his initial inspection, the cost of the reinspection will be assessed against the contractor, otherwise it will be borne by the Army.

By order of the Secretary of War:

S/E. S. ADAMS,
Major General,
The Adjutant General.

Copy furnished:

The Surgeon General.
The Quartermaster General.

CHAPTER 9

RECIPES

SECTION I

INTRODUCTION

1. General. All the recipes included in this manual have been put into this chapter. These recipes do not include all the recipes found in other cookbooks due to the fact that all recipes are not suitable for an Army mess. However, a good cook will always be on the alert to discover additional recipes from commercial cookbooks and other sources of dishes which are suitable for an Army mess. In this manual all recipes are based on service for 100 men. The quantity required for a greater or smaller number of men can be easily figured by changing the amount of each ingredient proportionally. For convenience of use and ease in finding, the recipes have been indexed and arranged in groups as follows:

- Breakfast dishes
- Soups
- Meat dishes (includes poultry, game, and omelets)
- Gravies and sauces
- Fish and sea-food dishes
- Vegetable dishes
- Desserts
- Sweet-dough products
- Hot breads
- Rolls
- Salads and dressings
- Beverages

In each group recipes are arranged in alphabetical order. The index should be used as a reminder of the various ways in which food can be prepared and also of the many varieties of foods and dishes which are usable in a mess.

2. Variation in recipes. The opinions of experienced cooks often vary as to the proper quantities of food required to prepare various dishes for a given number of men. This variation of opinions is due to individual taste or based upon their knowledge of the preference of their particular messes. The recipes in this manual are designed to be a guide for those who do not definitely know the exact quantities required, and these recipes will produce satisfactory results if accurately followed. The quantities shown for 100 men may be successfully modified by an experienced cook and should be so modified by experience where local conditions justify or demand this. The quantity of food consumed by a mess will vary according to the character of duty performed, the number of absentees, the season of the year, and many other causes, and the same mess will require noticeably varying quantities, dependent upon varying conditions of service. Inexperienced cooks should follow the recipes contained herein; experienced cooks may successfully deviate from the recipes under certain conditions, and all cooks should know by experience the proper quantities of food required to satisfy their own messes. This knowledge is acquired by the constant study of these and other recipes and of the preferences of the messes which they serve, as evidenced by their consumption or rejection of the dishes offered. In messes feeding a large proportion of recruits, or during periods when organizations are performing especially hard physical labor, the quantities listed may prove short of requirements.

3. Weights and measures. a. Scales and liquid measures are issued to messes in barracks but are not issued in the field. However, in the absence of these, the cook can use dippers, cups, and spoons for measuring the quantities called for in recipes. The following table shows quantities of frequently used foods measured in utensils available in the mess:

Pepper, cinnamon, or other ground spices -----	1 level spoon, M1918 -----	¼ ounce.
Flour or baking powder -----	----- do -----	½ ounce.
Melted butter or other fat -----	----- do -----	Do.
Flavoring extract -----	----- do -----	½ ounce.
Sugar -----	1 quart size dipper level full --	1 pound.
Flour or baking powder -----	1 quart size dipper heaping full	2 pounds.
Sugar -----		

Note. Additional information on weights of foods contained in utensils available in the mess will be found in paragraphs 1 and 2, appendix III.

b. If a recipe calls for 1 ounce of cinnamon, 4 level tablespoonfuls are required; if it calls for 2 ounces of baking powder, 8 level tablespoonfuls are required, etc.

c. When evaporated milk is used in place of fresh milk, the quantity given in a recipe should be diluted with an equal quantity of water to produce an amount equal to fresh milk. One 14½-ounce can of evaporated milk, diluted with 1 pint of water, is equal to 1 quart of fresh milk.

d. Whenever a recipe calls for fresh beef, veal, pork, or mutton, the quantity given includes the weight of bones. In other words, the quantities given in this manual do not mean boneless cuts of meat.

e. The following table will be found convenient. Each weight is based on the cup or spoon being level full.

	Flour	Sugar	Pepper, cinnamon, etc.
	Ounces	Ounces	Ounces
Standard measuring cup -----	4	8	
Quartmaster tablespoon or mess-kit spoon -----	¼	½	¼
Cup, M1918 -----	14	24	
Standard measuring teaspoon -----	1/12	½	

SECTION II

RECIPES

Breakfast Dishes

	Recipe		Recipe
Cakes, buckwheat	1	Mush, corn meal, fried	8
Cakes, corn	2	Mush, rolled wheat	9
Cakes, wheat (hot cakes)	3	Oatmeal	10
Hominy grits, boiled	4	Prepared breakfast foods	11
Hominy grits, fried	5	Toast, French	12
Milk for breakfast foods	6	Toast, milk	13
Mush, corn meal	7		

Soups

Barley soup	14	Oxtail soup	30
Barley and tomato soup	15	Oyster stew	31
Bean soup	16	Potato chowder	32
Beef soup	17	Potato soup	33
Chicken soup	18	Puree of beans	34
Clam chowder	19	Puree of carrots	35
Codfish chowder	20	Puree of green peas	36
Corn chowder	21	Puree of green peas and tomatoes ..	37
Cream of cabbage soup	22	Puree of lima beans	38
Cream of celery soup	23	Puree of potatoes	39
Cream of tomato soup	24	Puree of split peas	40
Green pea soup	25	Rice soup	41
Lentil soup	26	Split pea soup	42
Macaroni and tomato soup	27	Tomato soup	43
Noodle soup	28	Tomato and rice soup	44
Noodles	29	Vegetable soup	45

MEAT DISHES

Bacon, fried	46	Ham:	
Bacon, simmered	47	Baked	85
Beef à la mode	48	Simmered	86
Beef:		Smothered	87
Braised (pot roast)	49	Hamburger	88
Braised, with vegetables	50	Hash, chop suey	89
Corned	51	Liver and bacon	99
Creamed	52	Meat loaf	91
Curry of	53	Mutton:	
Dressing	54	Simmered	92
Dried, chipped or sliced on		Chops	93
toast	55	Potpie	94
Fricassee	56	Stew	95
Fritters	57	Omelet:	
Hash	58	Plain	96
Hearts, stuffed	59	Cheese	97
Loaf	60	Ham	98
Potpie	61	Tomato	99
Pot roast	62	Pork:	
Roast	63	Chops	100
Rolls	64	Cutlets	101
Simmered	65	Roast	102
Spanish	66	Sausage:	
Turkish	67	Bologna, fried	103
Beefsteak	68	Pork	104
Hamburg	69	Pork, in blankets	105
Beefsteak and mushrooms	70	Frankfurter	106
Beefsteak and onions	71	Frankfurter, in blankets	107
Beefsteak potpie	72	Short ribs of beef	108
Brains	73	Southern creoles	109
Brains and eggs	74	Spaghetti, Italian style	110
Chicken:		Spareribs	111
Creamed	75	Stew:	
Fricassee	76	Chop suey	112
Fried	77	Pan	113
Roast	78	El rancho	114
Stew with dumplings	79	Irish	115
Dumplings	80	Tamales	116
Chili con carne	81	Turkey, roast	117
Chuck steak with onions	82	Veal cutlets	118
Duck, roast	83	Veal, roast	119
Goose, roast	84	Yorkshire pudding	120

GRAVIES AND SAUCES

Sauce: (Continued)

Flour batter (for thickening		Cranberry	127
liquids)	121	Cream, for codfish	128
Gravy:		Plum pudding	129
Brown	122	Rhubarb	130
Cream	123	Spanish, fish	131
Giblet	124	Sweet, chocolate	132
Stock	125	Sweet, lemon	133
Sauce:		Sweet, vanilla	134
Barbecue	126	Tomato	135

FISH AND SEA FOOD DISHES

Codfish cakes	136	Oysters, scalloped	140
Fish, baked	137	Salmon cakes	141
Fish, fresh, fried	138	Salmon hash	142
Oysters, fried	139		

VEGETABLE DISHES

Asparagus	143	Peas, green	177
Beans:		Potatoes:	
Baked	144	Baked	178
Canned	145	Boiled	179
Dry, simmered	146	Boiled in jackets	180
Lima, green or soaked, canned	147	Browned	181
Lima, dry, simmered	148	Potatoe cakes	182
String or snap, canned	149	Cheesed (au gratin)	183
String or snap, fresh	150	Creamed	184
Beets:		French baked	185
Fresh, boiled	151	French fried	186
Canned	152	Fried (sautéed)	187
Harvard	153	German boiled	188
Pickled	154	Hashed browned	189
Cabbage	155	Lyonnais	190
Bavarian	156	Mashed	191
Boiled	157	Sweet, baked	192
Fried	158	Sweet, boiled	193
Carrots:		Sweet, candied	194
Baked	159	Sweet, fried	195
Candied	160	Pumpkin, baked	196
Mashed	161	Rice:	
Corn:		Boiled	197
Canned	162	Curried	198
Fried	163	Fried	199
Fritters	164	Spanish	200
Scalloped	165	Steamed	201
Eggplant	166	Sauerkraut	202
Greens	167	Sauerkraut, how made	203
Hominy	168	Squash:	
Macaroni and Cheese	169	Baked	204
Onions:		Canned, baked	205
Boiled	170	Mashed	206
Fried	171	Succotash	207
Onions and grated cheese	172	Tomatoes, stewed	208
Parsnips:		Turnips:	
Baked	173	Boiled	209
Mashed	174	Mashed	210
Sugared	175	Left-over	211
Peas, creamed, canned	176		

DESSERTS

Apples, baked	212	Custard, egg	229
Apple or fruit rolls	213	Fritters, oatmeal	230
Apple sauce	214	Fruits, dried, stewed	231
Apricots, dried, stewed	215	Gelatin	232
Brown betty	216	Ice cream	233
Cake:		Chocolate	234
Chocolate	217	Coffee	235
Corn	218	Ice:	
Eggless	219	Lemon	236
Fruit, dark	220	Orange	237
Marble	221	Pineapple	238
Quick	222	Icing, boiled, for cakes	239
Raised	223	Icing, uncooked, for cakes	240
Spice	224	Meringue	241
Sponge	225	Mincemeat	242
White	226	Peaches, dried, stewed	243
Cobbler, apple or fruit	227	Pie crust	244
Crullers	228		

DESSERTS (Continued)

Pie:		Pudding:	
Apple or fruit	245	Apple	254
Banana cream	246	Banana	255
Chocolate, meringue	247	Bread, with sauce	256
Coconut cream	248	Cornstarch	257
Custard	249	Indian, baked	258
Lemon cream	250	Plum	259
Mince	251	Rice	260
Pumpkin or squash	252	Rice and apple	261
Prunes, stewed	253	Sweet potato	262
		Tapioca	263

SWEET DOUGH PRODUCTS

Basic sweet dough	264	Doughnuts, jelly	268
Cake, apple	265	Rolls, cinnamon	269
Cake, coffee	266	Rolls, parkerhouse	270
Doughnuts	267	Stollen	271

HOT BREADS

Biscuit:		Corn bread	275
Baking powder	272	Corn bread (sour milk)	276
Cheese	273	Gingerbread	277
Sour milk	274		

ROLLS

Basic dough	278	Parkerhouse rolls	282
Cinnamon rolls	279	Raisin bread	283
Finger rolls	280	Soft bun bread	284
Pan rolls	281	Sandwich buns	285

SALADS AND DRESSINGS

Apple and celery salad	286	Raw vegetable salad	299
Baked bean salad	287	Salmon salad	300
Bean, stringless, salad	288	Slaw (coleslaw)	301
Beet salad, pickled	289	Tomatoes, sliced	302
Cabbage salad	290	Vegetable salad	303
Cabbage and apple salad	291	Boiled dressing	304
Celery salad	292	French dressing	305
Chicken salad	293	Mayonnaise dressing	306
Cucumber and onion salad	294	Mustard salad dressing	307
Lettuce salad	295	Salad dressing, eggless	308
Piccalilli salad	296	Sour cream dressing	309
Pimento salad	297	Tomato french dressing	310
Potato salad	298	Thousand island dressing	311

BEVERAGES

Cocoa or chocolate	312	Lemonade	314
Coffee, hot	313	Tea, hot and iced	315

BREAKFAST DISHES

1. Cakes, buckwheat

8 pounds flour, buckwheat	3 pounds sugar or molasses *
4 pounds flour, wheat	1 can milk, evaporated
3 ounces salt	6 quarts water
12 ounces baking powder	24 eggs
Procedure same as for wheat cakes except that no melted fat is added.	
* When molasses is used it should be mixed with the eggs, water, and milk.	

2. Cakes, corn

8 pounds flour	6 quarts boiling water
4 pounds corn meal	2 cans milk, evaporated
12 ounces baking powder	24 eggs, beaten
4 ounces salt	1 pound melted fat
1½ pounds sugar	1 gallon water

Add the corn meal to the boiling water and boil for 5 minutes, cool, then place in mixing bowl. Add the milk and the 1 gallon of water. Sift together the flour, baking powder, salt, and sugar, and mix. Add the beaten eggs and melted fat (butter or vegetable shortening is best). Beat well and cook the same as wheat cakes.

3. Cakes, wheat (hot cakes)

12 pounds flour	36 eggs
3 pounds sugar	½ pound fat, melted
4 ounces salt	1 can milk, evaporated
12 ounces baking powder	6 quarts water

Sift together the flour, sugar, salt, and baking powder. Beat the eggs and add to water and evaporated milk. Turn this mixture into the sifted flour mixture and add the melted fat (vegetable shortening is best). Then beat into a smooth batter. If the batter seems too thick, add a little more water or milk. Grease a hot griddle iron or clean stove top with bacon rind or clean fat and pour out the batter, a spoonful at a time. Cook until nicely browned on both sides. Serve hot with butter or sirup, or both. Hot cakes should be cooked a few at a time. If all the cakes required for a meal are cooked before starting to serve, the first ones cooked will become tough and leathery.

4. Hominy grits, boiled

9 pounds hominy grits	2 pounds sugar
7 gallons water	2 ounces salt

Bring the salted water to a boil, then add sugar and hominy, and boil for about 20 minutes or until tender. Remove to the back part of the range and let simmer for about 40 minutes. (A double boiler is preferable. One can be made by inserting the boiler containing the hominy into a large boiler.) Serve with butter or sirup.

5. Hominy grits, fried

10 pounds hominy grits, fine	4 ounces salt
7 gallons water	

Prepare as in recipe 4. Remove from the boiler, spread about 1 inch deep in well-greased pan, and allow to cool. Cut in pieces about 2 inches square, roll in flour, and fry in deep fat. Serve hot with sirup or butter.

6. Milk for breakfast foods

15 cans milk, evaporated	1 ounce salt
4 pounds sugar	

Add sufficient water to make 7½ gallons. Whip well for a few minutes. One ounce vanilla or lemon extract may be added if desired. This recipe will produce a satisfactory substitute when fresh milk is not available.

7. Mush, corn meal

10 pounds corn meal, white or yellow, (white preferred)	7 gallons water
3 pounds sugar	1½ ounces salt

Bring the salted water to a boil, then add the sugar and corn meal, meanwhile whipping briskly to prevent lumping. Cook for about 20 minutes and then allow to stand about the same length of time where it will remain hot. Place in vegetable dishes and serve with fresh milk or diluted evaporated milk (recipe 6).

8. Mush, corn meal, fried

12 pounds corn meal	3 ounces salt
7 gallons water	2 pounds sugar

Prepare in the same manner as corn meal mush. Pour the mush into a well-greased bake pan to a depth of about 1 inch, allow to cool, cut into pieces about 2 inches square, dip in a flour batter, and fry in a deep fat. Serve hot with butter and sirup.

This preparation may be improved by dipping each piece in an egg batter before rolling in the flour.

9. Mush, rolled wheat

Prepare in the same manner as oatmeal (recipe 10), using 9 pounds rolled wheat instead of 9 pounds of oatmeal.

10. Oatmeal

- | | |
|---------------------------|-----------------|
| 9 pounds oatmeal | 2 ounces salt |
| $\frac{1}{2}$ pound sugar | 8 gallons water |

Bring the salted water to a boil, whip the oatmeal in slowly, adding sugar, and boil for 5 minutes. Let simmer 30 minutes and serve with milk and sugar. (See recipe 6.)

Note. This recipe is for the regular style oatmeal or rolled oats. The quick type requires only about 3 minutes and no simmering. The package will show whether it contains the quick type.

11. Prepared breakfast foods

Follow the directions given on the packages.

12. Toast, french

- | | |
|-------------------------|----------------------------------|
| 30 pounds bread, dry | 36 eggs |
| 5 cans milk, evaporated | $1\frac{1}{2}$ pounds cornstarch |
| 7 pints water | $2\frac{1}{2}$ ounces vanilla |

Slice the bread $\frac{1}{2}$ -inch thick (be careful not to cut bread too thick). Mix milk, water, eggs, vanilla, and corn starch into a batter. Add salt to taste. Dip slices in the batter and fry in deep fat or on a griddle. Serve hot with butter or sirup, or both.

13. Toast, milk

- | | |
|-----------------|---|
| 20 pounds bread | 4 gallons milk, or 16 cans milk, evaporated, and 16 pints water |
| 4 pounds sugar | |

Slices of left-over bread may be used. Place the bread in a large bake pan (not more than one-third full) and brown in a 15-count oven. Serve in vegetable dishes with hot sweetened milk poured over it. (See recipe 6.)

SOUPS

14. Barley soup

- | | |
|--------------------------|--------------------------|
| 7 gallons beef stock | 2 pounds onions, chopped |
| 3 pounds barley, pearled | Salt and pepper to taste |

Thoroughly mix all ingredients and boil for 1 hour. Ten minutes before serving, add enough beef stock to make 10 gallons of soup. Season to taste with salt and pepper.

15. Barley and tomato soup

- | | |
|-------------------------------------|--------------------------|
| 7 gallons beef stock | 2 pounds bacon, diced |
| 5 pounds barley | Salt and pepper to taste |
| 8 pounds tomatoes (fresh or canned) | |

Thoroughly mix all ingredients and boil for 1 hour. If fresh tomatoes are used, they should first be stewed and pressed through a colander. Ten minutes before serving, add enough beef stock to make 10 gallons of soup. Season to taste with salt and pepper.

16. Bean soup

- | | |
|-------------------------------|---|
| 3 pounds beans, dry | $1\frac{1}{2}$ pounds bacon, diced and browned |
| 7 gallons water or beef stock | 2 cans tomatoes, no. $2\frac{1}{2}$ or no. 3 cans |
| 10 pounds soup bone | Salt and pepper to taste |

Thoroughly clean and wash the beans. Place them and the soup bone in the beef stock and allow to simmer for about 5 hours, or until the beans have gone to pieces and will pass through a colander. Ten minutes before serving add the tomatoes, the diced and browned bacon, and enough beef stock to make 10 gallons of soup. Thicken with a flour batter and season to taste with salt and pepper. Serve hot with crackers or croutons.

17. Beef soup

- | | |
|----------------------------------|-----------------------------|
| 7 gallons beef stock | 2 pounds rice, if desired |
| 5 pounds beef, shank, neck, etc. | 1 bunch parsley, if desired |
| 2 cans tomatoes, no. 3 cans | Salt and pepper to taste |

This soup may be made to best advantage on days when simmered beef is served. After simmering the beef until done, take it out and skim off the grease. Dice the beef very fine and add the stock and tomatoes to the water in which the beef was boiled; if desired, a little rice may be added. Ten minutes before serving, add enough beef stock to make 10 gallons of soup. Season to taste with salt and pepper and serve hot. Sprinkle with chopped parsley.

18. Chicken soup

- | | |
|--|--------------------------------|
| 7 gallons beef stock | 2 pounds rice |
| 17 pounds chicken scraps (bones, wing tips, necks, legs, etc.) | 6 ounces parsley, chopped fine |
| | Salt and pepper to taste |

Simmer the chicken scraps until well done. Remove the bones and place them in the beef stock, then boil for 1 hour. Remove the bones and strain the stock. Dice the chicken very fine and place in a boiler with the strained stock and add the rice and boil for 30 minutes. Ten minutes before serving, add enough beef stock to make 10 gallons of soup. Sprinkle with chopped parsley.

Note. Chicken soup should be made only when chicken is being served in one of the following forms: Roasted, stewed, fricasseed. It is not economical to buy chickens for the sole purpose of making soup. On days when chicken is being served there are ample scrap meat and bone from wing tips, necks, legs, etc., to make a delicious chicken soup.

19. Clam chowder

- | | |
|-----------------------------------|-----------------------------------|
| 6 quarts clams, husked, diced | 2 pounds onions, chopped, browned |
| 12 pounds potatoes, diced, raw | 2 pounds flour |
| 2 pounds bacon, diced and browned | Salt and pepper to taste |
| 7 gallons beef stock | |

Boil the potatoes, clams, bacon, and onions in the beef stock until well done. If fresh clams are used, wash thoroughly to remove sand. Thicken slightly with a flour batter and serve hot. Season to taste with salt and pepper and add enough beef stock 10 minutes before serving to make 10 gallons.

20. Codfish chowder

- | | |
|----------------------------------|--------------------------|
| 9 pounds codfish, salt, shredded | 2 pounds bread |
| 2 pounds bacon, diced | 4 cans milk, evaporated |
| 2 pounds onions, chopped | 7 gallons beef stock |
| 6 pounds potatoes, diced, raw | Salt and pepper to taste |

Brown the bacon and onions in a bake pan, then transfer to a boiler and add the potatoes, codfish, and beef stock. Boil until done, about 20 minutes. Add enough beef stock 10 minutes before serving to make 10 gallons. Toast sliced bread (preferably dried-out bread) in the oven and add it, after dicing, to the chowder when the potatoes are done. Then add the milk and season to taste with salt and pepper.

21. Corn chowder

- | | |
|--------------------------|--------------------------|
| 5 cans corn, no. 2 cans | 8 gallons beef stock |
| 2 pounds bacon, diced | 4 cans milk, evaporated |
| 2 pounds onions | 2 pounds bread, diced |
| 6 pounds potatoes, diced | Salt and pepper to taste |

Brown the bacon and onions in a bake pan, then transfer to a boiler and add the potatoes and beef stock. Boil until done, about 20 minutes. Add enough beef stock 10 minutes before serving to make 10 gallons. Toast sliced bread (preferably dried-out bread) in the oven and add it to the chowder after the potatoes are done. Add the milk and corn but do not allow to boil. Season to taste with salt and pepper.

22. Cream of cabbage soup

- | | |
|---------------------------------|-----------------------------------|
| 10 pounds cabbage, chopped fine | 2 pounds fat, butter preferred |
| 7 gallons beef stock | 1 pound flour, browned in the fat |
| 4 cans milk, evaporated | Salt and pepper to taste |

Boil the cabbage about 15 minutes, add the beef stock, thicken with the browned flour, and season to taste with pepper, salt, and celery salt. Add the milk. Add enough beef stock 10 minutes before serving to make 10 gallons.

23. Cream of celery soup

- | | |
|--------------------------------|--------------------------------|
| 7 pounds celery, diced fine | 2 pounds flour, browned in fat |
| 7 gallons beef stock | 4 cans milk evaporated |
| 2 pounds fat, butter preferred | Salt and pepper to taste |

Add the celery to the beef stock and boil about 1 hour. Season to taste with pepper, celery salt, and salt. Thicken with batter made of the fat and flour, and just before serving add the milk. Add enough beef stock 10 minutes before serving to make 10 gallons.

24. Cream of tomato soup

7 gallons beef stock	2 pounds fat, butter preferred
4 cans tomatoes, no. 3 can	2 pounds flour, browned in fat
4 cans milk, evaporated	Salt and pepper to taste

Add the tomatoes to the stock and bring to a boil. Break up the tomatoes. Season to taste with celery salt, mustard, salt, and pepper. Thicken slightly with the browned flour, and add the milk and a pinch of soda. Add enough beef stock 10 minutes before serving to make 10 gallons.

25. Green pea soup

10 cans green peas, no. 2 cans, or	7 gallons beef stock
12 pounds fresh shelled peas	Salt and pepper to taste

If canned peas are used, boil for 10 minutes in the beef stock. If fresh peas are used, boil in beef stock until well done. Add enough beef stock 10 minutes before serving to make 10 gallons.

26. Lentil soup

Prepared in the same manner as bean soup (recipe 16), substituting lentils for beans.

27. Macaroni and tomato soup

3 pounds macaroni	5 cans tomatoes, no. 3 can, or
7 gallons beef stock	equivalent fresh tomatoes
2 pounds onions, chopped	Salt and pepper to taste
2 pounds bacon, diced	

Break the macaroni in pieces about 1 inch long. Add macaroni, onions, and bacon to boiling beef stock and boil for 40 minutes, seasoning to taste with salt and pepper. Add tomatoes and boil a few minutes. Break up the tomatoes. Add enough beef stock 10 minutes before serving to make 10 gallons.

28. Noodle soup

7 gallons beef stock	5 pounds noodles
	Salt and pepper to taste

Boil noodles 40 minutes in the seasoned soup stock. Add enough beef stock 10 minutes before serving to make 10 gallons.

29. Noodles

3 pounds flour	9 eggs
1½ ounces salt	Milk or water to make a stiff dough

To prepare noodles, sift ½ ounce of salt with each pound of flour, break 3 eggs into the sifted mixture, and mix with milk and water until a stiff dough is formed. Roll the dough out until it is about ⅛ inch thick, sprinkle a little flour over it, and roll it up. Cut slices from the end of the roll about ⅓ to ¼ inch thick and spread on a board or cloth in the sun to dry.

30. Oxtail soup

12 pounds oxtails	4 pounds carrots, diced
7 gallons beef stock	4 pounds onions, diced
	Salt and pepper to taste

Cut the oxtails into small pieces (about 1 inch long), wash, drain, sprinkle with salt and pepper, dredge with flour, and brown in fat or bacon drippings in a pan on top of the stove. Add to the stock with the carrots and onions, and simmer until the meat is tender. If desired, the soup may be thickened with a flour batter. Just before serving add sufficient stock to make 10 gallons of soup.

31. Oyster stew

10 quarts oysters, fresh, or 20 no. 2	7 gallons beef stock
cans oysters	5 cans milk, evaporated
	Salt and pepper to taste

Drain the liquor from the oysters. Add flour to the liquor from the oysters to make a thin batter. Add the batter to the stock and bring to a boil. Season. Add the oysters. Simmer 5 minutes. Add enough beef stock 10 minutes before serving to make 10 gallons.

32. Potato chowder

Prepare in same manner as corn chowder (recipe 21), using 10 pounds of potatoes in place of corn.

33. Potato soup

10 pounds potatoes, diced	2 cans milk, evaporated
7 gallons beef stock	2 pounds fat, butter preferred
2 pounds onions, chopped and browned	1 pound flour, browned in fat
Salt and pepper to taste	

Boil the potatoes in the stock until well done, then pass through a colander and bring to a boil again. Thicken with the flour batter. Add the chopped onions and evaporated milk. Add enough beef stock 10 minutes before serving to make 10 gallons.

34. Puree of beans

5 pounds dry beans	2 pounds fat, butter preferred
7 gallons beef stock	2 pounds flour, browned in fat
1 pound bacon, diced and browned	Salt and pepper to taste

Place the beans, bacon, and stock in the boiler, and let simmer over night, or until the beans are thoroughly broken to pieces. Pass through a colander, replace in boiler, and add a batter made of the flour and fat. Season. Allow to simmer at least 1 hour before serving. Ten minutes before serving, add enough beef stock to make 10 gallons of soup.

35. Puree of carrots

Prepare in the same manner as puree of beans (recipe 34), using 17 pounds of diced carrots braised or fried in a little fat until brown, instead of 5 pounds of beans, and simmer about 2 hours or until carrots are well done.

36. Puree of green peas

Prepare in the same manner as puree of beans (recipe 34), using 5 pounds of green peas instead of 5 pounds of beans. Only about 1 hour's simmering is required.

37. Puree of green peas and tomatoes

Prepare in the same manner as puree of green peas (recipe 36), using four no. 3 cans tomatoes (or the equivalent in fresh tomatoes), and 6 pounds of green peas.

38. Puree of lima beans

Prepare in the same manner as puree of beans (recipe 34), using 5 pounds of dry lima beans instead of 5 pounds of dry beans. Two and one-half cans of evaporated milk or 3 quarts of fresh milk added just before serving greatly improve the flavor.

39. Puree of potatoes

10 pounds potatoes, diced fine	2 pounds fat, butter preferred
7 gallons beef stock	1 pound flour, browned in fat
2 pounds bacon, diced and browned	Salt and pepper to taste

Add the potatoes and bacon to the cold stock and boil until potatoes are completely broken to pieces, seasoning to taste. A stalk of fresh celery or a little celery salt may be used as additional seasoning. Thicken slightly with the flour batter. Add enough beef stock 10 minutes before serving to make 10 gallons.

40. Puree of split peas

Prepare in the same manner as puree of beans (recipe 34), using 5 pounds of split dried peas instead of 5 pounds of beans.

41. Rice soup

3 pounds rice	1 pound onions, chopped and browned
7 gallons beef stock	2 pounds bacon, diced and browned
Salt and pepper to taste	

Wash the rice and add it to the bacon, onions, and cold stock, and boil for 1 hour.

42. Split pea soup

7½ pounds split peas	2 pounds bacon, diced and browned, or
7 gallons beef stock	ham bones or bacon rind
Salt and pepper to taste	

Add the peas and bacon to the cold stock and let simmer for 5 hours. Add enough beef stock 10 minutes before serving to make 10 gallons.

43. Tomato soup

- | | |
|---|--------------------------|
| 12 pounds tomatoes, fresh, or 6 no. 3 cans tomatoes | 2 pounds flour |
| 5 gallons beef stock | 1 pound sugar |
| 2 pounds bacon | Salt and pepper to taste |

Place the tomatoes and bacon in the stock and boil for 1½ hours. Remove the bacon and press the soup through a colander to separate the skins and seeds of the tomatoes. Replace on the range and thicken with a flour batter. Color lightly with caramelized sugar. Add enough beef stock 10 minutes before serving to make 10 gallons.

44. Tomato and rice soup

- | | |
|---|--------------------------|
| 3 cans tomatoes, no. 3 cans, or 6 pounds fresh tomatoes | 7 gallons beef stock |
| 2 pounds rice | Salt and pepper to taste |

Chop the tomatoes thoroughly and mix all ingredients. Season to taste, adding a small piece of garlic. Boil for 1 or 2 hours. Add enough beef stock 10 minutes before serving to make 10 gallons.

45. Vegetable soup

- | | |
|-------------------|---|
| 2 pounds cabbage | 2 cans tomatoes, no. 3 cans, or 4 pounds fresh tomatoes |
| 1 pound onions | 7 gallons beef stock |
| 2 pounds potatoes | Parsley, chopped |
| 1 pound rice | Salt and pepper to taste |
| 2 pounds celery | |

Chop and thoroughly mix all ingredients. Start in cold water. Boil for 1 hour or more. Add enough beef stock 10 minutes before serving to make 10 gallons. Parsley may be added as a garnish just before serving. Many other vegetables may be substituted for those indicated.

MEAT DISHES

(Includes poultry, game, and omeletes)

46. Bacon, fried

22 pounds bacon, issue, or 24 pounds bacon, breakfast

Cut about five slices to the inch. If dry salt, issue, bacon is used, place in a bake pan containing boiling water, boil for 5 minutes, then drain off water. Fry on a hot range or in a quick oven. Drain off excess fat and stir occasionally so that all the bacon is thoroughly cooked. If served with eggs or hot cakes, etc., 10 pounds bacon are sufficient.

47. Bacon, simmered

22 pounds bacon, issue.

Cut into pieces weighing about 5 pounds each. Wash thoroughly and place in cold water. Bring to boil, then reduce temperature and simmer for 2 hours. Slice and serve.

48. Beef a la mode

- | | |
|---|------------------------------|
| 35 pounds beef, fresh (from less tender cut) | 2 pounds carrots, diced |
| 2 pounds bacon or pork | 6 pickles, issue, large |
| 1 pound flour, browned in ½ pound butter or other fat | 3 cans tomatoes, no. 3 cans |
| 5 gallons beef stock | 1 clove garlic, chopped fine |
| | Salt and pepper to taste |

Cut the beef into pieces weighing about 5 pounds each and rub with salt and pepper, allowing ½ teaspoon salt and ¼ teaspoon pepper to each pound of meat; cut the bacon (or pork) into strips about the thickness of the little finger and the length of the pieces of beef, using a narrow-bladed knife. Cut 4 equally spaced slits in each piece of the beef, parallel with the grain. Insert in each slit one piece of bacon, rolled in garlic and cayenne pepper, and one slice of pickle. Make a gravy of the flour, fat, tomatoes, and beef stock. Put the meat in a pan, pour the gravy over it, and place the carrots around it. Cook slowly in a slow oven (200°-250° F.—20 count) for about 3 hours or until well done. Remove meat from oven, slice across the grain, replace in the gravy and cook a little longer, or slice

and place on a platter with the gravy poured over it. Serve with hot gravy. The gravy should be very spicy; therefore, season it well with garlic, bay leaves, or Worcestershire sauce.

49. Beef, braised (pot roast)

55 pounds beef, (from less tender cut) 1 pint vinegar
8 pounds onions, chopped Salt and pepper to taste

Cut the beef into pieces weighing about 5 pounds each. Wipe with a damp cloth. Sear until well browned on all sides. Season. Place in a large Dutch oven or camp kettle or any covered utensil. A heavy utensil is best. Add the chopped onions and vinegar. If the meat is well covered with fat, basting is not necessary. If the beef is lacking in fat, it is a good practice to lard with strips of fat or place a layer of fat on top. About 2 pounds of fat pork or bacon are required for this. This added fat improves the flavor, melts, and bastes the roast. Cook covered in a slow oven (200°-250° F.) or on top of stove until tender. This will require 2 to 5 hours, depending on tenderness of beef used. The beef should be turned three or four times while cooking. When done, remove from utensil and slice. The roast may be served in either of two ways: Make a thick gravy in the utensil in which the beef was roasted and pour this gravy over the sliced beef on platters, or make a gravy of the desired thickness and serve separately.

50. Beef, braised with vegetables

40 pounds beef, chuck roast 8 pounds turnips, sliced
(not boned) 1 clove garlic, chopped fine
8 pounds carrots, sliced 3 pounds flour
8 pounds onions, sliced Salt and pepper to taste
8 pounds celery, cut in bits

Cut the meat into pieces weighing about 5 pounds each, wipe it with damp cheesecloth, and roll in flour. Place vegetables in sufficient salted cold water to barely cover them and boil until soft, then rub them through a colander or coarse strainer. Sear the meat on all sides. After the meat is seared, transfer it to a kettle or kettles. If the beef is lean (lacking in fat), it is well to cut about 2 pounds of fat pork into strips, or use sliced bacon, and lay on top of the beef. This keeps the roast basted. Pour the vegetables and their liquid over the meat, together with any preferred seasoning. Cover tightly and let it simmer slowly for 4 or 5 hours, turning twice. After the meat is cooked, remove from kettle. Thicken the liquid remaining in the kettle by adding flour, and pour it over the meat.

51. Beef, corned

50 pounds corned beef

Wash the meat in warm water and, if it has been in brine until too salty, cover it with cold water and bring slowly to a boil. Drain off the water, cover again with fresh cold water and reheat. As soon as the liquid bubbles, reduce the heat, add a few whole peppers, and continue cooking slowly (always below the boiling point) for 2 or 3 hours, according to quality and quantity of beef, until the meat is tender. Keep the meat closely covered during the cooking process, and turn it when partly done, adding hot water from time to time so as to keep it completely covered. Carrots, parsnips, and potatoes may be added during the cooking process, if desired.

52. Beef, creamed

20 pounds coarse ground beef 8 cans milk, evaporated
1 pound lard or butter 2 gallons beef stock or water
2 pounds flour

Braise the meat. Make a gravy in a separate pan as follows: Melt the lard, add the flour, stirring constantly until thoroughly blended and browned. Stir in the liquid, a little at first, then enough to thin the mixture, and finally the remainder. Season to taste. Pour the gravy over the ground meat and simmer until the meat is tender.

53. Beef, curry of

45 pounds beef, fresh 2 ounces curry powder
1 pound flour Salt and pepper to taste

Cut the beef into 1-inch cubes and place in a bake pan. Cover with cold beef stock or water and season to taste with curry powder (usually about 2 ounces

of curry powder is used). Cook in a slow oven (200°-250° F.—18 to 20 counts) about 3 hours. When nearly done thicken slightly with a flour batter. Serve hot.

54. Beef dressing

10 pounds beef scraps of any kind	1 gallon beef stock
14 pounds bread	1 ounce sage
2 pounds onions, chopped	Salt and pepper to taste

Run the meat scraps through a chopper, soak the bread in cold water and remove excess water by squeezing, mix the meat and bread with the onions, season with sage to taste, add sufficient beef stock to make about the same consistency as hash, and spread 2 or 3 inches deep over the bottom of a well-greased pan. Spread a little grease over the top and bake for 40 minutes in a medium oven (325°-400° F.—12 to 16 counts). Serve hot with meat and gravy.

Do not leave on the stove as this causes the dressing to become dry and hard.

55. Beef, dried, chipped, or sliced on toast

7 pounds chipped or sliced dried beef	2 bunches parsley, chopped fine
2 pounds fat, butter preferred	½ ounce pepper
1 pound flour, browned in fat	4 gallons beef stock
4 cans milk, evaporated	130 slices bread—about 12 pounds

Melt the fat in the pan and add the flour. Cook a few minutes to brown the flour. Add the milk and beef stock, stirring constantly to prevent lumping. Add the dried beef and cook 5 minutes. Add the parsley and pepper. Serve hot on toast.

56. Beef fricassee

45 pounds beef, fresh (from less tender cut)	3 pounds fat, butter preferred
2 pounds onions	3 gallons beef stock
1 pound flour	Salt and pepper to taste

Heat the fat in a bake pan. Add the beef, diced into 1-inch cubes, and onions. Brown on top of the range or in a quick oven (400°-450° F.—9 to 12 counts) for about 20 minutes. Sift in the dry flour and continue cooking for about 5 minutes. Add sufficient beef stock to nearly cover the meat and mix thoroughly. Cook on top of the stove or in a slow oven (200°-250° F.—18 to 20 counts) until well done.

57. Beef fritters

25 pounds cooked beef	1 pound flour
8 pounds bread	Salt and pepper to taste
3 pounds onions, minced	

Soak the bread and remove the excess water by squeezing with the hands. Grind the meat fine and add the bread and minced onions and mix all together. Mold into cakes of about 3 ounces each, roll in flour, and fry in deep fat until brown. Serve hot with tomato sauce (recipe 135). The fritters may be improved by dipping in egg batter before rolling in flour.

58. Beef hash

15 pounds potatoes	10 quarts beef stock
5 pounds onions	1 clove garlic
25 pounds meat scraps, fresh or cooked	Salt and pepper to taste

Chop the ingredients fine and add the beef stock until the mixture is of the consistency of ordinary mush and place about 3 inches deep in a well-greased pan. Smooth the top and grease lightly. Bake in a quick oven (400°-450° F.—9 to 12 counts) for 1½ hours, or until done. Scraps of beef or pork, or a mixture of both, or corned beef may be used for making hash.

59. Beef hearts, stuffed

32 pounds beef hearts	1 gallon beef stock
10 pounds bread crumbs	2 pounds bacon, sliced
3 pounds onions	Salt and pepper to taste
½ pound fat	

Wash and clean the hearts and allow to drain. Chop and brown the onions. Soak the bread crumbs, squeeze out excess water, and mix with onions. Season

to taste with thyme and stuff the holes in the hearts with the dressing. Place the hearts in a bake pan with a slice of bacon on top of each, and bake in a medium (325°-400° F.—12 to 16 counts) oven. After the hearts have become nicely browned the temperature of the oven should be reduced. Cook until done, allowing 3 to 3½ hours. Slice thin and serve.

60. Beef loaf

40 pounds beef, fresh	5 pounds bacon
2 pounds onions	1 clove garlic
1 pound flour	25 eggs, beaten
2 or 3 quarts beef stock	Salt and pepper to taste

Grind the meat, onions, and garlic together. Add beaten eggs, salt and pepper. Mix well. Make into loaves about 4 inches wide by 3 inches high and as long as the pan is wide. A loaf of this shape can be cut into pieces of attractive size and about the proper size for the individual, and the pieces will hold their shape. Then make a batter of flour and beef stock, rubbing this over the loaves. Place in the oven (200°-250° F.—18 to 20 counts) and bake for about 1½ hours. A slice of bacon may be placed on the top of each loaf to improve the flavor. Serve hot with gravy.

Beef loaf may be served with tomato sauce, if desired.

61. Beef potpie

35 pounds beef, fresh or left-over meat	5 pounds turnips
17 pounds potatoes	5 pounds carrots
2 cans tomatoes, no. 10 cans, or equivalent fresh tomatoes	1 clove garlic
5 pounds onions	1 pound flour
	Salt and pepper to taste

Cut the beef into 1-inch cubes, place in cold water, and bring quickly to a simmer. Add turnips and carrots cut in 1-inch cubes and simmer until these are nearly done. Add cut potatoes, chopped garlic, onions cut in 1-inch cubes, and the tomatoes, and finish cooking. Thicken slightly with flour batter and cover with raw biscuits (recipe 272). Serve as soon as the biscuits are done.

62. Beef, pot roast

55 pounds beef, fresh	Salt and pepper to taste
2 pounds onions	3 pounds flour

Use meat from the chuck, brisket, shoulder, or any other less tender part of the carcass and cut into 5-pound pieces. Make a gravy of beef stock and flour batter. Season well with salt and pepper. Put the meat and onions in the gravy and cook in a slow oven (200°-250° F.—18 to 20 counts) until tender. The gravy should cover the meat in the pan about one-half inch as in the preparation of beef à la mode. Slice the meat and serve on a platter with hot gravy poured over it. Serve with dumplings.

63. Beef, roast

55 pounds beef, fresh

This recipe is for cooking the tender cuts of beef. The less tender cuts should be braised, if a roast is desired.

Cut the beef into pieces of about 5 pounds each and wipe with a damp cloth. Sear until all sides are well browned. If the beef is lean (lacking in fat), it is well to lard it with about 2 pounds of fat pork, cut into strips, or lay these strips over the top. Sliced bacon may be used. This improves flavor and bastes the beef while roasting. Place in pan with fat side up. After searing, cook in a slow oven (200°-250° F.—18 to 20 counts) for about 1¾ hours (about 20-22 minutes per pound per piece; see par. 17, chapter 7). If in larger pieces than 5 pounds, more time is required; however, for 5-pound pieces the time of 1¾ hours after searing should not be greatly exceeded as roasting longer than this or allowing the roast to remain in the oven after it is done, tends to make the finished roast dry and hard. Roasting should be started so that the roast will be finished shortly before time to serve; for example, a roast for dinner started about 9:30 A. M. will be ready to carve at 11:30 A. M. Add very little water, only sufficient to keep from scorching at the bottom. When done, carve into thin slices, across the grain. Remove all chunks of fat, bones, and tendons, and render for soup stock. Serve hot with gravy made from the roast drippings (see recipe 122).

64. Beef rolls

- | | |
|---|--------------------------|
| 25 pounds meat scraps, cooked,
left-over | 2 pounds onions, browned |
| 5 pound bread crumbs | 1 ounce chili pepper |
| | Salt |

Pass the meat scraps through a chopper. Soak the bread crumbs and squeeze out the excess water. Mix well the meat, bread, and seasoning of salt, browned onions, and chili pepper. Make a pie crust or rich biscuit dough rolled into long strips, using recipe for dough for apple rolls (recipe 213). Spread the meat-and-bread mixture about $\frac{1}{2}$ inch thick over the dough. Roll up lengths equal to that of the bake pan, brush top with beaten eggs, and bake in a slow oven (200°-250° F.—18 to 20 counts) for 1 hour.

65. Beef, simmered

- | | |
|---|----------------|
| 55 pounds beef, fresh (from less
tender cut) | 3 ounces salt |
| | 1 ounce pepper |

Cut the beef into pieces weighing about 5 pounds each, wipe with damp clean cloth. Put in boiling water deep enough to cover.

Add salt and pepper, and simmer about 3 hours or until tender.

66. Beef, spanish

- | | |
|---|--------------------------|
| 45 pounds beef, fresh (from less
tender cut) | 8 pounds onions, chopped |
| 3 cans tomatoes, no. 3 cans | 2 pounds bacon |

Cut the beef into $1\frac{1}{2}$ -inch cubes and fry in a little fat for about 5 minutes. Pour off the fat and add the tomatoes and onions. Add sufficient beef stock to cover the meat, season to taste with salt and pepper, and allow to simmer for 2 hours. Serve hot.

If desired, season while cooking, with 1 cup Worcestershire sauce.

67. Beef, turkish

- | | |
|--------------------------------|--------------------------------------|
| 35 pounds beef, fresh | 4 pounds onions, chopped and browned |
| 9 pounds rice | 5 gallons beef stock |
| 4 pounds fat | 1 pound flour for rolling meat |
| 2 pounds flour, browned in fat | Salt and pepper to taste |

Beef from the less tender cuts may be used for this recipe. Make a batter of the flour and melted fat, adding the stock and onions to make a gravy. Cut the meat into 1-inch cubes. Season with cayenne pepper, salt, and a little garlic, roll in flour, and fry. After the meat is fried, put immediately into the gravy and allow to simmer for 2 hours. While cooking it may be necessary to add a little more stock. Meanwhile boil the rice and place around a platter, making a nest in the center into which the stew is poured.

68. Beefsteak

- | | |
|--------------------------------|----------------|
| 60 pounds beefsteak, fresh, or | 2 pounds fat |
| 45 pounds of boned | 2 pounds flour |

Cut the steaks into pieces weighing about 3 ounces each, and make tender, if necessary, by beating each piece with the flat side of a cleaver. If the steaks are beaten, first place a small quantity of flour in a dishpan and season well with salt and pepper and roll each piece of steak in the flour. Fry in shallow fat.

69. Beefsteak, hamburg

- | | |
|-----------------------------|-----------------|
| 45 pounds beef, fresh (raw) | 5 pounds onions |
| Salt and pepper to taste | |

Use meat from the less tender cuts. Run the meat through a grinder twice. Chop the onions fine, using a sharp knife. Mix meat and onions well and season with salt and pepper. Mold into steaks about 3 inches in diameter and about $\frac{1}{2}$ inch in thickness. Fry on griddle or clean stove top. Serve hot with gravy, or in hamburger sandwiches. (See recipe 285.)

This recipe will be improved by the addition of 12 eggs to the meat-and-onion mixture.

70. Beefsteak and mushrooms

- | | |
|---|---|
| 60 pounds beef, fresh, or 45 pounds
if boned | 2 pounds flour
6 cans mushrooms, no. 2 can |
| 2 pounds butter | Salt and pepper to taste |

For the steak. Prepare and cook the beefsteak as in recipe 68.

For the sauce. While the steaks are cooking, place the butter in a frying pan and heat until smoking hot, then introduce the flour slowly, stirring continuously to prevent lumping and scorching. When the butter and flour mixture becomes smooth, add to it the mushrooms and their liquid and continue cooking for 5 minutes. Place the cooked beefsteak on platters and cover with the mushroom gravy containing the mushrooms. Serve hot.

71. Beefsteak and onions

- | | |
|---|--|
| 60 pounds beef, fresh, or 45 pounds
if boned | 2 pounds fat
Salt and pepper to taste |
| 20 pounds onions, sliced | |

Prepare and cook the beefsteak as in recipe 68. Peel and slice the onions. Brown in hot fat. Season with salt and pepper. Serve the steak hot on a platter smothered with the onions.

72. Beefsteak potpie

- | | |
|---|--|
| 35 pounds beefsteak, fresh, or cooked,
cut in small portions | 4 pounds onions, chopped and browned
1 clove garlic |
| 3 gallons beef stock | |

If fresh steak is used, season the meat with pepper and salt, roll the small pieces of steak in flour, and fry in fat. Remove the cooked steak, add 1 pound of flour to the frying fat and brown. Add slowly the 3 gallons of stock to make a thin gravy, then add the onions. Pour this onion gravy over the steak.

If cooked steak is used, the onion gravy is made by adding 2 pounds flour to 2 pounds hot fat then adding the onions.

Make a regular biscuit dough (recipe 272) using about 10 pounds of flour. Cut into biscuits, place them over the top of the steak and gravy, and allow them to brown in the oven. Serve hot.

73. Brains

- | | |
|------------------------|-----------------------|
| 25 pounds beef brains | 5 pounds bacon, diced |
| 8 pounds onions, diced | |

Clean and wash the brains well in cold water, and dice them into about ½-inch cubes. Fry the bacon to a golden brown and add the brains. Cook in a moderate oven (250°-325° F.—16 to 18 counts) about 30 minutes, after which add diced onions and season well with chili powder and salt. Cook about 30 minutes longer. Serve hot on toast.

74. Brains and eggs

- | | |
|-----------------------|--------------------------|
| 20 pounds beef brains | 50 eggs |
| 3 pounds bacon | Salt and pepper to taste |

Clean and wash the brains well in cold water, and dice into about ½-inch cubes. Dice the bacon into small cubes or run it through a meat grinder. Fry the bacon until brown. Add the brains and fry until nearly done (about 45 minutes). Add the eggs, beaten slightly, and fry about 10 minutes more. Season to taste with salt and pepper. Serve with dry toast.

This preparation may be enriched by the addition of more eggs and reducing the amount of brains in proportion.

75. Chicken, creamed

- | | |
|--|--|
| 60 pounds chicken (fowl) dressed,
undrawn | 10 cans milk, evaporated, diluted with 6
quarts water (preferably from the
boiled chicken) |
| 10 pounds veal, diced | 2 pounds butter, or 1 pound butter and
1 pound vegetable shortening |
| 1 dozen eggs | Salt and pepper to taste |
| 2 cans pimiento, no. ¼ can | |
| 4 pounds flour | |

Singe and draw the chickens, cut into fourths, place in pan with the veal, cover with cold water, and boil until chicken meat falls off the bones. Remove

bones (be careful not to leave splinters of bone in the finished product), dice the chicken meat and thoroughly mix with the diced veal. Hard-boil the eggs, dice, and add to the meat.

Make a cream sauce using the butter, flour, milk, and broth from the boiled chicken. Season to taste. Slice pimento into strips (thin), add to cream sauce, and pour the sauce over the meat and eggs. Serve on toast or mashed potatoes.

Note. The addition of two no. 1 cans of mushrooms will improve this dish. Also, any left-over cooked chicken which may be on hand may be used in place of fresh chicken.

76. Chicken fricassee

70 pounds chicken (fowl) dressed, undrawn	4 pounds flour
2 pounds butter or vegetable shortening	8 cans milk, evaporated, diluted by 8 pints water or 8 quarts fresh milk
	Salt and pepper to taste

Cut each chicken into about 12 pieces (natural divisions). Cover with water, season well with celery salt, and allow to simmer until tender. Remove the chicken and make a gravy, using 1 pound butter, 1 pound flour, and the water in which the chicken was cooked. Pepper and salt the chicken well, fry in shallow fat or roll in flour, and fry in deep fat. Put into the gravy when fried. Before serving, add the milk and the remainder of the butter. Care should be taken to break up the chicken as little as possible. Serve on a platter with or without rice. Old fowls may be utilized to advantage by this recipe.

77. Chicken, fried

75 pounds chicken (fryers or broilers) dressed, undrawn	4 pounds cracker meal, or flour, or bread crumbs
12 eggs, beaten	10 pounds fat

Fowls over 6 months old should not be fried. Remove pin feathers by singeing over hot blaze. Divide each chicken into about 10 pieces (natural divisions). Fry in shallow fat, or in deep fat. If fried in deep fat, dip each piece in the beaten eggs and then in the cracker meal. If the mixture does not adhere to the pieces sufficiently, repeat the operation. Drain well in a colander and keep hot until served. In case older chickens are used, which are large and possibly tough, fried pieces should be placed in a bake pan with about 2 inches of water, the pan covered and placed in a slow oven to steam for about 40 minutes.

78. Chicken, roast

75 pounds chicken, dressed, undrawn	15 pounds bread crumbs
4 pounds onions, minced, browned	2 pounds flour
2 pounds fat, butter preferred	

Singe, then clean the chicken well, saving heart, liver, and gizzard, which should be cooked and then minced for use in gravy or dressing. To make the dressing, moisten the bread crumbs with water, mix with onions and giblets, and season with pepper and salt, sage, thyme, or other spices. The bread may be soaked in oyster liquor and oysters added to the dressing. Celery, currants, or raisins may be used instead of onions. Lemon juice or nuts may be added. This dressing may be used with any fowl or fish. Stuff the chicken well with dressing. Sew up with strong thread and tie wings down to the body. Make a batter with the flour and fat, season with salt and pepper and rub the chicken with it before placing in oven. Roast in a slow oven (200°-250° F.—18 to 20 counts). After the chicken has been in the oven about 20 minutes, add a little hot water and baste every 15 minutes until done. This generally requires about 2½ hours, depending upon the quality of the fowl. Last few minutes of cooking should be at a high heat to brown the outside of the chicken. Carve and serve hot with gravy (recipe 123).

79. Chicken stew with dumplings

60 pounds chicken, dressed, undrawn	Salt and pepper to taste
-------------------------------------	--------------------------

Singe and clean the chicken well and cut into 10 or 12 pieces (natural divisions). Cover with cold water and simmer until nearly done (tender). Then thicken the stew slightly with a flour batter (recipe 132), season to taste with salt and pepper, add the dumplings, and allow to cook 10 or 15 minutes depending on the size of the dumplings. Dumplings may be made in accordance with the following recipe:

80. Dumplings

- | | |
|-------------------------|----------------------------|
| 9 pounds flour | 3 ounces salt |
| $\frac{3}{4}$ pound fat | Water to make a soft dough |
| 3 ounces baking powder | |

Sift the flour, baking powder, and salt together three times. Mix the fat into the flour and add enough water to make a soft dough. Roll out on a well-floured board to about $\frac{1}{4}$ inch thickness. Cut into strips about 1 inch by 3 inches. Drop dough into boiling chicken broth and boil 20 minutes. Serve with the chicken.

Dumplings may also be in biscuit form made by rolling the dough and cutting with a biscuit cutter.

81. Chili con carne

- | | |
|--|--|
| 30 pounds meat scraps, fresh preferred,
but may be cooked | 4 cloves garlic
2 ounces chili powder |
| 6 ounces chili peppers, ground | 2 cans tomatoes, no. 3 cans |
| 8 pounds chili beans (small red
beans) simmered | 2 gallons beef stock |

Simmer the beans until soft. Run $\frac{2}{3}$ of simmered chili beans through a food grinder. Trim all the fat from the meat and chop into $\frac{1}{2}$ -inch cubes, fry, cover with about 1 inch of beef stock, add the ground chili pepper and the chili powder, and salt to taste. Mix with the ground beans, then add the remaining third of the beans whole, the garlic, and tomatoes. While cooking it may be necessary to add more beef stock to replace that lost by evaporation. When ready to serve, there should be sufficient beef stock to cover the preparation. Baked beans may be substituted for chili beans.

82. Chuck steak with onions

- | | |
|-----------------------|--------------------------|
| 60 pounds chuck steak | 3 pounds fat |
| 25 pounds onions | Salt and pepper to taste |

Peel and slice the onions. Brown in hot fat. Season with salt and pepper. Pound flour into the steaks to make them tender. Brown the steaks on both sides quickly in hot fat. Reduce the heat and cook slowly for 20 minutes or until well done. Season with salt and pepper. Serve the steaks on a platter with the onions around them.

83. Duck, roast

Prepare in the same manner as roast chicken (recipe 78).

84. Goose, roast

Prepare in the same manner as roast chicken (recipe 78).

85. Ham, baked

50 pounds ham, smoked

Wipe the ham with a damp cloth. Place in a pan with the fat side up. Roast in an uncovered pan at 325° F. (16 counts) allowing 25 to 30 minutes per pound. When the ham is done, remove it from the oven and take off the rind. With a sharp knife score fat covering in squares. Stick long-stemmed cloves into the intersections, spread brown sugar over the ham, and return to oven to brown.

86. Ham, simmered

40 pounds ham, smoked

Wash and scrape the ham. If the ham is very salty, let soak for several hours in fresh water. Then change the water. The water in which hams are cooked should never be allowed to reach the boiling point. Place hams in near-boiling water (enough to cover) 5 to 10 minutes, after which reduce the temperature to 180° F. by introducing cold water, and simmer until the hams are properly cooked. This process requires about 20 minutes to the pound. If two or more hams are simmered in the same vessel, the time of cooking should be computed on the largest ham. Skim all the impurities from the water as they arise. Let the hams cool in the water in which they are cooked.

Mold, if present, may be removed from ham by wiping with a clean cloth dampened with vinegar. The water in which the ham was cooked may be used to cook cabbage, spinach, etc.

87. Ham, smothered

50 pounds ham	5 pounds bread crumbs
¼ ounce cloves, whole	1 gallon milk
1 pound sugar, brown	2 pounds onions, chopped

Trim off the rind or skin from hams and wipe with a clean cloth. Cut them into slices about ¼ inch thick and put in a bake pan, cover with boiling water and cook at a simmering temperature from 35 to 40 minutes. Drain off the water, place over the top the cloves, onions, and bread crumbs, and add the milk. Bake in a moderate oven (250°-325° F.—16 to 18 counts) for about 45 minutes or until the top is crisp and brown.

88. Hamburger

See Beefsteak, hamburger (recipe 69).

89. Hash, chop suey

7 pounds bacon, chopped fine	5 cans corn, no. 2 cans
8 pounds onion, chopped fine	2 ounces chili powder
20 pounds beef, cooked, coarsely ground	2 gallons beef stock
17 pounds turnips, cooked and chopped	4 cans tomatoes, no. 3 cans
	4 pounds celery, diced
	Salt and pepper to taste

Place the bacon in a large bake pan and cook in the oven until well browned, add the onions and fry, but do not allow to brown. Add the other ingredients and bake for 1 hour. The addition of Worcestershire sauce improves the flavor.

90. Liver and bacon

30 pounds liver, beef, sliced	10 pounds onions, browned
10 pounds bacon, fried	2 pounds flour

Slice the bacon thin, about 5 slices per inch, and simmer for 5 minutes. Remove from water, roll the slices of liver in flour, and fry quickly in the bacon fat. Brown the onions and put on liver. Place fried bacon around the onions and liver. Season to taste with salt and pepper. Serve hot.

91. Meat loaf

Same as for beef loaf (recipe 60) except that up to one half of the beef may be replaced with fresh or cooked pork. If pork is used the loaf should be baked not less than 2 hours.

92. Mutton, simmered

45 pounds mutton	3 ounces salt
	1 ounce pepper

Prepare in the same manner as beef, simmered (recipe 65).

93. Mutton chops

45 pounds mutton loin	Salt and pepper to taste
-----------------------	--------------------------

Cut in chops weighing from 2 to 4 ounces and fry the same as beefsteak. Serve hot. (See recipe 68.)

94. Mutton potpie

Prepare in the same manner as beef potpie (recipe 61) using mutton instead of beef.

95. Mutton stew

35 pounds mutton	3 gallons beef stock or water
40 pounds potatoes	1 pound flour
7 pounds onions	

Cut the mutton into 1-inch cubes. Add sufficient beef stock or cold water to just cover the mutton and allow to simmer slowly for 1½ hours or until the mutton is done. Add vegetables and cook until done. Season to taste with pepper and salt and thicken slightly with a flour batter (recipe 121). Serve hot with or without dumplings (recipe 80). If dumplings are added, use only 20 pounds of mutton and 30 pounds of potatoes.

96. Omelet, plain

150 eggs	8 cans milk, evaporated, diluted
2 pounds drippings or fat	with 8 pints water; or 8 quarts
Salt and pepper to taste	fresh milk

Mix the eggs and milk, season, and whip well, put drippings or other fat into the bake pan, and when the fat begins to smoke pour in the mixture, not more than 3 inches deep, and bake in a medium oven.

97. Omelet, cheese

Same as for plain omelet except that 3 pounds of cheese, chopped very fine, are added before cooking.

98. Omelet, ham

Same as for plain omelet, except that 3 pounds of finely chopped cooked ham are added before cooking.

99. Omelet, tomato

Prepare in the same manner as the plain omelet, substituting 8 small cans of tomatoes for the 8 pints of water, or for 4 quarts of fresh milk.

100. Pork chops

60 pounds pork loin

Cut into chops about one-half inch thick and weighing from 3 to 5 ounces each. Fry in a bakepan without added fat until seared, then cover pan until the chops are done. Use a high heat until chops are seared, then finish at lower temperature as high heat after searing will make the chops dry and hard. They may be breaded in flour or corn meal and fried with added fat. Serve with gravy made from the drippings.

101. Pork cutlets

50 pounds pork cutlets

2 pounds fat

2 pounds flour

Dredge each cutlet with flour and fry in shallow fat. Season to taste with salt and pepper. Serve hot with gravy made from the frying (see recipe 123). Dipping in egg batter before flouring improves the product.

102. Pork, roast

50 pounds pork, shoulder, butt, or loin, or 40 pounds fresh ham

Salt and pepper to taste

Wipe the roast with damp cloth and cut into pieces weighing about 5 pounds each. Place in an uncovered roaster without water and rub with salt and pepper. Roast in a moderate oven (325°—350° F.—12 to 16 counts). Cook until roast is well done, allowing 30 to 35 minutes per pound for a 3- to 4-pound roast.

103. Sausage, bologna, fried

30 pounds bologna sausage

12 eggs

2 cans milk, evaporated, diluted with

3 pounds fat

1 quart water, or 2 quarts fresh milk

Remove sausage casing and slice about $\frac{1}{2}$ inch thick and dip in batter made by beating eggs and adding milk. Fry in deep fat. Serve hot. Bologna sausage may also be served cold with salad, or made into sandwiches.

104. Sausage, pork

(32 lb. mixture)

20 pounds pork, lean

$\frac{1}{2}$ ounce coriander

12 pounds beef, lean

$\frac{3}{4}$ ounce sage

4 ounces salt

$\frac{1}{2}$ pint vinegar

3 ounces pepper, black

1 clove garlic

Dice the pork in $1\frac{1}{2}$ -inch squares. Grind the beef and mix with the pork, add all the seasoning and mix well, then grind again. The more thoroughly the sausage is mixed, the better it will be. Mould into patties each about 4 ounces and fry without the addition of fat. Serve hot. If too dry, add water. If desired, 10 pounds of dry bread, or cracker crumbs or corn meal, may be ground in, but this does not improve the product.

105. Sausage, pork, in blankets

30 pounds link sausages

3 pounds flour

2 eggs, beaten

$1\frac{1}{2}$ ounces salt

2 pounds lard

Make a dough of the flour, lard, and salt and roll out as for pie crust (see recipe 244). Inclose 1 or 2 sausage links in a piece of dough, wash with the egg, and bake until a delicate brown.

106. Sausage, frankfurter

35 pounds frankfurter sausage

Place sausage in boiling water, but do not allow it to boil thereafter, as this causes the skins to crack, rendering them unsightly and injuring the flavor. Long cooking also injures the quality; therefore, the sausage should not be put into the water more than 15 minutes before serving. Serve hot.

107. Sausage, frankfurter, in blankets

Prepare in the same manner as pork sausage (recipe 105).

108. Short ribs of beef

75 pounds short ribs	2 tablespoonfuls pepper
3 pounds onions, chopped	6 tablespoonfuls salt
3 pounds carrots	6 cans tomatoes, no. 3 cans
1 pound fat	

Melt the fat in bake pan. Add onions and short ribs, cut in pieces containing 1 or 2 ribs, and brown well. Add tomatoes, carrots, and seasoning, and enough water to cover all ingredients. Cover the pan and cook slowly in moderate oven (250°-325° F.—16 to 18 counts) for 3 hours or until done. Serve hot.

Note. If the quantity of carcass beef on hand does not provide sufficient short ribs and it is not desired to purchase any as a wholesale market cut, any shortage can be made up by using chuck meat.

109. Southern creoles

70 pork hocks, fresh, small (35 lbs.)	2 quarts tomato catsup
4 cans tomatoes, no. 3 cans	3 ounces pickling spices

Simmer hocks for 30 minutes, then pour off the water and add the tomatoes, catsup, and spices, salt, and pepper. Bake until the meat is done. Pour the cooking mixture as a sauce over the hocks when served. Either strain the sauce to take out the pickling spices or cook spices in a small bag so that they may be removed before serving. Serve hot.

110. Spaghetti, Italian style

10 pounds meat, diced, beef preferred (fresh or left over)	1 can tomatoes, no. 10 cans, or 4 cans, no. 2½ or no. 3 cans
1 pint cooking oil or bacon drippings	1 quart tomato pulp or tomato catsup
2 pounds onions, chopped	8 pounds spaghetti
3 cloves garlic, chopped	Salt and pepper and paprika to taste.

Heat the oil or fat and brown the onions and garlic, add meat, and brown. Add tomatoes and catsup. Salt and pepper to taste. Simmer until sauce begins to thicken and, add paprika to give bright red color. Put spaghetti in boiling salted water and boil 20 minutes or until done. Drain spaghetti and run enough cold water over it to make it firm and keep from becoming a doughy mass but do not chill. Pour the hot sauce over it and serve. Grated cheese may be sprinkled on top.

111. Spareribs

55 pounds spareribs

Cut the spareribs into pieces of 2 or 3 ribs each. There are two principal methods of cooking spareribs:

With sauerkraut. Place the spareribs on a rack in a bake pan and sear about 15 minutes or until nicely browned in a hot oven (450°-500° F.—8 counts). Remove spareribs and rack and pour off drippings but save these. Place four no. 10 cans, or 16 no. 2½ cans, or 4 gallons of fresh sauerkraut in the same bake pan and pour the drippings from the searing over the sauerkraut. Place the seared spareribs on top of the sauerkraut, season highly by sprinkling with pepper, salt, and a little ground sage, and bake in a slow oven (200°-250° F.—18 to 20 counts) for 1 hour. If the spareribs become hard and dry, this can be corrected by covering the pan for the last 15 to 30 minutes of baking and the steam will soften them. Any excess liquid makes excellent soup stock.

With cabbage. Drop the spareribs into boiling water, then simmer for 30 minutes. Bring the water to a boil again, drop in 50 pounds of cabbage (see recipe 156), and boil until cabbage is tender, about 20 minutes.

112. Stew, chop suey

- | | |
|--|--|
| 30 pounds meat (pork, beef, or veal) | 1 pint barbecue sauce (see recipe 126) |
| cut in strips $\frac{1}{4}$ inch thick and 1 inch long | or $\frac{1}{2}$ pint molasses |
| 17 pounds onions, sliced | 2 gallons beef stock |
| 4 pounds celery, sliced crosswise | 8 pounds rice |

Brown the meat, add the stock, and simmer until meat is tender. Add onions, celery, and seasoning and cook 30 minutes before serving. This should be served with 8 pounds of cooked rice, steamed (see recipe 201).

113. Stew, pan

- | | |
|--------------------------------------|--------------------------|
| 35 pounds beef, cooked and diced | 3 quarts beef stock |
| 25 pounds potatoes, boiled and diced | Salt and pepper to taste |
| 4 pounds onions, chopped | |

Mix the beef, potatoes, and onions and season. Put in a well-greased bake pan, spreading to a depth of about 3 inches and add sufficient beef stock to cover the mixture. Bake in medium oven until nicely browned. It should not be as watery as the ordinary stew. All left-over potatoes, except fried, may be utilized in this stew. Left-over parts of roasts and gravy may be used. Serve hot.

114. Stew el rancho

- | | |
|--|--|
| 30 pounds meat (beef, pork, or veal), fresh, without bone and with but little fat, cut in about $1\frac{1}{2}$ -inch cubes | 2 ounces chili powder |
| 15 pounds potatoes | 5 pounds carrots, quartered lengthwise |
| 5 pounds onions, small, whole | 7 pounds turnips, sliced across grain |
| | 7 pounds cabbage, cut in eighths |
| | 2 cans tomatoes, no. 3 cans, or 10 pounds fresh tomatoes |

Place the meat, turnips, carrots, and tomatoes in a large pan of cold water and bring slowly to a boil. Simmer until the meat is tender and then add the remaining vegetables. Season with salt and chili powder, and simmer until vegetables are done. All ingredients should be thoroughly cooked but not broken into pieces. The liquid should cover all the solids by about an inch. The stew is improved by a bunch of parsley chopped fine and added just before serving. A few sprigs of parsley may be used for garnishing. Serve hot with the vegetables whole, if possible. Any kind of fresh meat and any vegetables may be used in this stew.

115. Stew, irish

- | | |
|--|----------------------|
| 30 pounds beef, fresh, or left-over beef | 1 pound flour |
| 20 pounds potatoes, peeled | 2 gallons beef stock |
| 5 pounds onions | |

Select cuts of beef suitable for stewing from less tender cuts and dice into $\frac{1}{2}$ -inch cubes or smaller, cutting all about the same size. Place in cold water and bring to the simmering point slowly. Cook at a simmering temperature until nearly tender. Dice the potatoes into 1-inch cubes, chop the onions, and add both to the meat. Add beef stock or water to cover the ingredients in the pan about 1 inch. Season to taste with salt and pepper and thicken with batter made of flour (recipe 121). Simmer until the vegetables are thoroughly done. This stew is improved by the addition of 3 pounds of diced carrots or turnips or 3 no. 3 cans tomatoes. To make a potpie out of this, cover with a biscuit dough (recipe 272) and bake in a medium oven (325° - 400° F.—12 to 16 counts). To improve the appearance, the dough may be washed with a beaten egg, which will give a golden-brown color. Serve hot.

116. Tamales

- | | |
|---------------------------------|------------------------------|
| 20 pounds cooked meat scraps | 3 ounces salt |
| $1\frac{1}{2}$ pounds corn meal | 2 ounces chili powder |
| 8 pounds flour | 1 clove garlic, chopped fine |
| 5 pounds mashed potatoes | 1 quart beef stock |

Run the meat through a chopper, add salt, pepper, garlic, and chili powder, and mix well. Add the beef stock. Mix the corn meal flour and potatoes with enough water to make a stiff dough. Roll out this dough $\frac{1}{4}$ inch thick, using flour for dusting. Cut the dough in long strips about $2\frac{1}{2}$ inches wide. Place on each strip enough meat to form a core about $\frac{1}{2}$ inch in diameter. Fold the sides of the strip together and seal by moistening the edges with water and pressing together. Cut the rolled strips into pieces about 5 inches long. Fresh meat may be used in making tamales, in which case the fat is cut off and the meat is cut into $\frac{1}{2}$ -inch cubes and cooked until well done in a small amount of fat. Then proceed as outlined above. Fry the tamales in deep fat. Serve hot.

117. Turkey, roast

Prepare in the same manner as roast chicken (recipe 78), substituting 70 pounds of turkey, undrawn, or 50 pounds of dressed and drawn turkey for the chicken.

118. Veal cutlets

[illegible]

Cut in slices weighing about 4 ounces each, roll in flour, and fry the same as beefsteak (recipe 68). Serve hot with cream gravy made from the frying. (recipe 123).

119. Veal, roast

70 pounds veal	1 pound fat
----------------	-------------

Lard with fat. Roast in a moderate oven (325° F.—16 counts) for 30 minutes per pound.

120. Yorkshire pudding

10 pounds flour	2 ounces salt
8 ounces baking powder	Pinch cayenne pepper
12 eggs	

Sift together three times the flour, baking powder, salt, and cayenne pepper. Add eggs, whipped to a foam, and sufficient water to make a dough somewhat softer than that used for biscuits. Drop the dough from the hand into the pan in which beef has been roasted, keeping the handfuls about 1 inch apart. Bake in a medium oven (325°-400° F.—12 to 16 counts). The above recipe may be improved by substituting milk for water.

GRAVIES AND SAUCES

121. Flour batter (for thickening liquids)

Flour	Water
-------	-------

The quantity of flour used will depend upon the quantity of liquid to be thickened and the thickness desired. One quart of water, mixed with 1 pound of flour will thicken to gravy consistency about 2½ gallons of liquid. The thickness of the liquid will also depend upon the length of boiling, after putting in the batter, as long boiling evaporates more of the moisture and results in thicker liquid. Care must be used in mixing the batter with the liquid as constant stirring is necessary to prevent lumping.

122. Gravy, brown

1 quart fat	2 gallons water
2 pounds flour	

The gravy should be made in the pan used in roasting the meat, as only by this method can all the extractives lost from the meat be retained in the gravy. Brown gravy is made from the drippings of roasted meat or fowl and the frying of pork. One quart of fat will make 2 gallons of gravy. Take the fat in the roasting pan after the meat or fowl has been removed, heat to the smoking point and add enough flour to absorb the hot fat, stirring constantly to prevent burning and lumping. When the flour is brown, add cold water (about 1 gallon to the pound of flour used) and continue cooking and stirring until the gravy is smooth and of the desired thickness or consistency. Salt and pepper to taste. Serve hot. Brown gravy may also be made from stock by the same procedure, except that 2 quarts of stock is used instead of 1 quart of drippings; however, gravy made from stock is not nearly as palatable as that made from roast drippings.

123. Gravy, cream

- | | |
|---------------------------------------|--|
| 1 quart fat | 8 pints water, or 1½ pounds powdered skim milk dissolved in 7¾ |
| 2 pounds flour | |
| 8 cans milk, evaporated, diluted with | quarts water, or 2 gallons fresh milk |

Cream gravy is made from the fryings of beef or fowl. Follow the same procedure as in making brown gravy, except that the flour is not browned and milk is used instead of water.

124. Gravy, giblet

This should be made only when poultry is roasted or fried. Chop the cooked gizzards, hearts, and livers of the fowls and add to a cream gravy made from the drippings. (See recipe 123.)

125. Gravy, stock

- | | |
|-----------------|-----------------|
| 10 quarts stock | 2 gallons water |
| 2 pounds flour | |

Heat the stock to the boiling point, sift in the flour slowly, stirring constantly. If a brown gravy is desired, continue cooking until the flour is browned, then add the water and continue cooking and stirring until of the desired thickness, but if white gravy is desired do not brown the flour. Season with salt and pepper. Serve hot. This gravy should be made only when drippings or fryings are not available.

126. Sauce, barbecue

- | | |
|--------------------------|-------------------------------|
| 1 gallon catsup | 3 tablespoonfuls black pepper |
| 1 gallon vinegar | ¾ cup chili powder |
| 2 to 3 cups dry mustard | 2 medium size pieces garlic |
| 2 tablespoons red pepper | ½ cup salt |

Bring to boil and let boil 2 hours or until it begins to thicken. Mix well and keep it stirred.

127. Sauce, cranberry

- | | |
|-----------------------|----------------|
| 17 quarts cranberries | 6 pounds sugar |
|-----------------------|----------------|

Wash and stem the berries, put in a boiler, cover with about 1 inch of cold water. Cover tightly and boil until berries break to pieces and cover themselves with their juice. Remove the lid and simmer for 30 minutes. If a sauce free of skins is desired, rub through a colander. Then pour into an earthen or wooden vessel and cool. Serve cold with chicken, turkey, or other kinds of meat.

128. Sauce, cream, for codfish

- | | |
|---------------------------------------|------------------------------|
| 2 pounds fat | 1 pound onions, minced |
| 7 cans milk, evaporated, or 23 ounces | 10 eggs, hard boiled, minced |
| powdered skim milk dissolved in 5½ | 1 pound pickles, minced |
| pints water | |

Thicken 1 gallon of boiling water with a flour batter (recipe 121) and season with pepper and salt. Bring to a boil and add the fat, milk, onions, eggs, and pickles; whip well and spread over the fish on the platter. The sauce may be improved by the addition of 6 or more hard-boiled eggs, chopped fine.

129. Sauce, plum pudding

- | | |
|-------------------------------|--|
| 1½ pounds sugar | 1 can milk, evaporated, diluted with 1 |
| 1 tablespoonful lemon extract | pint water, or ¾ ounces powdered |
| ½ pint vinegar | skim milk dissolved in ¾ pint water |
| 3 quarts water | ½ ounce salt |
| 4 ounces cornstarch or flour | |

Dissolve the sugar in 3 quarts of water. Bring to a boil and add a batter made of the cornstarch or flour and ½ pint of cold water. Add the vinegar, milk, extract, salt, and a pinch of baking soda. Simmer until smooth.

130. Sauce, rhubarb

- | | |
|-------------------|----------------|
| 25 pounds rhubarb | 5 pounds sugar |
|-------------------|----------------|

Wash the rhubarb and dice in ½-inch cubes and place in a boiler with about 1 inch of water. Cover tightly and simmer for about 1½ hours. Then remove the lid and allow the water to evaporate for about 1 hour. Sweeten with sugar

and serve alone as a fruit sauce, or with roast mutton, lamb, or veal, or poured over plain cake. The sauce may be improved by adding other fruit or fruit juices.

131. Sauce, spanish, fish

2 pounds fat	5 ounces red pepper, ground
4 pounds onions, minced	2 gallons beef stock
2 cans tomatoes, (no. 10 cans)	Salt to taste
5 cloves garlic, mixed	

Fry onions and garlic in shallow fat until well done, then place in double boiler with the tomatoes, beef stock, and seasoning, and heat thoroughly. Thicken slightly with a flour batter (recipe 121).

132. Sauce, sweet, chocolate

Same as sweet sauce, vanilla (recipe 134), except 8 ounces melted chocolate are used in place of $\frac{1}{4}$ cup vanilla extract.

133. Sauce, sweet, lemon

Same as sweet sauce, vanilla (recipe 134), except $\frac{1}{8}$ cup lemon extract is used in place of $\frac{1}{4}$ cup vanilla extract.

134. Sauce, sweet, vanilla

9 pounds sugar	$\frac{1}{4}$ cup vanilla extract
$1\frac{1}{2}$ gallons water	$\frac{1}{2}$ teaspoonful salt
8 ounces cornstarch	$\frac{1}{4}$ pound butter or vegetable shortening

Mix sugar and cornstarch, stir into the boiling water and boil until slightly thickened. Add butter, flavoring, and salt, and cook until of desired thickness, which will depend upon use. This sauce may be made richer by using milk in place of all or a part of the water. Variations of this sauce may also be made by adding cooked fruit (run through a grinder) or by caramelization of part of the sugar.

135. Sauce, tomato

10 cans tomatoes, no. 3 cans, or equivalent in fresh tomatoes	3 ounces salt
2 pounds onions, chopped fine	3 ounces sugar
1 ounce cinnamon, ground	2 pounds butter, or 1 pound butter and 1 pound vegetable shortening
$\frac{1}{2}$ ounce cloves, ground	1 pound flour
5 chili pods, chopped fine, or chili pepper ground	1 clove garlic, chopped fine

Boil slowly all the ingredients, except the flour and butter, in 2 quarts of water for $1\frac{1}{2}$ hours. Remove from the range and run through a fine colander or sieve. Replace on the range. Heat the butter in a frying pan, add the flour, stir until smooth, and add it to the sauce. Excellent for fish, meats, or croquettes.

FISH AND SEA FOOD DISHES

136. Codfish cakes

17 pounds salt codfish	1 pound flour,
17 pounds potatoes, mashed	or 2 pounds cracker crumbs
20 eggs	2 pounds fat

If whole cod is used, soak, remove the bones, and pass through a meat chopper. Mix with the potatoes and eggs, and season with pepper and salt. Mold into cakes weighing about 3 ounces each and roll in cracker crumbs or flour and fry in deep fat. Serve hot with tomato sauce (recipe 135). These cakes may be improved by dipping in egg batter before frying; the batter is made by mixing 12 eggs and 2 cans of evaporated milk diluted with 2 pints of water or 2 quarts of fresh milk, or 7 ounces powdered skim milk dissolved in $1\frac{1}{2}$ pints water.

137. Fish, baked

50 pounds fish, fresh	5 pounds bacon or salt pork
-----------------------	-----------------------------

Dress fish and place in a bake pan containing about 1 inch of water with 1 to 4 slices of bacon over each fish according to size. Season well with pepper and salt. Bake in medium oven (325° - 400° F.—12 to 16 counts) for 1 hour or until done,

basting frequently. The entrails may be withdrawn from beneath the gills without opening the belly and the fish filled with dressing (see recipe 80). Fish weighing less than 2 pounds are not suitable for baking.

138. Fish, fresh, fried

- | | |
|-----------------------------------|---------------|
| 35 pounds fish, fresh | 1 pound flour |
| 1 pound corn meal or cracker meal | 2 pounds fat |

Clean and slice (or split) into pieces not more than 1 inch thick. Season with salt and pepper, roll in flour and corn meal, and fry in deep fat until thoroughly browned. Serve hot with tomato sauce (recipe 135).

139. Oysters, fried

- | | |
|--|-----------------------|
| 4 gallons oysters (selects) shucked | 30 eggs |
| (6 or 8 for each man, according to size) | 7 pounds cracker dust |
| | 7 pounds fat |

Dip oysters in egg batter and then in cracker dust. Take one oyster at a time between the hands, press flat, and lay in the hot deep fat. Fry until slightly brown. Serve hot with tomato or Worcestershire sauce.

140. Oysters, scalloped

- | | |
|--|---|
| 12 quarts oysters, standards, or shucked | powdered skim milk dissolved in 5 pints water |
| (about 6 oysters for each man) | |
| 3 pounds bacon | 10 pounds bread, diced and toasted, or 10 pounds crackers |
| 6 cans milk, evaporated, or 18 ounces | |

Dice the bacon and fry until crisp. Add the oysters and bring to a boil, then mix in the bread or crackers and simmer 15 to 20 minutes. Add the milk just before serving.

141. Salmon cakes

- | | |
|------------------------------|----------------------------------|
| 20 cans salmon, 1-pound cans | 2 pounds cracker or bread crumbs |
| 20 pounds potatoes, mashed | 2 pounds fat |
| 20 eggs | |

Mix the ingredients well, season to taste with salt and pepper, make into cakes about 3 inches in diameter, roll in flour, and fry in deep fat. Serve hot with tomato sauce (recipe 135).

142. Salmon hash

- | | |
|------------------------------|--------------------|
| 20 cans salmon, 1-pound cans | 1 quart beef stock |
| 15 pounds potatoes, mashed | 10 pounds onions |

Mix ingredients well, adding a little beef stock. Season with salt and pepper, spread 3 inches deep in a greased bake pan and bake in a medium oven (325°-400° F.—12 to 16 counts) for 40 minutes or an hour. Serve hot.

VEGETABLE DISHES

143. Asparagus

- | | |
|---|--------------------------|
| 15 cans asparagus, No. 2 cans, or 20 pounds fresh asparagus | 15 pounds bread, toasted |
|---|--------------------------|

Canned asparagus. Open the cans and heat (not boil) the contents. Serve hot on toast with a cream sauce made from the liquid from the asparagus. Season with salt and pepper to taste.

Fresh asparagus. Clean and wash asparagus and put in boiling salted water for 15 minutes. Drain and serve on toast as above.

144. Baked beans

- | | |
|------------------------|---|
| 18 pounds beans, dry | 2 ounces mustard, dry, or 6 ounces prepared |
| 4 pounds bacon, sliced | |
| 1 pint molasses | 2 pounds onions, chopped |
| 1 pint catsup | 2 pounds tomatoes, fresh, or 1 no. 3 can |

For serving as an additional vegetable, use one half of this recipe.

Wash and soak the beans for 4 hours or over night in cold water. Drain, place in hot water, and simmer for 2 hours. Drain and place beans in bake pan or

covered earthen crocks. Mix in the chopped onions and tomatoes. Season to taste with salt and pepper. Place sliced bacon on top of the beans. Make a mixture of the molasses, catsup, and mustard, adding a little vinegar if dry mustard is used, and pour over the beans, cover the pan and bake in a slow oven (below 200° F.—24 counts) for 4 hours, or until tender. Serve hot.

In cold weather the soaking may be over night, in which case the 2-hour simmering will not be necessary. In hot weather the beans may sour if soaked when a cool temperature cannot be obtained. When this condition is met with, beans may be baked as follows:

Wash the beans in cold water, drain and place in cold water, simmer 45 minutes, drain and put beans in bake pan, mix in chopped onion and tomatoes. Season with salt and pepper. Place sliced bacon on top of the beans. Make a mixture of molasses, catsup, and mustard, and pour over the beans. Cover the pan and bake in slow oven for 5 hours, or until tender. Serve hot.

145. Beans, canned

4 cans beans, baked, no. 10 cans, or 20 cans beans, no. 2 cans

For serving as an additional vegetable use one-half of this recipe.

Open the cans and empty into bake pans or, if they cannot be heated in the oven, place in boilers. They may be served after simply heating (requiring about 15 minutes) but will be improved by adding 2 bottles or one-half of a no. 10 can of catsup, also about 12 whole onions, $\frac{1}{2}$ gallon of pickles, 2 or 3 pounds of sliced or cut bacon, 2 quarts of molasses, and 8 ounces of prepared (wet) mustard. The quantities of these additional ingredients may be varied according to what is on hand. The bacon should be laid on top of the beans, but onions, pickles, molasses, and mustard should be mixed through them. If bacon and onions are added, it is necessary to bake or cook the beans at least 30 minutes. If this is done the temperature should be kept below the boiling point if in a boiler, and if in an oven at slow heat (200°-250° F.—18 to 20 counts).

Note. In the absence of any other means of cooking, canned beans (as well as any other canned food) may be heated for serving by immersing the cans for about 15 minutes in hot or boiling water. The heat causes an internal expansion which may cause the hot contents to spurt out when the can is opened after removing from the hot water, and the cook who opens the cans must use care to avoid being scalded. If it is desired to prevent contamination of the water in which the unopened cans are heated, the labels should be removed and the cans washed clean before immersing.

146. Beans, dry, simmered

20 pounds beans, dry salt pork

4 pounds bacon, sliced, or ham hocks, or

For serving as an additional vegetable, use one-half of this recipe.

Wash the beans thoroughly, place in a boiler with about 4 gallons of cold water and bring to a boil, then skim and simmer for 4 hours or until done. After they have simmered about 2 hours, add the meat and season to taste with salt and pepper. Water added during cooking should be boiling hot. Serve hot.

147. Beans, lima, green or soaked, canned

4 cans lima beans, green or soaked 2 pounds bacon, sliced, or ham hocks, or
no. 10 cans, or 20 no. 2 cans salt pork

If the meat is not added the beans can be heated for serving in about 15 minutes (see note, recipe 145). If the meat is added, open the cans, add the meat, and simmer for about 1 hour.

148. Beans, lima, dry, simmered

15 pounds lima beans, dry 2 pounds bacon, sliced, or ham hocks, or
salt pork

Wash the beans thoroughly and place them in a boiler with about 4 gallons of cold water, boil 10 minutes and skim. Add the meat and season with salt and pepper to taste, then simmer 4 hours or until tender. Serve hot.

149. Beans, string or snap, canned

4 cans beans, string (or snap), no. 10 3 pounds bacon, sliced
cans, or 20 cans beans, no. 2 cans

Empty the cans into a bake pan or boiler, add the bacon and simmer about 20

minutes. If necessary to heat the beans in the cans, the bacon may be simmered separately and added after the cans are opened.

150. Beans, string or snap, fresh

26 pounds beans, string or snap, fresh 3 pounds bacon, sliced

Cut off tips, then break the beans into pieces about 1 inch long, wash and place in a closed boiler with sufficient water to one-third cover them. Then add the bacon and season with salt and pepper to taste. Simmer for 1 hour, adding more water or beef stock, if necessary, to barely keep the beans covered. Serve hot.

151. Beets, fresh, boiled

26 pounds beets

Clean the beets thoroughly but do not skin or cut off roots. Boil until well done, then hold under a faucet of cold water and rub the skins off with the hands and remove roots. Cut into slices or, if young and tender, serve whole. Serve hot with butter, cream sauce, or gravy. While washing and cooking be careful not to break the skins as to do so would cause bleeding.

152. Beets, canned

4 cans beets, no. 10 cans, or 16 cans beets, no. 2½ cans

If desired to serve as boiled beets, heat sufficiently for serving and serve hot with butter, cream sauce, or gravy; if desired to serve as pickled beets, prepare as in recipe 154.

153. Beets, harvard

3 cans, beets, no. 10 cans, or 12 cans	3 ounces cornstarch
beets, no. 2½ cans, or 25 pounds	1½ ounces salt
beets, fresh	1 quart vinegar
3 pounds sugar, granulated	1 pound butter

If fresh beets are used, clean and boil until tender, then drain and remove skins and roots. Cut the beets into thin slices or cubes. Sift together the sugar, cornstarch, and salt, mix with the vinegar, and boil this sauce 5 minutes, stirring constantly to prevent scorching. Add the butter and, when melted and stirred in, pour the sauce over the beets which should be heated if cold. Let stand a few minutes to absorb the sweet-sour flavor of the sauce.

Serve alone as an additional vegetable, or with meats. If served with meats, use one-half of this recipe.

154. Beets, pickled

30 pounds beets 2 quarts vinegar

Boil the beets until done, then rub the skins off under cold water with the hand, cut into ¼-inch slices, and season with salt and vinegar. If desired, 1 pound of sugar may be added to the vinegar. Allow them to stand about 5 hours before serving.

155. Cabbage

When preparing cabbage take off dead and dry outer leaves. Slice about one-half inch off the stalk of each head and place the head in cool fresh water, being sure that stem end is immersed in the water for several hours. The cabbage will take up water through the stem as a flower would, and become cool and crisp. Cabbage should never be overcooked until it assumes a tan color. Cooked cabbage should always retain the natural green color. It should be cooked only long enough to make it tender. This requires only about 20 minutes for boiled cabbage. Always boil in an open kettle, as this allows strong odors to escape.

156. Cabbage, bavarian

35 pounds cabbage 1½ quarts vinegar
4 pounds salt pork or bacon

Strip off outer leaves and remove the cores, cut into fine shreds, wash and soak, place in a boiler containing the pork or bacon, vinegar, and 2 gallons of water. Season with salt and pepper. Boil rapidly in an open boiler for about 20 minutes, adding boiling water, if necessary, to keep covered. Then thicken slightly with a flour batter (recipe 121) and boil for about 5 minutes longer. Serve hot.

157. Cabbage, boiled

45 pounds cabbage

8 pounds bacon or salt pork, or corned beef

Strip off the outer leaves, remove the cores, wash, quarter, and soak. Place in a boiler with sufficient water to cover. Add the meat, and season to taste with salt and pepper. Cook in an open boiler for 20 minutes, adding boiling water as required to keep the cabbage completely covered at all times. Serve hot.

158. Cabbage, fried

35 pounds cabbage, boiled

4 pounds bacon drippings

Chop the cabbage fine and add to it the bacon drippings. Season with salt and pepper. Cook on a range in a covered bake pan about $\frac{1}{2}$ hour, stirring frequently to prevent burning. Serve hot.

Fried cabbage may also be made from finely chopped raw cabbage.

159. Carrots, baked

25 pounds carrots, fresh

2 pounds bacon drippings

Scrape and wash the carrots well, cut into slices not more than $\frac{1}{2}$ inch thick, and place them in an open boiler containing sufficient cold water to cover. Boil until tender. Remove and place in a bake pan containing the bacon drippings. Season to taste with salt and pepper, and bake in a medium oven (325° - 400° F.—12 to 16 counts) for about 20 minutes. Serve hot.

160. Carrots, candied

45 pounds carrots, fresh

5 pounds sugar, granulated, or brown (brown preferred)

1 pound butter

1 gallon beef stock, strained

Clean and scrape the carrots, and slice lengthwise. Boil, until medium done, about 20 minutes. Spread the slices in three layers in a bake pan, putting about one-third of the sugar and butter on top of each layer. Pour the beef stock over the whole and bake in a medium oven (325° - 400° F.—12 to 16 counts) 40 minutes to 1 hour, or until well browned. Serve hot.

This recipe is sufficient for the main vegetable dish to take the place of potatoes. If served as an additional vegetable, use one-half this recipe.

161. Carrots, mashed

30 pounds carrots, fresh

7 quarts beef stock

2 pounds bacon drippings

Scrape the carrots and cut into slices not more than one-half inch thick. Place in an open boiler containing the beef stock or water. Season with salt and pepper and simmer until tender. Add the bacon drippings and mash thoroughly. Serve hot.

162. Corn, canned

4 cans corn, no. 10 cans, or

 $\frac{1}{2}$ pound butter

20 cans corn, no. 2 cans

Put corn in a boiler and season to taste with salt and pepper. Mix well, simmer until hot, and add the butter. If the corn is too thick, it may be thinned with milk or water. Serve hot.

163. Corn, fried

3 cans corn, whole kernel style, no.

1 cup green peppers, minced

10 cans, or 15 cans corn, no. 2 cans,

 $\frac{1}{2}$ pound butter

or 20 pounds corn cut from roasting

 $\frac{1}{2}$ pound bacon drippings

ears (corn on the cob) after cooking

Drain liquid from corn. Mince peppers. Heat butter and bacon drippings in bake pan until just below smoking point. Place green peppers (minced) in hot fat and fry 5 minutes. Add corn to pan and lower heat. Stir frequently. Serve when thoroughly heated. Care must be used to prevent scorching.

164. Corn fritters

3 cans corn, cream style, no. 10 cans,

10 pounds flour

or 15 cans corn, no. 2 cans

5 ounces baking powder

24 eggs

2 gallons milk or water

2 $\frac{1}{2}$ ounces salt

Beat the corn and eggs together thoroughly. Sift together the salt, flour, and baking powder three times. Add a portion of the liquid, then a portion of the sifted dry ingredients, stirring well. Continue until the dry ingredients are thoroughly mixed in, regulating quantity of liquid to make a thick batter which will just drop off a spoon. A thin batter makes a poor product. Using a large basting spoon, drop spoonfuls into hot fat and fry until brown. There are two methods of frying: (1) In hot fat about one-half inch deep; or (2) in fat deep enough to cover the fritters. Serve hot with sirup.

165. Corn, scalloped

4 cans corn, cream style, no. 10 cans,	1 quart milk
or 20 cans corn, no. 2 cans	4 pounds cracker or bread crumbs
1 pound butter	Salt and pepper to taste
2 pounds flour	

Make a white sauce of the butter and flour. Let this partly cook, then add the milk and corn. Season to taste. Mix thoroughly, and put a layer of this mixture into a bake pan; over this put a layer of broken crackers or bread crumbs and repeat until pan is filled. Dot the top with a little butter or vegetable shortening. Bake in a medium oven (325°-400° F.—12 to 16 counts) about 30 minutes or until nicely browned.

166. Eggplant

25 pounds eggplant	2 pounds flour
12 eggs	6 pounds fat

Peel the eggplant and slice lengthwise. Beat the eggs well and add to them about 3 pints of water or milk. Season the eggplant with salt and dip it in the egg and water mixture, roll in flour, and fry in deep fat until browned. Place in a colander and drain before serving. Serve hot.

167. Greens

30 pounds greens	4 pounds bacon
1 quart beef stock	

Wash in cold water, changing water at least 4 times to remove grit. Put the greens and bacon in 4 gallons of cold water and boil in an open boiler until tender, about 10 minutes. Serve hot, season to taste with salt, pepper, and vinegar or add the following preparation. Remove the bacon and strain the free water from the greens, chop greens fine and place in a well-greased bake pan, add beef stock to moisten, and bake in an oven for about one-half hour. Season with salt and pepper to taste. Slice the bacon and serve on top of the greens. Greens may be improved in appearance and taste by the addition of minced hard-boiled eggs in the serving dish. Excessive cooking will destroy their vitamin properties.

Beet tops, dandelion, spinach, turnip tops, and other greens may be prepared in the same way.

168. Hominy

3 cans hominy, lye, no. 10 cans	2 ounces salt
---------------------------------	---------------

Place the hominy and salt in a boiler and simmer for 20 minutes. Season with pepper to taste. Serve hot.

169. Macaroni and cheese

8 pounds macaroni	4 pounds cheese, diced
-------------------	------------------------

Add the macaroni to 7 gallons of salted boiling water or beef stock and boil for 20 minutes. Strain the free water off and spread about one-third of the macaroni in the bottom of a well-greased bake pan, followed by one-third of the diced cheese, and continue in alternate layers until all of both ingredients are in the bake pan. Bake in an oven about 30 minutes, sprinkle with paprika, and serve hot. If desired, 2 or 3 pounds of toasted bread crumbs and 2 or 3 cans of tomatoes may be mixed with the cheese between the layers of macaroni.

170. Onions, boiled

20 pounds onions

Select small onions, peel, and boil whole until tender, from one-half to three-fourths of an hour and serve with cream sauce.

171. Onions, fried

30 pounds onions
2 pounds lard or drippings

4 quarts beef stock

Peel and slice onions, put all ingredients in a bake pan on a hot fire. When the stock is all evaporated, the fat in the pan will be sufficient to brown the onions. Stir frequently and season to taste with pepper and salt. May be used to smother beefsteak or served separately as a vegetable.

172. Onions and grated cheese

25 pounds onions
2 pounds fat

2 pounds cheese, chopped fine

Peel and slice the onions and fry until well done. Mix the chopped cheese with the onions and bake in a quick oven (400°-450° F.—9 to 12 counts) for 20 minutes. Serve hot.

173. Parsnips, baked

30 pounds parsnips
5 pounds bacon

2 quarts beef stock

Scrape and wash the parsnips thoroughly and place them in a well-greased bake pan. Season to taste with pepper and salt and add the beef stock. Place strips of bacon over the parsnips and cover the pan to prevent evaporation. Bake in a slow oven (200°-250° F.—18 to 20 counts) for about 1 hour, or until tender. Serve hot.

174. Parsnips, mashed

30 pounds parsnips
2 pounds bacon drippings

7 gallons water

Scrape and wash the parsnips thoroughly and place in an open boiler containing the water. Simmer until tender, pour off the free water and add the bacon drippings. Season with salt and pepper to taste, and mash thoroughly.

Mashed parsnips left over may be served later by preparing as follows:

Place in a bake pan, level the top, and grease lightly. Place in the oven until browned, about 40 minutes. Serve hot.

175. Parsnips, sugared

30 pounds parsnips
2 quarts beef stock

2 pounds sugar
1 ounce cinnamon, ground

Salt and pepper to taste

Scrape and wash the parsnips thoroughly, slice lengthwise, and place them in a well-greased bake pan. Season to taste with salt and pepper. Pour over them the beef stock. Cover the bake pan to prevent evaporation. Bake in a slow oven (200°-250° F.—18 to 20 counts) for about 1 hour, or until tender. Sift the sugar and cinnamon together. About 5 minutes before taking out of the oven, sprinkle this sugar-cinnamon mixture over the parsnips and replace in the oven until the top begins to brown.

176. Peas, creamed, canned

3 cans peas, no. 10 cans, or 16 no. 2
cans

2 cans milk, evaporated, or 6 ounces
powdered skim milk and 1½ pints
water

1 pound butter
1 pound flour

Put the peas into a stewpan and season with pepper and salt to taste, then add the butter and bring to a boil. Thicken slightly with a flour batter made with milk and flour (see recipe 121). Reheat and serve hot.

177. Peas, green

14 quarts peas, green
5 quarts beef stock
1 pound butter or drippings

2 cans milk, evaporated, or 2 quarts
fresh milk

Hull and wash the peas in cold water. Place in a boiler or stewpan containing the hot beef stock and butter. Season with salt and pepper and boil about 15 minutes. Thicken with a flour batter (recipe 121) and bring to a boil again, then add the milk, and serve hot.

178. Potatoes, baked

35 pounds potatoes, fresh

Select and wash (do not peel) potatoes of about the same size. Grease each potato and place in a bake pan and cover with a larger pan. Bake in a quick oven (400°-450° F.—9 to 12 counts) until well done, usually about 45 minutes. Do not pierce with a fork. If they seem soft when pressed, they are done. Baking over an hour may cause the potatoes to become dark and soggy. Serve hot with butter.

179. Potatoes, boiled

35 pounds potatoes, fresh

Peel and wash the potatoes, cut into pieces and place in boiling water. Boil briskly until thoroughly done (about 30 to 40 minutes). Drain and leave on stove a few minutes to dry. Serve hot.

180. Potatoes, boiled in jackets

35 pounds potatoes

Select and clean potatoes of uniform size. Soak them a few minutes in cold water, then put them in boiling water and cook until tender, which requires about 40 minutes. When tender drain off free water. Do not allow potatoes to boil until broken as this will cause them to absorb the water and become pasty and soggy. Remove the kettle to back of stove, allowing the steam to escape. The cooking should be so regulated that they can be served immediately when ready.

181. Potatoes, browned

35 pounds potatoes

Select and clean small potatoes and boil them until done, then peel and grease each potato and spread them in a single layer on the bottom of a well-greased bake pan. Bake in an oven until brown, usually about 30 minutes.

182. Potato cakes

30 pounds potatoes

2 pounds flour

4 ounces parsley, green, chopped

Run the peeled and cooked potatoes and the parsley through a food grinder and mold into cakes weighing about 3 ounces. Fry in shallow fat until nicely browned and crisp. May be served with any kind of meat. Left-over potatoes prepared in any manner may be used in this recipe. Soaked bread crumbs may be added to fill out quantity for one meal. Do not add more than 5 pounds bread to 30 pounds potatoes.

183. Potatoes, cheesed (au gratin)

30 pounds potatoes (left-over or boiled)

1 gallon beef stock

2 pounds cheese, chopped or grated

1 pound flour

4 cans milk, evaporated, or 1 pound powdered skim milk dissolved in 3 pints water

 $\frac{1}{2}$ pound shortening $\frac{1}{2}$ pound butter

Use any left-over boiled or baked potatoes. Cut into pieces about the size of a lima bean, season to taste with salt and pepper, and mix with the beef stock. Melt the shortening, add flour and milk, making cream sauce. Spread the potatoes 2 or 3 inches deep on the bottom of a well-greased bake pan. Pour the cream sauce over the potatoes, sprinkle with chopped or grated cheese, dot here and there with small pieces of butter, and bake in a quick oven (400°-450° F.—9 to 12 counts) for about 30 minutes until browned. Serve hot.

184. Potatoes, creamed

30 pounds potatoes

2 cans milk, evaporated, or 6 ounces

powdered skim milk dissolved in $1\frac{1}{2}$ pints water

1 gallon beef stock

4 ounces parsley

2 pounds flour

1 pound butter

Clean and boil the potatoes with jackets on until well done, then peel and slice them crosswise. Allow the beef stock to come to a boil on the range, thicken it with a flour batter (recipe 121), and add the milk. Place the potatoes

in a bake pan and cover them with the beef stock and batter mixture, add the butter, bring to a boil, and remove from the range immediately. Meanwhile, chop the parsley fine and sprinkle over the potatoes before serving. Serve hot.

185. Potatoes, french baked

35 pounds potatoes
2 pounds fat

4 quarts beef stock

Clean, peel, and cut the potatoes in halves lengthwise. Place them in a well-greased bake pan and salt to taste, then add the stock and fat. Mix thoroughly and cook in a medium oven (325°-400° F.—12 to 16 counts) about 1 hour, or until the potatoes are tender. Do not stir while cooking. Serve hot.

186. Potatoes, french fried

50 pounds potatoes

7 pounds fat

Clean and peel the potatoes and cut them lengthwise into ½-inch slices. Fry in deep fat until nicely browned. Do not place too many of the potatoes in the fat at one time, as this cools the fat and makes the fried potatoes grease-soaked. Drain and salt. Serve hot.

187. Potatoes, fried (sauteéd)

40 pounds potatoes, unpeeled

1 pound fat

Wash the potatoes and boil with jackets on until tender. When cool peel and slice crosswise. Season with salt and pepper to taste and add sufficient hot fat to moisten. Spread over the bottom of a well-greased bake pan to the depth of about 2 inches, and fry in a quick oven (400°-450° F.—9 to 12 counts) or on top of the range for about 30 minutes. Serve hot. Care should be taken not to get the potatoes too greasy. They may be fried, without first being moistened with hot fat, in shallow fat but must be carefully watched to prevent burning.

188. Potatoes, german boiled

30 pounds potatoes

2 pounds onions, browned

Clean, peel, and cut the potatoes into pieces about the size of an egg, place in cool water, and boil until done. Then place in vegetable dishes and spread about 2 basting spoonfuls of browned onions over the contents of each dish. Serve hot.

Potatoes left over from this recipe may be used in lyonnaise potatoes, salads, fried potatoes, hash, stews, and various other dishes.

189. Potatoes, hashed browned

30 pounds potatoes

1 gallon beef stock

Cut the cooked potatoes into pieces about the size of a lima bean. Season to taste with salt and pepper, and mix with beef stock. Spread 2 or 3 inches deep over the bottom of a well-greased pan. Spread a little fat over the top and bake about 30 minutes in a quick oven (400°-450° F.—9 to 12 counts). Serve hot.

190. Potatoes, lyonnaise

40 pounds potatoes, unpeeled

8 pounds onions

Wash the potatoes and boil them with jackets on until tender, then peel and slice crosswise. Wash and slice the onions, fry them brown, and add to the potatoes. Season to taste with pepper and salt, adding sufficient melted fat to moisten. Spread 2 inches deep in the bottom of a well-greased bake pan. Bake about 15 minutes in quick oven (400°-450° F.—9 to 12 counts). Serve hot.

191. Potatoes, mashed

40 pounds potatoes
1 pound butter

2 cans milk, evaporated, or 6 ounces
powdered skim milk and 1½ pints
water

Clean and peel the potatoes and boil them until thoroughly done. Drain, salt, and mash well. Heat milk and melt butter and add to the mashed potatoes, beat vigorously with a wire whip. Garnish with small quantity of chopped parsley. The potatoes may be fluffed by the addition of 1 tablespoonful of baking powder just before they are beaten with the wire whip. Serve hot.

192. Potatoes, sweet, baked

40 pounds potatoes, sweet 1 pound fat

Wash and trim all defective spots. Rub with fat and bake in a pan in a medium oven (325°-400° F.—12 to 16 counts) for 1 hour or until done. Serve hot in jacket with butter.

Do not pierce with fork to ascertain if done. When done, the potatoes are soft when pressed. This requires about 50 minutes.

193. Potatoes, sweet, boiled

40 pounds potatoes, sweet, unpeeled

Peel and trim all defective spots and wash. Boil 40 minutes or until tender, then drain. Serve hot.

194. Potatoes, sweet, candied

45 pounds potatoes, sweet, unpeeled 2 pounds sugar
1 pound butter 1 gallon beef stock, strained

Wash the potatoes and boil until medium done, about 20 minutes; then peel and slice them lengthwise. Spread the slices in three layers in a bake pan, putting about one-third of the sugar and butter on top of each layer; pour the beef stock over the whole and bake in a medium oven (325°-400° F.—12 to 16 counts) 40 minutes to 1 hour until well browned. Serve hot.

195. Potatoes, sweet, fried

45 pounds potatoes, sweet 5 pounds fat
Procedure same as for potatoes, french fried (recipe 186).

196. Pumpkin, baked

30 pounds pumpkin, fresh 2 pounds bacon drippings

Peel the pumpkin, remove the seeds, and clean well. Cut in pieces not more than 2 inches square. Spread the pieces in one layer in a bake pan and pour over them about 1 pound of bacon drippings. Season with salt and pepper, cover with a large pan to prevent evaporation, and bake in a slow oven (200°-250° F.—18 to 20 counts) until well done. Serve hot.

197. Rice, boiled

7 pounds rice 4 ounces salt
3 gallons water

Wash the rice thoroughly in several waters. When the water comes to a boil, sprinkle in the rice and salt. Boil in an uncovered kettle, stirring once or twice with a fork. Boil about 30 minutes or until the rice can be mashed in the fingers, reduce the heat and keep on stove sufficiently long to drive off moisture. When finished, each grain will be whole and separate. If cooked too much the grains will burst and stick together. Serve hot, as an addition to meat dishes. If served as a vegetable, add gravy, or add raisins and serve with milk and sugar.

198. Rice, curried

7 pounds rice 4 ounces salt
3 gallons water 2 ounces curry powder

Prepare and cook the rice as for rice, boiled (recipe 197). Make a paste of the curry powder and a little water and add to the finished rice. Serve as an additional vegetable or with meats.

199. Rice, fried

7 pounds rice 4 pounds fat
2 pounds onions, diced

Boil the rice as in recipe 197. Place the fat in a bake pan and heat. Place the onions in the hot fat and brown slightly. Add the rice and stir continually to prevent burning and to mix the fat with it thoroughly. Rice may be fried in a hot oven, but must be stirred every few minutes. About 15 or 20 minutes are required to fry it. Serve hot.

200. Rice, Spanish

7 pounds rice 1 can tomatoes, minced, no. 10 cans,
1 pound bacon, minced fine or 4 no. 2½ cans
3 pounds onions, minced fine 2 gallons beef stock
3 pounds peppers, green, minced Salt and cayenne pepper to taste
1 ounce chili powder

Wash the rice thoroughly, then fry in shallow fat until nicely browned. In the meantime fry the minced bacon, onions, and peppers in another pan until browned and tender, then add the minced tomatoes and fry slowly for another 10 minutes. Place the fried rice and bacon-onion-pepper-tomato mixture together in a boiler, add the chili powder, and pour on the beef stock. Simmer until the rice is tender. Serve hot alone or with meats.

201. Rice, steamed

7 pounds rice
2 gallons water
4 ounces salt

Wash the rice thoroughly in several waters. Bring the water to a boil, add the salt, sprinkle in the rice, and let boil for 5 minutes, then let cook at a simmering temperature for 45 minutes with the lid partly open so that the steam may escape. When stirring rice, always use a fork to avoid breaking the kernels.

202. Sauerkraut

4 gallons sauerkraut, or 4 cans sauer-
kraut, no. 10 cans
2½ gallons beef stock

Add the beef stock to the sauerkraut, season to taste, and simmer for about 1 hour. Serve hot.

203. Sauerkraut, how made

30 pounds cabbage, trimmed
1 pound salt

Remove outer green leaves and slice the cabbage fine. Place in a barrel a layer of cabbage (about 12 inches) and sprinkle salt over it, then mash with a wooden masher until mushy. Add other layers of cabbage and salt until the barrel is full. After the barrel is filled, cover the kraut with a clean cloth and then with a board prepared to fit snugly inside of the barrel. The board should be placed on the cloth and a hundred-pound rock on the board while the cabbage is fermenting. Let stand in a temperature of about 70° F. for 1 month. If the kraut is made in warm weather, the amount of salt used must be increased by ½ pound. In warm weather the ripening process will be faster than in cold weather. When the kraut is ready for use it will have a decided odor, but when not fully matured it will have an odor somewhat resembling that of beer. The temperature of the place where it is stored has much to do with the acidity acquired in any given time. Each time when removing kraut from the barrel, thoroughly wash cloth, barrel cover, weight and sides of barrel, before replacing. This should be done once a week whether kraut is removed or not. Care should be exercised in the selection of a barrel for sauerkraut. Charred barrels should not be used. Oak barrels are preferable.

204. Squash, baked

Prepare in the same manner as pumpkin, baked (recipe 196), substituting squash for pumpkin.

205. Squash, canned, baked

12 cans squash, no. 3 cans, or 4 cans
squash, no 10 cans
1 pound fat

Remove from the cans, season with salt and place in a well-greased pan, spread evenly and add a small amount of fat, place in a medium oven (325°-400° F.—12 to 16 counts) and bake for one-half hour. Serve hot.

206. Squash, mashed

25 pounds squash, fresh
4 quarts beef stock
2 pounds bacon drippings

Peel the squash, remove the seeds, and clean well. Cut in pieces not more than 2 inches square, place in a boiler, and pour over it the beef stock. Season to taste with salt and pepper, close the boiler with a tight lid, and boil about 2 hours (or until well done). Add the bacon drippings and mash well before serving. Serve hot.

207. Succotash

2 cans corn, no. 10 cans, or 10 no. 2
cans
2 pounds bacon, diced
2 quarts beef stock
1 can lima beans, no. 10 cans, or 5
no. 2 cans
1 pound flour

Mix the corn, beans, and bacon, season to taste with pepper and salt, and pour over the mixture sufficient beef stock to cover it. Simmer until hot (about 15 minutes), then thicken slightly with a flour batter (recipe 121), and boil for 5 minutes more.

208. Tomatoes, stewed

30 pounds tomatoes, fresh, or 3 cans 5 pounds bread, dry
 tomatoes, no. 10 cans, or 14 cans 1 pound butter (for flavoring, if desired)
 tomatoes no. 3 cans

For *fresh tomatoes* place 8 or 10 tomatoes in a colander at a time and set in boiling water for about one-half minute. Peel and split them in halves and place in the stewpot. Simmer and add 4 quarts of strained beef stock, season to taste with pepper and salt, and add croutons made from dry bread.

If *canned tomatoes* are used, heat just long enough to be hot for serving, not over 15 minutes, season, and add croutons (and butter if used). Serve hot.

209. Turnips, boiled

25 pounds turnips 5 pounds bacon or salt pork

Peel turnips and cut crosswise into $\frac{1}{2}$ -inch slices. Add bacon or salt pork, pepper and salt to taste, and boil slowly 40 minutes or until done. Keep turnips completely covered with water and leave boiler uncovered in order that the sulphur may escape. Serve hot.

210. Turnips, mashed

Same as turnips, boiled, except the turnips are mashed before serving.

211. Turnips, left-over

May be used by baking in the oven until slightly browned while covered with a few strips of bacon or salt pork.

DESSERTS

212. Apples, baked

100 apples $1\frac{1}{2}$ ounces cloves, ground
 2 pounds sugar $1\frac{1}{2}$ ounces nutmeg, ground
 Select uniform-sized hard apples. Wash and remove the core. Place in a bake pan, sprinkle with the sugar and spice. Bake in a moderate oven (250°-325° F.—16 to 18 counts) for about 1 hour or until tender. Serve hot or cold, with or without sweet milk or sauce.

213. Apple or fruit rolls

Dough

4 ounces sugar
 10 pounds flour
 5 pounds lard
 2 ounces salt

Filler

25 pounds apples, fresh, or 7 pounds
 apples, dried, or 3 cans apples, no.
 10 cans
 3 ounces nutmeg
 3 ounces cinnamon
 $\frac{1}{2}$ pound butter
 5 pounds sugar

Prepare the dough and filler as for apple pie (recipes 244 and 245), stewing the apples rather dry to avoid soggy crust. Roll the dough about $\frac{1}{4}$ -inch thick into strips about 7 inches wide and a little longer than the width of the pan. Spread the apple filler moderately thin over the dough and then roll like a cigarette. Do not use too great a proportion of filler to dough or the rolls will be soggy. Regulate width of dough so that the finished rolls are not over 3 inches thick. Place in pan, seam side down, and close together so that the rolls retain their shape. Bake about 40 minutes in a medium oven (325°-400° F.—12 to 16 counts) and serve hot or cold, with or without sauce. Any kind of stewed and spiced fruit may be substituted for the apples and the rolls named accordingly.

214. Apple sauce

8 pounds apples, evaporated, or 30 Sugar (varies with apples used), about
 pounds apples, fresh, or 3 cans 5 pounds
 apples, no. 10 cans 6 lemons

If *evaporated apples* are used, place the apples in 3 gallons of cold water and bring to a boil, then simmer until tender, about 2 hours. Add sugar to taste and flavor with lemon extract or sliced lemons.

If *fresh apples* are used, peel, core, quarter, add sugar and lemons, and simmer until mushy.

If *canned apples* are used, add sugar and lemons and simmer until mushy. Serve cold.

215. Apricots, dried, stewed

10 pounds apricots, dried
5 pounds sugar

6 lemons

Wash apricots and then place in enough water to cover. Soak about 8 hours or overnight, then add sugar and juice of lemon and simmer for 45 minutes or until tender.

216. Brown betty

15 pounds bread, or bread scraps
10 pounds sugar, caramelized

4 pounds currants or other dried tart fruit

Dice the bread into 1-inch cubes and brown in a slow oven. Add the caramelized sugar and the fruit to 5 gallons of water, thicken slightly with a flour batter (recipe 121), and pour over the diced bread. Bake in a medium oven (325°-400° F.—12 to 16 counts) about 20 minutes and serve with sauce (recipe 145).

217. Cake, chocolate

Same as for cake, white (recipe 226), with addition of 1 pound cocoa or 12 ounces melted plain chocolate. The cocoa or melted chocolate is added at the end of the mixing and thoroughly stirred in.

218. Cake, corn

9 pounds flour
6 pounds corn meal
7 pounds sugar

30 eggs
8 ounces baking powder
1 ounce extract
2½ ounces salt

4 pounds fat (butter, lard, or lard substitute)

Whip the sugar, fat, extract, and salt to a cream and beat in the eggs slowly. Sift together the flour, corn meal, and baking powder, and add to the creamed mixture with sufficient water to make a stiff batter. Bake in a medium oven (325°-400° F.—12 to 16 counts) for about 30 minutes. This cake may be made in different forms using muffin pans as well as bake pans. Serve hot with butter, jam, jelly, or sirup.

219. Cake, eggless

10¼ pounds flour
5¼ ounces baking powder
3½ ounces cinnamon
2 ounces flavoring extract
15 pounds sugar

2¼ pounds fat (butter, lard, or lard substitute)
4 pounds fruit, dried, stewed, ground
10 quarts milk, fresh, or 10 cans milk, evaporated, diluted with 10 pints water

Cream the fat and sugar and flavoring extract. Sift together the flour, baking powder, and cinnamon three times and add this and the fruit to the creamed mixture with the milk. Water may be used in place of the milk, but does not make as good a cake. Stir well and bake about 40 minutes in a moderate oven (250°-325° F.—16 to 18 counts). Serve plain or iced. This recipe produces a fairly palatable cake which can be made from items included in the field ration, or when eggs are not available.

220. Cake, fruit, dark

8 ounces citron
8 ounces lemon peel
8 ounces orange peel
3 pounds raisins
3 pounds currants
3 pounds nuts, mixed, shelled
½ ounce nutmeg, ground
½ ounce ginger, ground

½ ounce cloves, ground
½ ounce cinnamon, ground
6 pounds flour
4½ pounds sugar
4½ pounds fat (butter, lard, or lard substitute)
12 ounces molasses
40 eggs

Slice citron, lemon, and orange peel very thin and about the size of a postage stamp, and wash. Pick the raisins, currants, and nuts over carefully and wash. Mix all the fruit and drain in a sieve for 2 hours, then dredge with a mixture of the nutmeg, ginger, cloves, cinnamon, and 1 pound of the flour. Cream the sugar, butter, and molasses and beat in the eggs. Add the remaining flour. When the flour is about half mixed in the batter, add the dredged fruit and spices and continue mixing until the fruit is evenly distributed and the mixture smooth. This mixture makes 35 pounds of cake.

The best results are obtained by baking fruit cake in an earthen crock. If this is not available it may be baked in a pan. Fruit cake requires a long slow process of baking. From 3 to 5 hours in a slow oven (200°-250° F.—18 to 20 counts) is required.

221. Cake, marble

Same ingredients as for cake, white (recipe 226), with added coloring. After the batter is mixed it should be divided into halves or thirds according to the number of colors desired. One portion should be left white, the other portion or portions should be colored as follows:

Chocolate. Add 8 ounces cocoa or 6 ounces melted plain chocolate and stir well.

Pink, red, orange, etc. These, or other desired colors, may be obtained by adding prepared commercial vegetable colorings until the desired color is reached.

After the different portions are colored they are combined, stirring only enough to make a pleasing combination of colors.

222. Cake, quick

4 pounds fat (butter, lard, or lard substitute)	2 cans milk, evaporated, or 7 ounces powdered skim milk dissolved in 2 pints water
12 pounds sugar, brown	
30 eggs	½ ounce cinnamon, ground
7 pounds flour, soft	½ ounce nutmeg, ground
6 ounces baking powder	

Put ingredients into a bowl and beat all together for 3 minutes. Regulate liquid to make a thick batter, adding water or milk if necessary. Bake in a medium oven (325°-400° F.—12 to 16 counts) for 40 minutes, or until done. Serve plain or with icing. The batter may be used for cup cakes.

223. Cake, raised

4 pounds yeast-raised dough (recipe 264)	3 pounds flour
	3 ounces nutmeg
2½ pounds fat (butter, lard, or lard substitute)	3 ounces cinnamon
	1 ounce cloves
4½ pounds sugar	3 pounds raisins
18 eggs	

Take the dough when it is ready to punch down the first time and add to it the fat and sugar, and mix well. Then add the eggs one at a time, working them into the dough. Sift the flour, cinnamon, cloves, and nutmeg together and add to the mixture. Mix or knead thoroughly, put in a bake pan, and set aside for about 1 hour, preferably in a temperature of 80° F. At the end of this time, the cake should be light and about double in height. Bake in a medium oven (325°-400° F.—12 to 16 counts) for about 30 minutes, or until done. Cool before removing from the pan. This cake will be improved in appearance and flavor by icing.

224. Cake, spice

2½ pounds fat (butter, lard, or lard substitute)	5 cans milk, evaporated; or 1 pound powdered milk dissolved in 4 pints water
7 pounds sugar	
40 egg yolks	1 ounce salt
20 egg whites	2 ounces cinnamon, ground
6 pounds flour, soft	1 ounce cloves, ground
4 ounces baking powder	1 ounce allspice, ground
	1 ounce nutmeg, ground

Cream the fat and sugar. Beat the egg yolks with the creamed fat and sugar. Moisten the spices with 1 pint boiling water and beat into the creamed fat-sugar-egg mixture. Sift together the flour, baking powder, and salt 3 times, and add gradually, with the milk, to the creamed mixture in such proportions as to make mixing easy. Beat the egg whites until stiff, and fold carefully into the batter. Bake in a medium oven (352°-400° F.—12 to 16 counts) for 40 minutes if made in the form of a loaf cake, or 25 minutes if made into cup cakes. Keep the oven as near 375° F. as possible throughout the baking. Serve plain or with icing.

225. Cake, sponge

2-1/3 pounds flour, soft	4 tablespoonfuls cream of tartar
5-1/3 pounds sugar	1/2 cup water, boiling
60 eggs	3 tablespoonfuls vanilla extract
3 teaspoonfuls salt	

Weigh the flour, and sift 3 times with 1/2 of the sugar. Separate the eggs and beat the yolks. Add the remaining sugar to the yolks, and beat well to thoroughly mix. Add the boiling water, beating continuously. Add the flour-and-sugar mixture slowly and mix thoroughly. Sift the salt and cream of tartar over the egg whites and beat until the whites are stiff. Add the extract to the whites and mix with the yolk mixture. Bake for 1 hour at 300° F., on lowest shelf or rack in the oven; avoid top heat. Remove from the oven and turn the pan upside down until the cake is cool. This may be served with fruit as a shortcake.

226. Cake, white

7 pounds sugar	10 ounces baking powder
3 1/2 pounds fat (butter, lard, or lard substitute)	2 ounces salt
24 eggs	4 cans milk, evaporated, or 13 ounces powdered skim milk dissolved in 3 pints water
2 1/2 ounces flavoring extract	
13 1/2 pounds flour	

Cream together the sugar, fat, eggs, and flavoring extract, adding one ingredient at a time in the order given. The flour, baking powder, and salt should be sifted together twice and added gradually. Add a part of the milk from time to time as needed to make the mixing easy. If mixed in a mechanical mixer, the beating operation should be at second speed. When all the milk is added there should be a stiff batter. If too stiff, more milk or water may be added. This may be baked in round pans for layer cake or in large pans for shortcake. If used for layer cake use 2 to 4 layers to form a cake when cool enough to handle and spread any desired filling between layers. Cover top and sides with same filling or an icing (recipes 239 and 240). If baked in sheet form, it may be made into layer cake or served plain or with a sweet sauce (recipe 134). This may also be made into cup cakes.

227. Cobbler, apple or fruit

Filler	Crust
7 pounds apples, evaporated, or 25 pounds apples, fresh, or 3 can apples, no. 10 cans	14 pounds flour
4 1/2 pounds sugar	7 ounces baking powder
2 ounces cinnamon	2 pounds lard
1 ounce nutmeg	2 pounds sugar
3 lemons, sliced thin	27 eggs
	2 1/2 ounces salt
	2 quarts water

If evaporated apples are used, wash the apples thoroughly and soak them in cold water for 2 hours, then cook them in 2 1/2 gallons water until well done, but not broken. Cool them and add the sugar, spices, and sliced lemon.

If fresh apples are used, peel, core, and cut into eighths. Cook in a pan with sugar, sliced lemons, and spices until medium soft but not mushy. Avoid stirring as this breaks the apples.

If canned apples are used, cook as for fresh apples, but less cooking is required.

Crust. Cream the sugar, lard, and salt thoroughly, then add the eggs, one at a time, stirring constantly. Pour in the water and mix well. Sift the flour and baking powder together several times, then add them to the mixture and work until smooth. Take about 2/3 of the dough and roll out 1/2 inch thick. Line 2 bake pans with a bottom crust and bake in a medium oven (325°-400° F.—12 to 16 counts) for

20 minutes. When baked, cover both crusts in pans with spiced apples about $\frac{1}{2}$ inch thick. Roll out the remainder of the dough and cover the contents of both pans, tucking the sides down well. Bake for 20 minutes in a medium oven. Serve hot with a sweet sauce of any flavor (recipe 134).

Other fruits, fresh, canned, or dried (peaches, apricots, prunes, etc.), may be substituted for the apples, and the cobbler named accordingly.

228. Crullers

10 ounces fat (butter, lard, or lard substitute)	5 pounds flour
$1\frac{1}{4}$ pounds sugar	$2\frac{1}{2}$ ounces baking powder
10 eggs	$1\frac{1}{4}$ pints water
$\frac{1}{2}$ ounce flavoring extract	8 pounds fat (for deep frying)

Cream butter and sugar together, and add the extract. Beat the eggs well, then beat into the creamed mixture. Sift the baking powder and flour together and add to the mixture. Add the water, stir until the dough is smooth. Roll out the dough to a thickness of $\frac{1}{2}$ inch and cut with a doughnut cutter. Fry a golden brown in deep fat. Remove, drain, and roll in granulated sugar, or place on a plate and dust with powdered sugar.

229. Custard, egg

2 gallons milk, fresh, or 8 cans milk, evaporated, diluted with 8 pints water, or 26 ounces powdered skim milk dissolved in 9 pints water	40 eggs
	2 ounces salt
	24 ounces sugar
	2 ounces flavoring extract

Beat all ingredients to a foam and pour into a well-greased bake pan. Bake in a medium oven (325° – 400° F.—12 to 16 counts) for 20 to 30 minutes, or until done. When done a silver knife stuck in the custard will come out clean. If baked too long it will become watery. Any flavoring may be used. Serve cold.

230. Fritters, oatmeal

2 gallons oatmeal mush (recipe 10)	1 pound flour
2 pounds sugar	8 pounds fat (for frying)
12 ounces baking powder	

Mix all ingredients except fat to make a stiff batter. With a tablespoon cut pieces about half the size of an egg and fry, until a golden brown, in deep fat. Remove from the fat with a skimmer, and drain. Dust with powdered sugar or serve with sirup. To improve this recipe, add 6 eggs and a few drops of flavoring extract to each gallon of mush. Serve hot.

231. Fruits, dried, stewed

See: Applesauce (recipe 214).

Apricots, dried, stewed (recipe 215).

Peaches, dried, stewed (recipe 243).

Prunes, stewed, (recipe 253).

232. Gelatin

8 ounces gelatin, powdered	10 to 15 quarts water (dependent on brand of gelatin used—follow directions on package)
5 ounces sugar	
$\frac{3}{4}$ ounce flavoring extract	

Soak the gelatin in $\frac{1}{2}$ pint of cold water for 10 minutes. Bring the remainder of the water to a boil, stir in the soaked gelatin until dissolved, and then stir in the sugar. Cool the mixture and stir in the flavoring extract. Pour into a mold which has been rinsed in cold water. Let stand until it jells. It is then ready to serve. The lower the temperature in which set, the quicker the gelatin will jell. At 50° F. it will jell in 2 hours, while at 80° F. it will jell in 6 hours. Addition of various fruits, after cooling and before jelling, improves and enriches the dish. Fruit juices may be used for color and flavor. To remove from mold, set the mold in warm water for a few seconds.

233. Ice cream

½ pound flour or cornstarch
5 pounds sugar
½ teaspoonful salt
24 eggs

12 quarts milk, fresh, or 12 cans milk,
evaporated and 12 pints water
1 pint cream, thin
2 teaspoonfuls vanilla extract

Mix flour, sugar, and salt. Add eggs (slightly beaten) and milk, gradually. Cook in double boiler (over hot water) about 20 minutes, stirring constantly at first. If the custard has a curdled appearance this will disappear in freezing. When cool add cream and flavoring extract and freeze. Any flavoring extract may be used for flavor in place of vanilla, or any fruit may be added for flavor and additional richness. This ice cream may be used as a base for chocolate ice cream, coffee ice cream, strawberry ice cream, etc.

234. Ice cream, chocolate

4 gallons basic ice cream mixture 12 ounces cocoa or 8 ounces chocolate
melted

Add the cocoa or melted chocolate to the basic ice cream mixture, stir well, and freeze.

235. Ice cream, coffee

3¾ gallons basic ice cream mixture 1 quart water, boiling
6 ounces coffee, roasted and ground

Make coffee from the 6 ounces of coffee and 1 quart of boiling water according to any approved method, strain and cool, then add to the basic ice cream mixture, stir well, and freeze.

236. Ice, lemon

2 ounces powdered gelatin 7½ pounds sugar
15 quarts water 1¼ ounces lemon extract
80 lemons

Soak the gelatin in 2 pints of cold water for 10 minutes. Squeeze the juice from the lemons, grate the rinds, and add the juice, grated rinds, sugar, and the soaked gelatin to the balance of the water. Bring to a boil, cool, add the extract, and freeze.

237. Ice, orange

2 ounces powdered gelatin 15 lemons
15 quarts water 7½ pounds sugar
60 oranges 1¼ ounces orange extract

Soak the gelatin in 2 pints cold water for 10 minutes. Squeeze the juice from the oranges and lemons, grate the rinds. Add the juice, grated rinds, sugar, and the soaked gelatin to the balance of the water. Bring to a boil, cool, and add the extract and freeze.

238. Ice, pineapple

2 ounces powdered gelatin 15 to 20 pineapples, fresh, according to
10 quarts water size, or 7 cans crushed pineapple no.
7½ pounds sugar 2½ cans, or 2 cans pineapple, no. 10
cans

Soak the gelatin in 2 pints cold water for 10 minutes. Add the soaked gelatin, the sugar, and the pineapple (diced, if fresh) to the balance of the water. Bring to a boil, cool, and freeze.

239. Icing, boiled, for cakes

4 pounds sugar 12 egg whites, beaten stiff
½ pound butter 3 tablespoonfuls flavoring extract
1 pint water

Boil sugar, butter, and water until it forms a soft ball when dropped in cold water. Pour slowly over the beaten egg whites, beating continuously. Add the flavoring, mix well, and spread on cakes quickly. If not used immediately, it will harden and cannot be spread. Ten ounces of cocoa or 6 ounces of melted chocolate may be added to the sugar and water during cooking instead of the flavoring.

240. Icing, uncooked, for cakes

4 pounds powdered sugar ½ pound vegetable shortening or butter
1 pint cold water (do not use lard)
3 tablespoonfuls vanilla extract

Mix the sugar with cold water until of spreading consistency. Add the flavoring extract and shortening and mix well. Spread on cakes and let stand 30 minutes before serving.

Chocolate icing may be made by adding 10 ounces of cocoa or 6 ounces of melted chocolate with the sugar before adding the water. If chocolate is added, do not use any flavoring extract.

Any flavoring extract may be used for flavoring instead of vanilla using 2 tablespoonfuls instead of 3 tablespoonfuls of vanilla.

241. Meringue

(For 17 pies, 9 inch)

- | | |
|---------------|-------------------------|
| 34 egg whites | 1 pound sugar |
| 1 ounce salt | ½ ounce vanilla extract |

Beat the egg whites until they are foamy and white in appearance and stiff enough to hold their shape. Sprinkle sugar over the beaten whites and continue beating until the mixture is stiff enough to hold in peaks. During the beating add the salt and extract. Spread over pie filling with the aid of a smooth knife and brown on upper shelf of a quick oven (400°-450° F.—9 to 12 counts). This requires about 15 minutes.

242. Mincemeat

- | | |
|--|------------------------------|
| 1¼ pounds beef, fresh (cooked) or
corned beef | ¼ ounce black pepper, ground |
| 1¼ pounds suet | 2½ pounds sugar |
| 5 pounds apples, dried | ¼ pound salt |
| 2½ pounds peaches, dried | 1¼ pounds currants |
| 2½ pounds prunes, seeded | 4 pounds raisins |
| ¼ pound cinnamon, ground | ½ pound candied citron |
| 1 ounce cloves, ground | ¼ pound lemon peel |
| | ¼ pound orange peel |

Soak the dried fruit in cold water for 1 hour, then drain, and run the beef, suet, apples, peaches, and prunes through a meat grinder. Then mix all the ingredients with only sufficient water to moisten and pack in a clean container, preferably a wooden keg. This mixture will keep well when kept free from water. Five pounds of this mixture will make 15 pies.

243. Peaches, dried, stewed

- | | |
|-------------------------|----------|
| 7 pounds peaches, dried | 4 lemons |
| 3 pounds sugar | |

Wash peaches and place in enough water to cover. Soak about 8 hours or overnight, then add sugar and juice of lemons and simmer for 45 minutes or until tender.

244. Pie crust

(Makes 3 double 9-inch crusts)

- | | |
|--|-------------------|
| 1 pound flour | 1/5 ounce salt |
| 8 ounces fat (lard or lard substitute) | ¼ pint cold water |

All ingredients should be thoroughly chilled before using.

Mix the flour with one half the fat by chopping or cutting with a food chopper or knife until the size of corn meal. Then mix in the remainder of the fat by the same method, except that the fat is cut in so as to leave the mixture in small pieces, about the size of a bean, then add the cold water slowly while tossing the mixture with a fork. A medium-soft dough, not slack or stiff, is easiest to handle. Roll and handle as little as possible.

Best results will be had by making up pie crust dough in small batches like this recipe for 3 pies.

245. Pie, apple or fruit

- | | |
|---|--|
| 35 pounds apples, fresh, or 7 pounds
apples, evaporated, or 3 cans apples
no. 10 cans | 3 pounds sugar
3 lemons
¾ ounce cinnamon |
|---|--|

Fresh apples. Peel, core, and cut into eighths. Cook in a pan with sugar and lemon and cinnamon added until medium soft, but not mushy. Avoid unnecessary stirring which breaks the apples.

Evaporated apples. Soak overnight or about 8 hours in cold water. Cook as for fresh apples.

Canned apples. Put into pie crust, add sugar, lemon, and cinnamon, then bake.

The quantity of sugar and spices used in the stew will have to be increased or decreased depending upon the tartness of the apples. Make the pies with double crust and bake about 40 minutes in a quick oven (400°-450° F.—9 to 12 counts). Many fruits may be substituted for the apples, as apricots, peaches, cherries, pine-apples, etc.

This recipe is sufficient for about 17 pies.

246. Pie, banana cream

Filling. Same as for coconut cream pie (recipe 248) except that instead of the coconut, 10 pounds of sliced bananas are added after the filling has cooled. If the bananas are added while the filling is hot, they will turn black.

Crust. See recipe 244.

247. Pie, chocolate, meringue

Filling (17 pies)

17 ounces chocolate, plain	1½ ounces salt
6 quarts milk, fresh, or 6 cans milk,	34 egg yolks
evaporated, diluted with 6 pints	6 ounces butter
water, or 40 ounces powdered skim	1 ounce vanilla extract
milk dissolved in 9 pints water	5 pounds sugar
1 pound flour	

Melt chocolate in double boiler, add sugar, flour, and salt, and stir. Heat milk, but not to boiling point, stirring frequently to prevent scorching. When hot, stir gradually into the mixture. Cook the mixture about 15 minutes, stirring constantly until it thickens. Cover double boiler and set on back of stove. Beat egg yolks lightly, and stir about ¼ of the hot mixture with the yolks. Return to double boiler and cook about 2 minutes. Add butter and vanilla and beat until smooth.

After the pie crust has been baked, fill with the chocolate mixture, cover with a meringue (recipe 241), and brown on upper shelf of quick oven (400°-450° F.—9 to 12 counts). (For pie crust see recipe 244.)

248. Pie, coconut cream

Filling

1 pound flour	6 quarts milk, fresh, or 6 cans milk, eva-
3¾ pounds sugar	porated, diluted with 6 pints water, or
36 eggs	40 ounces powdered skim milk dis-
1 ounce vanilla extract	solved in 9 pints water
	5 pounds coconut, shredded

Separate egg whites and yolks and beat yolks lightly. Mix flour and sugar. Heat milk, stir about ¼ into flour-sugar mixture and beat until smooth. Add egg yolks and mix well. Add remainder of milk gradually with constant stirring. Put in double boiler and cook for about 15 minutes, then add coconut and extract and pour into baked pie shell, place filled pie shell in oven for about 10 minutes. Meringue (recipe 241) may be added before the pie is put into the oven. Do not cut this pie until time to serve. Serve on the day it is prepared. (For pie crust see recipe 244.)

249. Pie, custard

Filling

3½ pounds sugar	36 eggs
12 quarts milk, fresh, or 6 cans milk,	12 ounces cornstarch
evaporated, diluted with 6 pints	½ ounce vanilla extract
water	Pinch of nutmeg or mace, ground.

Beat the sugar and eggs until the sugar is well dissolved. Add the milk, saving enough to dissolve the cornstarch. Add the dissolved cornstarch and flavoring. Mix. For baking see par. 55, chapter 5. (For pie crust see recipe 244.)

250. Pie, lemon cream

Filling (17 pies)

1 pound flour	6 quarts milk, fresh, or 6 cans milk, eva-
5½ pounds sugar	porated, diluted with 6 pints water, or
48 eggs	40 ounces powdered skim milk dis-
17 lemons	solved in 9 pints water

Mix flour and sugar. Beat eggs and mix with flour and sugar, grate lemon rinds, squeeze lemon juice, and add grated rinds and juice to mixture. Stir milk into

mixture slowly to prevent lumping. Cook mixture in double boiler for 15 minutes, stirring constantly until it thickens, then remove from the fire and beat until smooth. Pour into pie shells which have been baked to a light brown. Place the filled pie shells (with meringue) on upper shelf of quick oven (400°-450° F.—9 to 12 counts) for about 10 minutes. (For pie crust see recipe 244.)

251. Pie, mince

For each pie use 1/3 pound of mincemeat (recipe 242), and 2/3 pound of liquid. The liquid may be either sugar, sirup, molasses, or cider. Mix the mincemeat and liquid thoroughly and use a double pie crust. Bake about 30 minutes in a quick oven (400°-450° F.—9 to 12 counts).

252. Pie, pumpkin or squash

Filling (17 pies)

12 pounds pumpkin or squash, fresh,	5 quarts milk, fresh, or 5 cans milk, eva-
or 3 no. 10 cans, or 7 no. 3 cans	porated, diluted with 5 pints water, or
6½ pounds sugar, brown or white	1 pound powdered skim milk dissolved
1½ ounces salt	in 8 pints water
34 eggs	3 ounces cinnamon or cloves
3 ounces ginger, ground	

If fresh pumpkin or squash is used, prepare and cook as in squash, mashed (recipe 206), if canned, cooking is not necessary. Place cooked or canned pumpkin or squash in a large bowl or container, the pumpkin or squash must be smooth but not watery, if watery, heat until water has evaporated. Mix sugar, salt, spices, and milk with the pumpkin or squash. Beat the eggs and stir into the mixture and pour into unbaked pie shells. Bake in a quick oven (400°-450° F.—9 to 12 counts) for the first 20 minutes, then lower to a slow oven (200°-250° F.—18 to 20 counts) and continue for 40 minutes longer. When completely baked, the filling is firm and does not stick to a knife blade, and the edge of the crust is a golden brown. If the filling shrinks unduly, it was too moist. (For pie crust see recipe 244.)

253. Prunes, stewed

7 pounds prunes	3 lemons, sliced thin
3 pounds sugar	

Wash prunes. Cover with cold water; bring to a boil and cook until tender (30 to 50 minutes). Add sugar and lemon for last 5 minutes of cooking. Remove from fire; add water to replace that which has evaporated. Let stand overnight. Serve cold.

254. Pudding, apple

7 pounds apples, dried, soaked, and	26 pounds bread (may be dry)
stewed, or 25 pounds of fresh ap-	7 pounds sugar
ples, stewed and diced, or 2 no. 10	4 ounces cinnamon
cans	

Slice and toast the bread and spread in the bottom of a well-greased bake pan, then spread a layer of the apples over the toast and sprinkle with sugar and cinnamon; continue alternate layers of toast and apples until the pan is filled. Bake in a medium oven (325°-400° F.—12 to 16 counts) about 20 minutes and serve with a plain or caramel sauce (recipe 134). Nearly any kind of fresh or dried fruit may be used and the pudding named accordingly.

255. Pudding, banana

10 pounds bananas	12 eggs
6 pounds sugar	4 pounds cornstarch
3 pints milk	1 ounce vanilla flavoring
1 ounce salt	½ ounce lemon flavoring
7 gallons water	½ pound butter

Put 6 gallons of water into a boiler. Add the sugar, salt, and milk. Bring to a boil. Dissolve the cornstarch thoroughly with 1 gallon of cold water. When the mixture reaches the boiling point, pour the dissolved cornstarch in slowly, stirring continually. Let it cook at a simmering temperature until thickened. Remove from the fire, and when partly cooled add the flavoring, beaten eggs, and crushed bananas. Pour into pans and let cool.

256. Pudding, bread, with sauce

- | | |
|-------------------------------------|---------------------------------------|
| 20 pounds bread crusts or dry bread | 4 cans milk, evap., or 4 quarts milk, |
| 4 pounds fruit, fresh, dried, or | fresh, or 1 pound powdered skim milk |
| canned | dissolved in 3½ pints water |
| 4 pounds sugar | 4 pounds raisins |
| 2 ounces cinnamon | 12 eggs |

Soak the bread in the milk. Season with sugar and cinnamon, add raisins and beaten eggs, mix and spread about 1 inch deep in pan. Over this spread about 1 inch of fruit stewed (if dried) then another layer of the bread mixture. Sprinkle sugar and cinnamon over the top layer. Bake about 40 minutes in a medium oven (325°-400° F.—12 to 16 counts). Serve hot or cold with cream or sweet sauce. This makes an excellent dish and gives an opportunity to use available scrap bread. Shredded coconut may be used to improve the flavor.

257. Pudding, cornstarch

- | | |
|---------------------|---------------------------------------|
| 7 pounds sugar | 7 cans milk, evap., or 7 quarts milk, |
| 1½ ounces salt | fresh, or 1½ pounds powdered skim |
| 5 pounds cornstarch | milk dissolved in 5½ pints water |
| | 1½ ounces flavoring extract |

Dissolve the cornstarch in 5 quarts of cold water, then add 5 gallons of boiling water, the sugar, salt, and milk. Cook for 5 minutes, cool, and add the extract. This pudding is improved by dissolving the cornstarch in 5 quarts of milk instead of cold water and the addition of 4 eggs to each gallon of pudding made. It should never be served plain; various fruits, coconut, etc., should be added. Pour into vegetable dishes and when cool place in the ice box; serve with milk or sweet sauce (recipe 134).

258. Pudding, Indian, baked

- | | |
|----------------------------------|--------------------------|
| 4 pounds corn meal | ½ pound butter |
| 2 pounds flour | 2 gallons water, boiling |
| 1 quart molasses | ½ ounce cinnamon |
| 4 cans milk, evaporated, diluted | 1 ounce ginger |
| with 4 pints water | |

Mix the molasses and corn meal together and pour over the boiling water. Add the butter, salt, and spices. When the mixture is cool, pour the milk over, but do not stir into the pudding. Bake in a slow oven (200°-250° F.—16 to 18 counts) from 2 to 3 hours. Take care that it does not burn. Serve hot.

259. Pudding, plum

- | | |
|----------------------------------|------------------------------------|
| 10 pounds flour | 5 pounds fruit, dried, stewed, and |
| 6 ounces baking powder | chopped fine |
| 2½ ounces salt | ½ ounce cloves, ground |
| 5 pounds beef suet, chopped fine | 2 ounces cinnamon, ground |
| 4 pounds sugar | ½ ounce nutmeg, ground |

Mix the flour, baking powder, salt, beef suet, stewed fruit, spices in the order named. Dissolve the sugar in water and add it to the mixture, together with sufficient cold water to make a stiff dough. Fill 5-pound lard pails or pudding cans two-thirds full of the mixture. If no lids are available, tie a cloth tightly over the top of each pail or can. Place in a boiler containing sufficient boiling water to reach the height of one-third the pails or cans and maintain the water at the same level during cooking. Boil for 8 hours. Remove from the cans and split the pudding lengthwise through the center. Serve hot with plum-pudding sauce (recipe 129).

260. Pudding, rice

- | | |
|------------------|--|
| 9 pounds rice | 5 cans milk, evaporated, diluted with |
| 24 eggs | 5 pints water, or 5 quarts fresh milk, |
| 4 pounds raisins | or 1 pound powdered skim milk dis- |
| 9 pounds sugar | solved in 4 pints water |
| 1 ounce salt | ½ ounce flavoring extract |

Boil the rice for 15 minutes and drain. The rice should not be over-boiled, as the kernels should remain separate and firm. Mix the eggs, raisins, sugar, milk, salt, and extract. Add rice and sufficient water to cover and stir. Bake slowly in a moderate oven (250°-325° F.—16 to 18 counts) until slightly brown. Serve with cold or hot sweet sauce (recipe 134).

261. Pudding, rice and apple

30 pounds apples	5 pounds rice
½ pound butter	4 pounds sugar
1 ounce cinnamon	6 eggs
3 cans milk, evaporated, diluted with	1 gallon water
3 pints water	

Peel and cut the apples into small pieces. Cook the rice until tender and then drain off the water. Line the bottom of pans with cooked rice, then a layer of apples. Cream butter, sugar, and spice. Then add eggs (beaten), water, and milk. Pour the mixture over the rice and apples. Bake in a medium oven (325°-400° F.—12 to 16 counts) for 30 minutes. Serve with milk or sweet sauce.

262. Pudding, sweet potato

40 pounds sweet potatoes	2 cans milk, evaporated
3 pounds sugar	1 ounce lemon flavoring, or ½ pint
18 eggs	lemon juice

Wash and cover sweet potatoes with clean water, bring to a boil, and let cook slowly for 40 minutes or until tender. Drain off the water. When cooled, peel and put them through the meat chopper. Separate the egg yolks from the whites, add the egg yolks to the potatoes, then the sugar, milk, and flavoring or lemon juice. Mix it thoroughly and place in buttered or greased pans. Beat the egg whites until stiff and spread over the pudding. Bake in a medium oven (325°-400° F.—12 to 16 counts) until browned.

263. Pudding, tapioca

4 pounds tapioca	4 pounds fruit, dried, stewed, and
4 gallons water, cold	chopped
7 pounds sugar	18 eggs
	1 ounce flavoring extract

Soak the tapioca 2 hours in sufficient cold water to cover; then simmer until clear (until the "pearls" have disappeared) which will require about 1 hour; then beat or whip in the fruit, sugar, beaten eggs, and extract while hot. Raisins, currants, or other fruit may be added.

If quick (granulated) tapioca is used, no soaking is required. Add tapioca to cold water and bring to the simmering point. In about 15 or 20 minutes the granules of tapioca will have disappeared. Then add other ingredients as shown for pearl tapioca.

Serve hot or cold with milk or a sweet sauce (see recipes 6 and 134).

SWEET DOUGH PRODUCTS**264. Basic sweet dough**

2 pounds flour, soft (pastry)	1 pound sugar
6½ pounds flour, hard (issue)	1¼ ounces salt
2 quarts milk, or water, or 2 cans	1 pound fat (lard or lard substitute)
milk, evaporated, diluted with 2	8 eggs
pints water	¼ ounce mace or nutmeg
½ pound yeast, compressed, or 1½	¼ ounce lemon extract, or 4 lemons,
pounds yeast, dried	grated, rind and all

This recipe produces one basic sweet dough and provides sufficient dough to make about 225 buns, doughnuts, etc., or an equivalent quantity of coffee cake, etc. Therefore, one basic sweet dough is sufficient for 100 men. For 200 men, use two basic sweet doughs; for 50 men use one-half of one basic sweet dough, etc.

Straight dough method. Cream thoroughly the sugar, salt, fat, and spice, then add eggs gradually and cream until light. Add flavoring extract. Dissolve the yeast in one-fourth of the milk which should be at a temperature of about 80° F. Add remainder of milk to the creamed mass and stir thoroughly to dissolve all ingredients. Add hard flour and begin mixing. Pour on yeast solution, add soft flour, and continue mixing until the dough is smooth and free from lumps. This dough should be slacker than ordinary bread dough. Regulate water or milk to have a dough not too slack to handle. Set to rise in temperature of about 80° F. and cover with cloth. Allow to ferment (rise) until dough around im-

pressions made by moderate pressure of two fingers starts to recede, then give first punch. The first rise requires about 1½ hours. In hot weather, or when it is impossible to keep the temperature of the dough down to 80° F., it is best to punch the dough young, about 45 minutes after mixing, as over-fermentation ruins sweet dough more than any other factor. After punching, allow to stand 15 or 20 minutes, then work into desired forms. Cover dough not being worked to prevent crusting.

Comments. The addition of 4 ounces of baker's malt, when available, to the above ingredients will improve the dough. All hard flour may be used if soft flour is not available. In such case substitute 1½ pounds cornstarch for an equal amount of flour.

This is a yeast-raised dough to which additional sugar may be added after fermentation. It is usually enriched by the addition of eggs, spices, butter, citron, lemon peel, raisins, nuts, etc., and is manipulated into desired forms. It may be made by the straight-dough or sponge methods. The sponge method (given below) is used when speed is essential.

If the dough must be handled in a cold room, some means should be found to keep the temperature up around 80° F. The dough may be placed in a suitable vessel and this vessel placed in a fireless cooker or into a larger container lined with sacks or hay. Close the top of larger container and keep in a warm place, if possible.

At least 50 different forms of cakes, rolls, buns, etc., may be made from this sweet dough. This is done by taking the desired quantity of the sweet dough for the product to be made, adding such additional quantities of sugar, butter, eggs, fruits, citron, lemon peel, nuts, etc., as desired for richness, and working into desired form.

Quick sponge method. Dissolve all the yeast (½ pound) in 1 pint of the liquid. Dissolve all the sugar (1 pound) in 1 pint of the liquid. Pour the dissolved yeast over 3 pounds of the hard flour and mix slightly. Pour the dissolved sugar into the mixture and mix well. Set to stand in a warm place (about 90° F.). This will become spongy in about 20 minutes, hence the name "sponge." As soon as it has become light and spongy, put it into a mixing bowl, add remainder of liquid, and stir well to break up the sponge. Then cream the salt, fat, spice, and eggs, and add flavoring extract as for the straight-dough method. Add the cream mixture and stir well, then add remainder of flour and mix thoroughly. Allow to rest about 5 minutes and then commence working into the desired forms.

265. Cake, apple

15 pounds apples, fresh, or 2 no. 10 cans apples	1 pound fat (butter, lard, or lard substitute)
1 basic sweet dough (recipe 264)	1 pound raisins
1 pound sugar	

Make in the same manner as coffee cake (recipe 266), but place thin slices of cooked, fresh, or canned apples over top of dough about 30 minutes before baking. Sprinkle with sugar and cinnamon, and raisins if desired, and bake in medium oven (325°-400° F.—12 to 16 counts) about 30 minutes. Avoid too much heat, as this may cause the fruit to become dry, or very ripe fruit to become mushy. Almost any kind of fruit may be used instead of apples. Bring edges of dough up around the side of the pan so as to retain fruit juice.

266. Cake, coffee

1 basic sweet dough	1 pound fat (butter, lard, or lard substitute)
1 pound sugar	1 pound raisins

Work all other ingredients thoroughly into the sweet dough, roll out about ½ inch thick, and place in any kind of pan available. Allow to rise at 80° F. for about 30 minutes, or until the dough has about doubled in size. Bake in medium oven (325°-400° F.—12 to 16 counts) 20-30 minutes, or until done. To determine when baked, raise edge to see whether under side is done. After baking, cool and add plain icing (recipe 240) or, instead of icing, sprinkle top with sugar and cinnamon just before placing in oven.

267. Doughnuts

- | | |
|----------------------------------|--|
| 1 basic sweet dough (recipe 264) | ½ ounce mace, ground |
| 3 pounds flour | ½ ounce lemon extract |
| ½ ounce salt | Water sufficient to make a slack dough |
| 3 ounces yeast, compressed | |

Mix all other ingredients with the basic sweet dough, then let rise for 20 minutes in a temperature of 80° F. Roll out into sheets about ½ inch thick and cut with doughnut cutter or form into various shapes as desired. Let rise again until about double in size, and fry in deep fat at 365° to 370° F. Too stiff a mixture may cause the doughnuts to crack while frying.

After frying, drain and sprinkle with powdered sugar mixed with a small quantity of cinnamon. Icing may be used.

268. Doughnuts, jelly

- | | |
|----------------------------------|---|
| 1 can jelly, no. 10 can | 3 ounces yeast, compressed |
| 1 basic sweet dough (recipe 264) | ½ ounce mace, ground |
| 3 pounds flour | ½ ounce lemon extract |
| ½ ounce salt | Water sufficient to make a slack dough. |

Same as for doughnuts but instead of cutting into doughnut shape, cut off pieces of dough about 1½ ounces in weight and roll into a ball. Make depression with thumb or any suitable instrument, drop small quantity of jelly into this depression, and close by pinching dough together. Let rise, or proof, about 30 minutes, then fry and sugar in the same manner as for doughnuts.

269. Rolls, cinnamon

- | | |
|----------------------------------|--|
| 1 basic sweet dough (recipe 264) | 1 pound fat (butter, lard, or lard substitute) |
| ½ pound sugar | 6 ounces cinnamon |

Roll the basic dough into sheets about ¼ inch thick, 15 inches wide, and convenient lengths. Brush with melted fat and sprinkle liberally with sugar and cinnamon. Roll the sheet dough into a tight roll as a cigarette and cut into ½-inch thick slices with a sharp knife. Place close together in well-greased pans with cut sides, which have first been sprinkled with sugar, up and down. Let rise until double in size and bake in a medium oven (325°-400° F.—12 to 16 counts) 30-40 minutes. Do not bake until hard. Move bake pans occasionally while in the oven to insure being well baked on bottom. Turn out of pans to prevent sticking. When cool, cover with uncooked icing (recipe 240) if desired.

270. Rolls, parkerhouse

- | | |
|----------------------------------|---------------------------------------|
| 1 basic sweet dough (recipe 264) | ½ pound fat (lard or lard substitute) |
|----------------------------------|---------------------------------------|
- Procedure same as for parkerhouse rolls (recipe 282).

271. Stollen

- | | |
|--|--|
| 1 basic sweet dough (recipe 264) | 2 pounds raisins |
| 1 pound fat (butter, lard, or lard substitute) | ½ pound citron |
| 2 pounds sugar | 2 cans pineapple, no. 2½ cans, diced and drained |
| 12 eggs | |

Work all other ingredients thoroughly into the sweet dough. Take 10 ounces of dough and roll into a piece 10 by 8 inches, rolling the half nearest the operator ½ inch thick and the half away from the operator 1 inch thick, so that by folding away from the operator the upper fold is thinner. Space in bake pans 2 inches apart. Let rise for about 30 minutes. Bake about 40 minutes in medium oven (325°-400° F.—12 to 16 counts). Other fruits may be added, if desired. After cooling, ice with uncooked icing (recipe 240).

HOT BREADS**272. Biscuit, baking powder**

- | | |
|--|---------------------------------------|
| 16 pounds flour | 6 cans milk, evaporated, diluted with |
| 3 ounces salt | 6 pints water, or 20 ounces powdered |
| 11 ounces baking powder | skim. milk dissolved in 6 pints water |
| 4 pounds fat (lard or lard substitute) | |

Sift the dry ingredients together 3 times and work in the fat. Make a well in the middle and add all the milk at once. Stir until mixed. This should make a soft dough, if not, add more milk. Turn out on lightly floured board and knead quickly for not more than 1 minute. The secret of making good biscuit is in handling the dough only enough to mix thoroughly. Roll out to one-half the thickness desired in the baked biscuit, cut out with a biscuit cutter, and place in bake pans just touching each other. Bake in a quick oven (400°-450° F.—9 to 12 counts) for 12 minutes or until brown. Serve hot.

273. Biscuit, cheese

Use the same recipe as for baking powder biscuit (recipe 272) adding 3 pounds of finely chopped American cheese. Mix same as for the baking powder biscuits, except that the cheese is added with the milk and thoroughly stirred in.

274. Biscuit, sour milk

8¼ pounds flour	2½ ounces baking powder
1¼ ounces baking soda	1 ounce salt
1½ pounds fat (lard or lard substitute)	¾ quarts milk, sour

Mix and sift dry ingredients. Work the fat into the flour mixture. Make a well in the middle and add all the milk at once. Stir until mixed. This should make a soft dough, if not, add more milk. Handle dough only enough to mix thoroughly. Roll out to one-half the thickness desired in the baked biscuit, cut out with a biscuit cutter and place in a bake pan just touching each other. Bake in a quick oven (400°-450° F.—9 to 12 counts) for 12 minutes or until brown. Serve hot.

275. Corn bread

9½ pounds corn meal, white or yellow	½ pound fat (lard or lard substitute)
2¼ pounds flour	20 eggs
3 ounces baking powder	4 cans milk, evaporated, diluted with
3 ounces salt	4 pints water

Sift together corn meal, flour, salt, and baking powder. Work in the fat, add beaten eggs and milk, and mix well. Pour into a well-greased, heated pan and bake 20 minutes in a quick oven (400°-450° F.—9 to 12 counts). Cut into squares and serve hot. This may also be baked as muffins in muffin tins.

276. Corn bread (sour milk)

9½ pounds corn meal, white or yellow	3 ounces salt
1 gallon milk, sour	40 eggs
3 ounces soda	¾ pound fat (lard or lard substitute)

Sift together corn meal and salt. Work in the fat. Dissolve soda in ¼ cup water. Add, with the milk and beaten eggs, to the mixture. Mix well and pour into a well-greased, heated bake pan. Bake about 20 minutes in a quick oven (400°-450° F.—12 to 16 counts). Cut into squares and serve hot. This may also be baked as muffins in muffin tins.

277. Gingerbread

21 ounces sugar	21 ounces fat (lard or lard substitute)
10 eggs	2½ pints molasses
2½ pints milk	2¼ ounces soda
¼ ounce cinnamon	2 ounces ginger
6 pounds flour	

Cream sugar, shortening, and spices. Add the eggs gradually, then add soda dissolved in molasses and milk. Mix thoroughly. Fold in flour. Grease pans. Bake in a medium oven (325°-400° F.—12 to 16 counts) for about 30 minutes. This may also be baked as muffins in muffin pans.

ROLLS

278. Basic dough

10 pounds flour	13 ounces sugar
6½ ounces yeast, compressed	13 ounces fat (lard or lard substitute)
6 pints water or milk	2½ ounces salt

Dissolve the yeast in 2 pints of the water at a temperature of 80° F. Dissolve the sugar and salt in remainder of water. Add this to the flour and mix slightly.

Add the dissolved yeast and the fat and mix thoroughly. Regulate the quantity of liquid to make a soft dough. Set to rise in a well-greased pan covered with a slightly damp cloth. In cold weather, or if the kitchen is cold, it is well to keep this cloth dampened with warm (not hot) water. If the temperature of the room is about 80°, it is sufficient to allow the dough to rise. Ferment and punch as for basic sweet dough (recipe 264). It is best to work up this dough while it is still on the young side. Do not allow it to over-ferment.

This dough makes rolls, etc., which are preferred by many to those made from the basic sweet dough. It may be made into a variety of rolls, as parkerhouse, sandwich buns, finger rolls, pan rolls, etc., or may be used to make a raisin bread. It may also be used to make plain bread which is superior for toast.

279. Cinnamon rolls

Use the basic dough (recipe 278) and make up into cinnamon rolls as shown in recipe 269.

280. Finger rolls

Use the basic dough (recipe 278). Scale into 2-ounce pieces, using the method shown in recipe 281, but cutting from 32-ounce pieces. Roll each piece about twice in a circular motion (do not form into a complete ball), then with the flat hand roll out into a cylinder or "snake" about 5 inches long. Endeavor to keep the ends square. It requires some experience to make neat finger rolls. Then place the rolls well apart on a well-greased bake pan, allow to proof (rise) until about double in size, and bake about 15 minutes in a medium oven (325°-400° F.—12 to 16 counts). These rolls are used for hot dogs and are good for lunches in the field, on the target range, etc.

281. Pan Rolls

Use the basic dough (recipe 278) scaled into 1½-ounce pieces. Scale off pieces of dough weighing 24 ounces and roll out into "snakes" about 2 inches in diameter. Double over and cut in half, repeat this with each half; this gives four pieces. Cut each of these in half, this gives eight pieces. Cut each of these in half and the result is 16 pieces, each weighing 1½ ounces. This method is quick and with a little experience will give weights nearly enough accurate for practical purposes. Round up each piece into a neat ball and put close together in a well-greased bake pan. Allow to proof (rise) until about double in size and bake for about 15 minutes in a medium oven (325°-400° F.—12 to 16 counts). Serve hot.

282. Parkerhouse rolls

Use the basic dough (recipe 278). Scale into 1½-ounce pieces as shown in recipe 281. Round into neat balls and allow to rest on the table, first sprinkling some dusting flour to prevent sticking to the table. By the time the last of the dough has been rounded, the first pieces will be ready for working into rolls. Place four of these pieces in a row. Use a small rolling pin (a piece cut from a household size broomstick is the proper size) and put a crease or dent in the middle of each piece. Then brush across the creases with melted butter or a mixture of melted butter and lard; then fold over, so that top fold is one-third shorter than bottom fold. Seal the two folds together by pressing the top lip, but do not apply enough pressure to knock down. Place in well-greased bake pans about 2 inches apart, let proof (rise) until about double in size, and bake in a medium oven (325°-400° F.—12 to 16 counts). Serve hot with butter, jam, or jelly.

283. Raisin bread

Wash 4 pounds of raisins, dredge with flour, then add to the basic dough (recipe 278) when mixing. Then handle as for soft bun bread (recipe 284).

284. Soft bun bread

Use the basic dough (recipe 278) and make up into loaves. If no individual bread pans are on hand, scale into 35-ounce pieces, round, and let rest until loose (about 20 minutes). Form into loaves and place six of these in one black iron bake pan. Proof (rise) until just above edge of pan, bake about 30 minutes in a medium oven (325°-400° F.—12 to 16 counts).

285. Sandwich buns

Use the basic dough (recipe 278). Scale into 2-ounce pieces as for finger rolls (recipe 280). Round each piece into a neat ball and place 2 inches apart in well-greased bake pans. Allow to rise about 15 minutes, then flatten, using the palm of the hand, or the bottom of a can, or a board, etc. Then allow to rise until about double in size and bake about 15 minutes in a medium oven (325°-400° F.—12 to 16 counts).

SALADS AND DRESSINGS**286. Apple and celery salad**

- | | |
|-----------------|-----------------------------|
| 9 pounds apples | 3 pints mayonnaise dressing |
| 8 pounds celery | 1 head lettuce |

Clean the celery and keep in a damp cloth so that it will remain crisp. When ready for use cut into ½-inch pieces. Save the celery leaves for use in soup, etc. Peel and core the apples and just before adding them to the mixture cut them into pieces similar in size to the celery. Add the mayonnaise dressing and mix well. Serve individually on lettuce leaves or in vegetable dishes garnished with lettuce leaves.

287. Baked bean salad

- | | |
|--------------------------------------|--------------------------|
| 16 pounds baked beans | 1 pint mayonnaise |
| 4 pounds onions, chopped fine | ½ pint vinegar |
| 4 pounds sweet pickles, chopped fine | 1 head lettuce |
| 2 ounces mustard, prepared | Salt and pepper to taste |

Mix all ingredients thoroughly and season to taste with salt, pepper, mustard, and vinegar. Left-over baked beans from dinner may be used for salad. Serve individually on lettuce leaves or in vegetable dishes garnished with lettuce leaves.

288. Bean, stringless, salad

- | | |
|-------------------------------------|--------------------------|
| 20 pounds beans, fresh, stringless, | ½ pint vinegar |
| cooked and cold, or 3 no. 10 cans | 1 head lettuce |
| 2 ounces mustard, prepared | Salt and pepper to taste |
| 2 pints mayonnaise | |

To the cold beans add the mustard, salt, vinegar, and mayonnaise, and mix well. Serve individually on lettuce leaves or in vegetable dishes garnished with lettuce leaves.

289. Beet salad, pickled

- | | |
|--|-----------------|
| 17 pounds beets, fresh, or 2 no. 10 cans | 2 pints vinegar |
| cut beets | 1 pound sugar |

If fresh beets are used, cook and peel them, then dice in ¼-inch cubes; if canned beets are used no cooking is necessary. Place the beets in a salad bowl and cover with vinegar and sugar solution. Let stand for 1 hour to cool and place in vegetable dishes, serve cold.

290. Cabbage salad

- | | |
|------------------------|------------------------------------|
| 20 pounds cabbage | 4 bunches parsnips |
| 2 pounds celery, diced | 1 quart dressing or 1 pint vinegar |

Trim, core, wash, clean, and quarter the cabbage and soak in salted water for 1 hour. Clean, trim, wash, and dice celery, soak in cold water until ready to use. Just before serving, remove cabbage from the water and shake. Shred or chop fine and place in a large bowl with the diced celery, then pour over it the dressing or vinegar. Mix well. Place in vegetable dishes and cover with minced parsley and serve cold.

291. Cabbage and apple salad

- | | |
|--------------------|-----------------|
| 15 pounds cabbage | 5 pounds apples |
| 1 quart mayonnaise | |

Prepare the cabbage as in cabbage salad (recipe 290). Wash, peel, and core the apples and place in cold water until just before serving. At that time remove and chop fine and shred the cabbage. Mix the cabbage, apples, and mayonnaise, and salt to taste. Serve individually on lettuce leaves or in vegetable dishes garnished with lettuce leaves.

292. Celery salad

- | | |
|--------------------------------------|----------------------------|
| 15 pounds celery, trimmed | 1 pint vinegar |
| 15 eggs | 1 pint water |
| 4 pounds potatoes, mashed | 2 ounces mustard, prepared |
| 2 pounds bacon grease or cooking oil | 5 heads lettuce |

Dice the celery fine, and let stand in cold water. Hard boil the eggs, chop fine, and mix with the diced celery. Make a dressing as follows: Mash the potatoes, mix in slowly the bacon grease (or cooking oil) with the vinegar and water. Then mix in the mustard and a little red pepper and salt to taste. The dressing should be of the consistency of cream or gravy. Regulate the quantity of water to get this result. Pour the dressing over the celery-and-egg mixture and serve cold on dishes garnished with lettuce leaves.

293. Chicken salad

- | | |
|---------------------------|-------------------|
| 30 pounds chicken (fowl) | 2 quarts dressing |
| 12 pounds celery, trimmed | 5 heads lettuce |

Prepare the chicken as for chicken stew (recipe 79). Simmer until so tender that the meat may be easily separated from the bones. Be careful to avoid leaving any bones with the meat. Dice the meat when cold, add the diced celery, and mix with the mayonnaise. Season to taste with salt and pepper and garnish with a little paprika sprinkled over the top. Serve cold on lettuce leaves.

The above is sufficient for a main dish. To serve as a salad the quantity of ingredients may be cut in half.

If desired, veal may be substituted for one-half the chicken. If simmered with the chicken the veal will take on a chicken flavor.

294. Cucumber and onion salad

- | | |
|-------------------------|--------------------------|
| 25 pounds cucumbers | 1 quart vinegar |
| 8 pounds onions, sliced | Salt and pepper to taste |

Peel the cucumbers and slice thin, cover with salted cold water, and allow to stand for 2 hours. Drain, add the onions and vinegar and season to taste with salt and pepper.

295. Lettuce salad

- | | |
|-----------------------------------|----------------------------|
| 13 heads lettuce, medium size | 1 quart vinegar |
| 12 eggs, hard boiled, minced fine | 2 ounces mustard, prepared |
| 2 pounds bacon, diced and browned | |

Wash and clean the lettuce thoroughly and cut into eighths. Soak in cold water about 1 hour. Mix the bacon, mustard, minced eggs, vinegar, and a little pepper and salt, and pour over the lettuce when cold. Serve ice cold. Lettuce may also be cut into eighths and served with thousand island dressing.

296. Piccalilli salad

- | | |
|---|---------------------------------|
| 5 pounds cabbage, minced | 5 pounds pickles, sweet, minced |
| 5 quarts tomatoes, minced, or 4 no. 3 cans, or 1 no. 10 can | 1 quart vinegar |
| 5 pounds onions, minced | 1 teaspoonful cloves, ground |

Mix all the ingredients well, season with salt, cayenne pepper, and cloves, and add sufficient water to make 3½ gallons. Regulate the quantity of water to make the consistency like thick gravy.

297. Pimento salad

- | | |
|-------------------------------|-----------------------------|
| 5 cans pimentos, 1-pound cans | 5 heads lettuce |
| 14 pounds cabbage | 2 pounds pickles, sweet |
| 2 pounds celery, diced | 1 quart mayonnaise dressing |

Prepare the cabbage as in cabbage salad (recipe 290), select one-fourth of the pimentos best suited for the purpose and slice them into fine cords like shoe strings. Chop fine remaining pimentos and pickles. Remove the cabbage from the water, shake, shred, and mix with the chopped pimentos, diced celery, chopped pickles, and the mayonnaise. Serve cold on lettuce leaves.

298. Potato salad

- | | |
|--------------------------------------|---|
| 25 pounds potatoes, boiled and diced | 1 can pimentos, or 4 green peppers, diced |
| 5 pounds celery, diced | ½ pint vinegar |
| 2 pounds onions, minced | 1 quart mayonnaise |
| 2 pounds bacon, diced and browned | 1 head lettuce or parsley |

Place the potatoes in a chopping bowl with the onions and celery over them. Fry the bacon until brown and while still hot pour over the potatoes. Add the vinegar, mayonnaise, and pimentos or peppers mixed together. Mix well and season with pepper and salt to taste. Allow to stand for 2 hours, then serve cold in dishes garnished with lettuce or parsley.

299. Raw vegetable salad

- | | |
|--|----------------------------|
| 6 heads lettuce (medium size) | 2 pounds celery, diced |
| 1 pound carrots, sliced and chopped fine | 4 pounds cabbage, grated |
| 2 pounds green pepper, chopped fine | 1 pint mayonnaise |
| 4 bunches radishes, sliced | $\frac{1}{2}$ pint vinegar |
| 2 pounds cucumbers, diced | 2 pounds tomatoes |

Chop fine 3 heads of lettuce, add rest of the ingredients, salt and pepper to taste. Serve cold in dishes garnished with the 3 remaining heads of lettuce.

300. Salmon salad

- | | |
|--------------------------------------|------------------------------|
| 12 cans salmon, 1-pound cans | 1 gallon mayonnaise dressing |
| 2 Pounds celery, diced | 3 green peppers |
| 10 pounds potatoes, boiled and diced | 6 lemons |
| 3 heads lettuce | |

Cool the cans of salmon and empty contents into a mixing bowl. Be sure to add all the oil in the can. Chop salmon fine and mix with the potatoes. Soak the diced celery in cold water for 1 hour, chop up the green peppers and add to the mixture. Add the mayonnaise and thoroughly mix. Garnish with sprigs of parsley or lettuce and serve cold on lettuce leaves with the lemons cut in thin slices and laid across the top of the salad.

301. Slaw (cole slaw)

- | | |
|-----------------------------------|-------------------------------|
| 20 pounds cabbage | 6 pounds onions, chopped fine |
| 4 pounds bacon, diced and browned | 2 pounds sugar |
| 1 quart vinegar | |

Wash the cabbage thoroughly and shred or chop fine. Mix thoroughly the onions, bacon, vinegar, and sugar. Season to taste with pepper and salt and bring to a boil. Remove from the fire and pour over the chopped cabbage. Serve hot or cold.

302. Tomatoes, sliced

30 pounds tomatoes

Wash the tomatoes well and trim away discolored or bruised spots. Place in the refrigerator until thoroughly chilled, then slice thin or cut into eighths and replace in the refrigerator until required. Place sliced tomatoes on lettuce and serve plain or with dressing (recipe 304) over both.

303. Vegetable salad

17 pounds vegetables, cooked, consisting of:

- | | |
|-----------------------|--|
| 5 pounds carrots | 2 pounds cucumbers, sliced, or celery, |
| 5 pounds peas | diced, or radishes, diced |
| 5 pounds string beans | |

Nearly any kind of left-over cooked vegetables may be used in making salads by seasoning them with mustard, vinegar, or mayonnaise or french dressing. Serve ice cold on dishes garnished with lettuce leaves.

304. Boiled dressing

- | | |
|----------------------------|----------------------------------|
| 3 eggs | $\frac{1}{2}$ ounce mustard, dry |
| $\frac{1}{4}$ pound butter | 1 pound flour |
| $\frac{1}{4}$ pound sugar | 1 pint milk (approximately) |
| 1 gallon water | Salt and cayenne pepper to taste |
| 1 pint vinegar | |

Put mustard, salt, sugar, and cayenne pepper into a kettle, pour over the vinegar, and heat to near boiling point. Rub the flour and butter together and add to the hot mixture. Beat the eggs, add the water, and let cook until like prepared mustard, add milk until right consistency.

This dressing may be used as a base, instead of mayonnaise, to make other dressings such as tartare sauce, thousand island, cucumber mayonnaise, etc.

305. French dressing

- | | |
|-----------------------------|-------------------------------|
| ½ teaspoonful paprika | 6 teaspoonfuls sugar |
| 6 teaspoonfuls salt | 2½ pints cooking or salad oil |
| ½ teaspoonful pepper, white | 1 pint vinegar |

Put the salt, pepper, paprika, sugar, and vinegar in a dish and beat thoroughly, then add slowly the oil, beating continuously. This dressing should not be poured over the salad until immediately before serving. A lemon dressing may be made by substituting 1 pint juice of fresh lemons for the vinegar.

306. Mayonnaise dressing

- | | |
|--------------------------|----------------------------------|
| 6 eggs | 2 tablespoonfuls mustard |
| 1 gallon salad oil | Salt and cayenne pepper to taste |
| 8 tablespoonfuls vinegar | |

First, every utensil used should be chilled or cooled. Break open the eggs into a mixing bowl and add the cayenne pepper, salt and mustard. Work it in until it is thoroughly mixed. Begin dropping in the oil, stirring constantly in the same direction, putting in only a few drops at first. When it begins to thicken, drop in a few drops of vinegar, then the oil again, a very little. Continue this until all of the materials are used. Be careful not to use too much vinegar as this makes it thin. It should be thick enough to drop when ready for use.

307. Mustard salad dressing

- | | |
|----------------------|------------------|
| 1 pound butter | 1¾ gallons water |
| 2 pounds flour | ¼ gallon vinegar |
| ¼ pound mustard, dry | |

Melt the butter in a double boiler, stir in the flour and mustard and cook until smooth. Reduce it with the vinegar and water to the desired thickness. Serve when cold.

308. Salad dressing, eggless

- | | |
|-----------------------|---------------------|
| 6 ounces sugar | ¾ pint vinegar |
| 4 ounces salt | 2¼ pints salad oil |
| 1 ounce mustard, dry | 3 pints water, cold |
| 1 teaspoonful paprika | 6 ounces cornstarch |

Place the sugar, salt, mustard, paprika, vinegar, and salad oil in a mixing bowl but do not stir. Make a paste by mixing the cornstarch with half the water, then add the other half of the water. Cook the paste over a slow fire, stirring constantly until it boils and becomes clear. Then add the hot paste to the other ingredients in the mixing bowl and beat briskly with an egg beater or wire whip until smooth. Chill before serving.

309. Sour cream dressing

- | | |
|---|-------------------------------|
| 1½ pints vinegar | 3 teaspoonfuls salt |
| 1 quart milk, fresh; or 1 can evaporated milk diluted with 1 pint water | ¼ teaspoonful pepper, cayenne |
| | 6 tablespoonfuls sugar |
| ½ pint salad oil, or 8 ounces melted butter | 4 teaspoonfuls mustard, dry |

Add the vinegar to the milk, then the oil, then all other ingredients, stirring briskly with a wire beater. Keep cold.

310. Tomato french dressing

- | | |
|---|----------------------|
| 2 cans soup, tomato, no. 1 cans | 1 ounce salt |
| 1½ pints salad oil, or olive oil | ¼ ounce mustard, dry |
| ½ pint vinegar | ½ ounce paprika |
| ½ pound sugar | |
| ½ ounce onion juice, or ½ pound onions, finely minced | |

Mix the ingredients in the order given in an electric mixer or whip by hand. Serve cold.

311. Thousand island dressing

- | | |
|--|--|
| 1 gallon mayonnaise dressing, or boiled dressing | 1 pint pickles, chopped, or sweet relish |
| 1 quart tomato catsup or chili sauce | 1 cup horseradish, grated (if available) |

Mix the above ingredients thoroughly. One-half pint chopped green olives improves the dressing.

BEVERAGES

312. Cocoa or chocolate

3 pounds cocoa, or 2½ pounds chocolate, plain	5 pounds sugar
	32 cans milk, evaporated

Put 8 gallons of water into an urn or boiler and bring to a boil. Take out 1 gallon of the hot water and dissolve the cocoa and sugar in this. If chocolate is used, first melt it in a double boiler. Then add to the remainder of the hot water and cook 5 minutes. Reduce the heat and add the milk, and stir well. Water may be used in place of milk, but this reduces the palatability.

In hot weather, iced cocoa is popular.

313. Coffee, hot

12½ gallons water, cold	5 pounds coffee, roasted and ground
-------------------------	-------------------------------------

Bring the water to a boil. Move container to back of stove in order to reduce temperature of water slightly under the boiling point. Place roasted and ground coffee in sugar interliner bag, or other similar bag, and tie same with cord, leaving sufficient room in the bag to permit expansion of the coffee. Place the bag containing the coffee in water, when water is slightly under boiling point, and allow to simmer, not boil, for 10 to 12 minutes. Stir the bag occasionally during the simmering period. Remove the bag. Serve at once.

Observe the following rules to insure good coffee:

a. Keep roasted and ground coffee in a container as airtight as possible.

b. Carefully measure quantities of both water and coffee.

c. When grounds are removed from coffee, throw them away. Do not use these grounds to make additional quantities of coffee, and do not use part spent grounds and part unused grounds for subsequent brews. Always use fresh (unused) ground coffee.

d. Be sure to bring water to a boil, but do not add coffee to water until the water has cooled slightly below the boiling point.

e. Serve the coffee as soon as possible after completion of brew. The brew should not be completed more than 15 minutes prior to time of serving.

f. Scour the coffee boiler daily.

g. After removing grounds from muslin bag or sack, the sack should be washed in lukewarm, not hot, water, thoroughly rinsed in cold water, and then permitted to remain submerged in a pan of cold water until ready to use again.

314. Lemonade

13 gallons ice water	100 lemons
7 pounds sugar	10 pounds ice

Squeeze the juice from the lemons with a lemon squeezer and add it to the water. Sweeten to taste with sugar and stir thoroughly before serving. Serve cold.

315. Tea, hot and iced

Hct tea

7 gallons water, fresh
10½ ounces tea

Cold tea

1 gallon water
15 ounces tea
18 lemons, or left-over lemonade to taste
9 gallons water

Hot tea. Bring the water to a boil, remove from the range. Suspend the tea from the top of the boiler in a muslin bag and allow to stand in the hot water for 5 minutes. The bag should be sufficiently large to give the tea plenty of room so that the boiling water will penetrate all portions of it. Remove the bag of tea, stir the beverage, and serve hot.

Iced tea. Use 1 gallon of water and 15 ounces of tea and prepare as for hot tea. Cool and just before serving add sufficient cold water to make 10 gallons. The juice of 18 lemons may be added, if desired. Any left-over lemonade may be added to the iced tea.

CHAPTER 10

MESS SANITATION

Introduction

The extreme importance of sanitation has been emphasized frequently by the War Department. The following extract from Circular 277, August 20th, 1942 again stresses the vital part sanitation plays in mess management:

"Commanders of all grades, surgeons, and medical inspectors must realize that organizations which have difficulty controlling endemic intestinal diseases during training will have greater difficulty in the field, and it follows that the combat value of such units will be substandard. The recurrence of these diseases is indicative of inefficiency on the part of the responsible commanders and medical officers and a lack of discipline in the units.

Causes. In general, intestinal diseases are transmitted from person to person by food and water, the infective agents being disseminated in the excreta of cases or carriers. The causal organisms are introduced into water with the infected excreta, and into food through the medium of hands contaminated with infected material, by water, by contaminated dishes and utensils, by flies, or by direct contact. As sources of infection are constantly present in military organizations and in the civilian population with which the troops are in contact, any relaxation in control measures will almost inevitably be followed by the occurrence of some of these diseases in epidemic form.

Prevention. Effective control of intestinal diseases is chiefly dependent upon control of the transmission agencies. Routine control measures are covered in detail in FM 8-40 and FM 21-10 and repetition is unnecessary. The following is published in extension thereof:

a. Inspection. It has become traditional in some units to inspect the messes on a fixed schedule and at times when messes are expected to be "ready for inspection." This is faulty because inspecting officers seldom if ever observe the methods employed in washing dishes, handling and preparing food, etc. The kitchen personnel usually hurry to prepare for the inspector, resulting in washing dishes and utensils in cold water and drying them with towels rather than the heat absorbed from hot water. Messes should be inspected at odd hours of the day, preferably just before or after a meal, and inspections should, as a general rule, be informal and unscheduled.

b. Food handling. The use of left-over food should be reduced to a minimum. Protein foods and salads, such as potato or egg, should not be prepared more than 4 hours prior to serving. Such foods, unless hot, should be kept in shallow pans in the refrigerator until the time of serving. Sliced cooked meats, ground meats, ground cheese, ground boiled eggs, peeled boiled eggs, coming in intimate contact with the hands of kitchen help, should be prepared just before cooking and serving. The placing of this type of food in deep containers in refrigerators is dangerous. Due to the slowness of heat loss, the center of the mass does not quickly reach refrigerator temperature and it affords ideal conditions for the rapid increase in bacteria.

c. Sandwiches. The use of ground meats and egg or cheese spreads as sandwich fillers is dangerous unless prepared just prior to serving. Sandwiches to be issued to troops in the field for future consumption should be generally of nonprotein foods unless adequate amounts of ground pickle mixture containing vinegar are used as a filler with them. They should be prepared as close as possible to the time of consumption. Sandwiches made of jelly, jam, butter, sliced cheese, and sliced meat, providing that no mayonnaise or other cooked dressing is used and the meat and cheese are covered on both sides with a ground pickle mixture containing vinegar, are suggested types to serve.

Responsibility. Attention is directed to paragraphs 2 and 7, FM 8-40, and paragraph 5, FM 21-10, which place the responsibility for sanitation and for the enforcement of the provisions of sanitary regulations on commanders of all grades."

SECTION I

INTESTINAL DISEASES

1. General. The intestinal diseases as a group are transmitted from person to person by food and water, the infective agents being disseminated in the excreta of cases or carriers. The causal organisms are introduced into water with the infected excreta, and into food through the medium of hands contaminated with infected material, by water, by contaminated dishes and utensils, by flies, or by direct contact with excreta.

2. Classification. The important diseases belonging to this group are:

Typhoid fever	Cholera
Paratyphoid fever	Helminthic infestations
Common diarrhea	Undulant fever
Bacillary dysentery	Food infection
Protozoal dysentery	Botulism

3. General Importance and Prevalence. a. Intestinal diseases are of great potential importance to a military force. However, measures are available by which the incidence of intestinal diseases can be greatly reduced below that which would and does occur in situations where the spread of these infections is inadequately controlled.

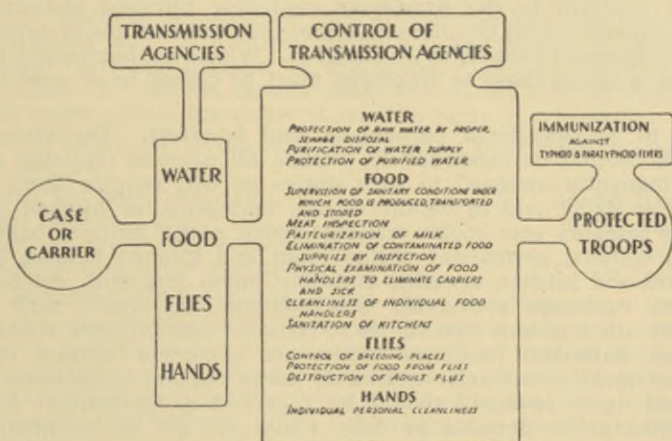


Plate 1. General Factors in the Control of Intestinal Diseases.

b. As sources of infection are constantly present in military organizations, and in the civilian populations with which the troops are in contact, any relaxation in measures for the control of intestinal infections will almost inevitably be followed by the occurrence among troops of some of these diseases in epidemic form. The prevalence of intestinal diseases and their importance to a military force are, therefore, to a very considerable degree dependent on the extent to which suitable control measures are enforced. In this respect, intestinal diseases differ markedly from such respiratory infections as influenza or common colds. In many instances, the latter cannot be completely controlled by any practical procedure, while uncontrollable epidemics of intestinal diseases seldom if ever occur in military forces under normal conditions.

c. While one attack of certain of the intestinal diseases, particularly typhoid, will usually confer permanent immunity, troops generally have a high group susceptibility to intestinal diseases.

d. The group of diarrheal diseases which are classified as common diarrhea are from a military viewpoint, under ordinary conditions, the most important of the intestinal diseases, largely because of their influence on the noneffective rate. This group includes those conditions, diagnosed as enteritis, colitis, or diarrhea, which in many instances are probably actually mild dysenteries or food infections. These conditions tend to occur as small explosive epidemics and incapacitate a

relatively large number of men before control measures can be made effective. On the other hand, typhoid is of relatively minor importance, but only because it can be controlled by available and practical control measures.

4. General Control Measures. The control of intestinal diseases is based on the control of environmental conditions with a view to preventing the transmission of the causal organisms by water and food. General measures for the control of intestinal diseases include water purification, food protection and control, waste disposal, and control of the housefly.

SECTION II

FOOD HANDLERS

5. The Examination of Permanent Food Handlers. *a. General.* No one in the transmissible stage of a communicable disease or who is a known carrier of the causative organisms of such a disease should never be employed as a food handler. Medical examiners must devote particular attention to the detection of any evidence of communicable disease and the history of an attack of such a disease which may have produced a carrier state. Mess officers and other officers under whose supervision permanent food handlers may be employed are responsible that such persons conform to the provisions regarding physical examination. They must cause permanent food handlers in whom they notice signs or symptoms of any communicable disease to report to the surgeon. Whenever permanent food handlers are employed, a list of those so employed must be posted in or near their place of employment.

b. Persons to be considered permanent food handlers. The term "permanent food handlers" should be construed to include all persons (enlisted and civilian) who are permanently assigned to such duties as will require them to regularly prepare food or drink and to handle dishes, tableware, or kitchen utensils. Included in this category are: cooks, assistant cooks, cooks' helpers, bakers, butchers, meat cutters, waiters, permanent dining room and kitchen helpers handling and washing dishes and kitchen utensils, dietitians, mess sergeants, milkers and other milk handlers, exchange attendants who dispense ice cream, milk and bottled goods, and any other person who comes in constant and intimate contact with food in other than unbroken packages which are protected against contamination. Medical Department personnel required to make routine inspections of meat and meat-food and dairy products should be regarded as permanent food handlers. Rotating kitchen police detailed by daily roster are not so included.

c. Procedure for examinations. Company, troop, battery and detachment commanders, officers in charge of bakeries and of special messes, officers in command of hospitals, quartermasters, exchange officers, and others concerned should report in writing to the surgeon the names of all prospective permanent food handlers under their jurisdiction. The station or organization surgeon will then take the necessary steps to have these men examined; he should keep a permanent record thereof and should report the results of the examination to the organization commander without delay, recommending immediate relief of those found unsuitable for the work.

6. Personal Cleanliness. *a.* Food handlers, particularly those working in kitchens or mess halls, should keep themselves scrupulously clean at all times. Those working in the preparation and serving of food should wear clean, white clothing. White undershirts are permissible, providing they have sleeves long enough to cover the unsightly hair under the armpits. Kitchen police and others working in the mess hall or kitchen may wear denims while performing particularly dirty jobs, such as floor scrubbing or handling of garbage, but not when they are preparing food.

Close supervision will be necessary to insure that food handlers wash their hands after visits to the latrine or after handling objects containing dirt or grease. A weak solution of cresol may be used to disinfect their hands. The hands should be air-dried rather than wiped.

It is important that hair be kept short and, where possible, covered with a white hat or cap. Fingernails should be short and clean. Thrice daily is not too often

for fingernail inspection of all mess personnel. The mess officer may make the inspection once daily and the mess sergeant twice.

Mess personnel with colds should be isolated immediately. The respiratory diseases spread violently once they reach the kitchen unless complete protective measures are taken.

b. It is the responsibility of the organization commander to instruct mess personnel in the ordinary rules of sanitation. The organization commander may call upon medical personnel for assistance in this instruction.

SECTION III

DISPOSAL OF KITCHEN WASTES

7. Disposal of Kitchen Wastes. Kitchen wastes consist of the food remnants accumulated after meals and in the preparation thereof, as well as the water in which kitchen utensils and mess gear have been washed. The amount of kitchen wastes varies considerably, especially the liquid portion. However, the solids average about $\frac{1}{2}$ pound per person per day and the liquids average 200 to 1000 gallons per company of 200 men per day. These wastes must be disposed of to prevent giving rise to offensive odors and attracting flies and rats to the mess area.

8. Garbage. a. Garbage is composed of the solid and semisolid wastes produced in the preparation of food. It includes waste food, the nonedible portions of food-stuffs, and waste materials incident to the preparation of food such as tin cans and coffee grounds. It does not include ashes or rubbish such as street sweepings, rags, boxes, or paper unless the paper is used to wrap the garbage.

b. Amount and character of garbage produced in temporary or semipermanent camps are as follows:

Amount per man per day	0.5-0.8 pounds.
Water content	65-80 percent.
Amount of dry matter combustible	85 percent.
Amount available for hog feeding	50 percent.

9. Methods of Garbage Disposal. a. *Burial.* On the march or in bivouac, burial of garbage is the method of choice. In larger camps, if soil is favorable, garbage may be buried in trenches 2 to 3 feet deep; however, it requires about 2500 square feet of ground for the burial of the garbage produced by 100 troops in one month. When garbage trenches are filled to within 1 foot of surface they should be back-filled and the earth well tamped down. Garbage pits should not be within 100 feet of any source of water used for drinking or cooking.

b. *Sale or gift.* Arrangements may be made, especially in semipermanent camps, to either sell or give the garbage to farmers. This is usually done by contract made by the quartermaster. The contractor should be bonded in order that the government may be protected in case of failure. All of the safeguards mentioned in paragraph 10 should be demanded in order that sanitary defects do not develop. If garbage is utilized for animal food the edible portion must be separated from the nonedible at the kitchens. The following are nonedible articles:

- Coffee grounds.
- Tea leaves.
- Eggshells.
- Banana peels and stalks.
- Fish heads and scales.
- Citron rinds.
- Tin cans, paper, and other rubbish.

c. *Hog feeding.* This is not feasible unless there are at least 500 troops in a camp for a considerable period of time. Hogs consume an average of 15 to 20 pounds of garbage per day. As 500 troops produce about 200 pounds of edible garbage per day, this will care for 10 to 15 hogs. Hogs should always be immunized against hog cholera.

d. *Reduction.* The cost of a reduction plant, both as to construction and operation, renders it impracticable for camp or cantonment.

e. *Closed incineration.* Closed incinerators are of two types, low temperature (1400° F.) and high temperature (minimum 1800° F.). The high temperature types

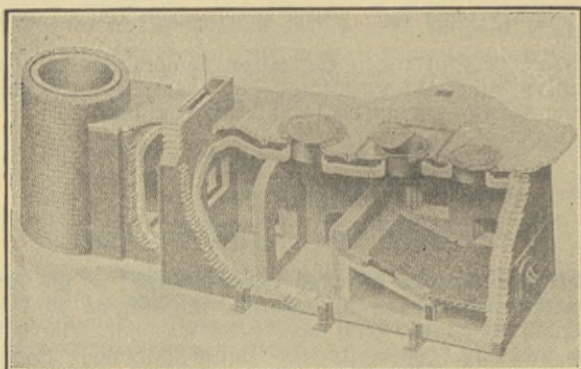


Plate 2. U. S. Standard Incinerator. Stack About 50 Feet in Height.



Plate 3. Incline Plane Incinerator.

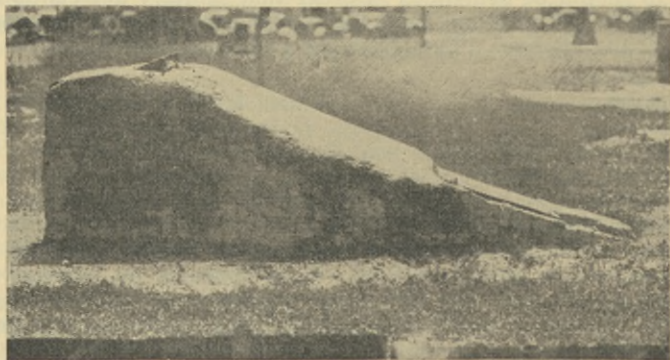


Plate 4. Incline Plane Incinerator, Side View.

cost more to install but consume all noxious gases. The U. S. standard incinerator is a typical high temperature incinerator (see Plate 2).

f. Semiclosed incinerator. The semiclosed incinerator is more easily built with unskilled labor than the closed type and is protected from rain and wind. The incline plane incinerator is a type which may be considered semiclosed and which will consume the garbage from about 1000 troops and is easily constructed. A trench is dug 11 feet 8 inches long, 2 feet 9 inches wide, and 1 foot 6 inches deep, as the firebox is below the level of the ground at one end. (See Plate 3.) The rock shown in the figure supports a piece of corrugated iron which is level for the first 20 inches and then slopes down to the grate. The upper part of the incline plane is roofed over with two pieces of oil drum, each consisting of one-third of a drum cut longitudinally. The entire outside except the doors is covered with a thick layer of wet clay, dried in place with a slow fire. Kitchen wastes are fed through the top door onto the corrugated platform and are gradually pushed down the plane toward the grate. Being dried out on the way down they are easily burned.

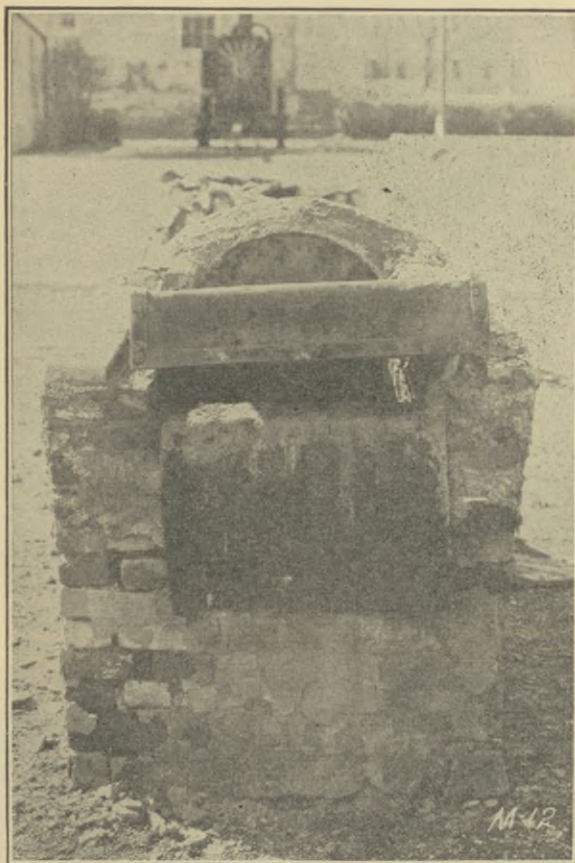


Plate 5. Incline Plane Incinerator, End View.

g. Open incineration. (1) If none of the methods of disposal previously described exist, the garbage produced in a camp is disposed of by open incineration. Sometimes one incinerator is built for the camp and operated by the quartermaster. This type is usually a multiple shelf incinerator (see Plate 6) or a rock pile incinerator. The latter type is difficult to operate and uses a great deal of fuel so is not constructed unless it is impossible to construct other types.

(2) As a rule company incinerators will be found satisfactory in most camps where garbage has to be burned in the camp for relatively short periods. However, this type of incinerator may be carried on over a period of many months.

(3) The company incinerator of choice is the *barrel and trench* incinerator. This consists of a barrel-like stack which is placed over the intersection of cross trenches. The stack provides means of preheating and partially drying the garbage prior to burning. In constructing a barrel and trench incinerator there are three parts to consider, the trench, the stack, and the supporting material and grate.

(a) Two trenches 1 foot wide and 10 feet long are so constructed that they cross at right angles at the center of each trench. Each trench slopes from the surface of the ground at each end to a depth of 18 inches at the center at the intersection.

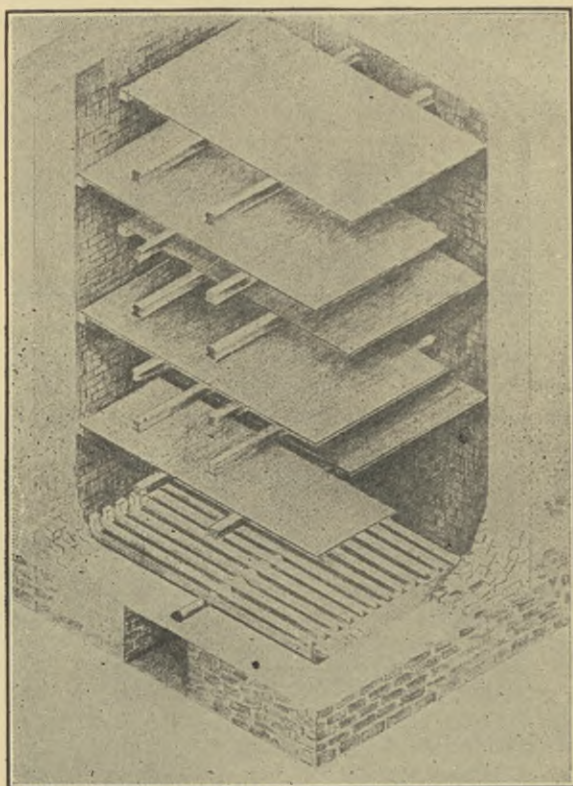


Plate 6. Multiple shed incinerator with side cut away to show interior construction

(b) The stack may be made of brick or stone either with or without mortar and measures about $4\frac{1}{2}$ feet in diameter at the bottom and 3 feet at the top (outside measurements). The stack may also be made of clay molded over a barrel from which both ends have been removed. An oil drum or galvanized iron garbage can with ends removed may also be utilized.

(c) The supporting structure may be either wide pieces of corrugated iron, sheet iron, or strips of strap iron, iron bars, or rails. The grate irons are made from iron rods or pipe and are inserted 3 or 4 inches apart and about 6 inches above the ground in all but the metal oil drum and galvanized iron can types where they are placed at the bottom of the stack.

(4) Other types of company incinerators are:

(a) The rock pit incinerator (Plate 11) which is not economical to operate on account of fuel consumption.

(b) The drying pan incinerator (Plate 12) which may be used where it is difficult to dispose otherwise of liquid kitchen wastes.

(5) Operation of open incinerators is an important factor in the successful disposal of garbage. Attendants should be trained to add garbage slowly so that it will not put out the fire, to use care in dumping garbage receptacles so as not

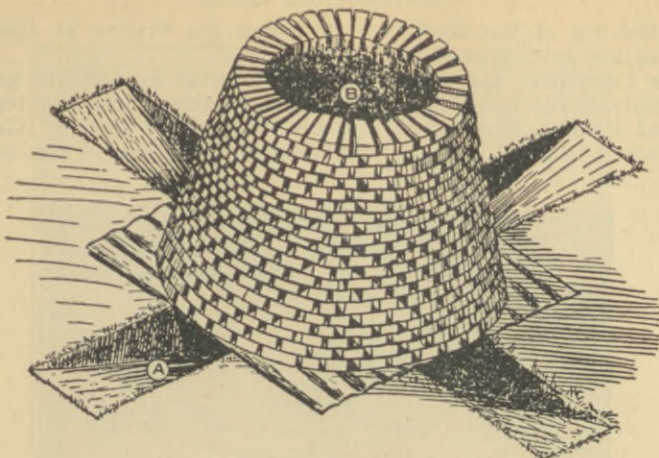


Plate 7. Barrel and Trench Incinerator.

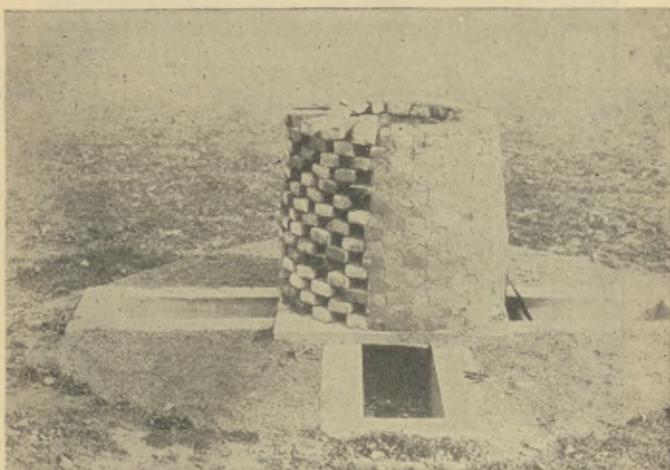


Plate 8. Cross Trench Incinerator.



Plate 9. Cross Trench Incinerator with Barrel Made of Packed Clay Molded Over a Wooden Barrel.

to break in the top of the stack, and to clean the firebox at frequent enough intervals so as not to clog it with ashes.

10. Garbage Collection. Garbage should be collected in standard galvanized iron cans with tightly fitting lids. The cans should be transported by truck or wagon to the point of ultimate disposal or to a central transfer station. Garbage should not be transferred to a garbage cart or wagon or from can to can at the kitchen.

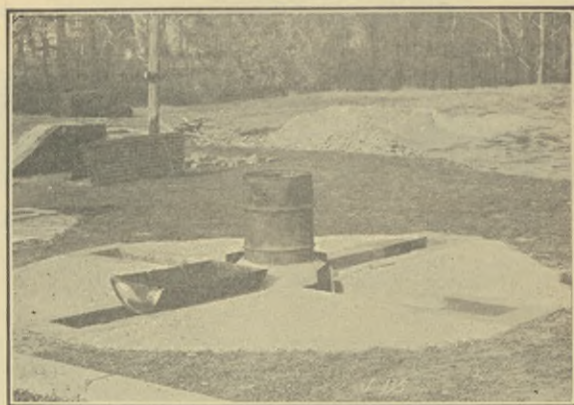


Plate 10. Cross Trench Incinerator made with 50-gallon Oil Drum. The Trenches are Longer than Normal in Order to Give Room for the Drying Pan.

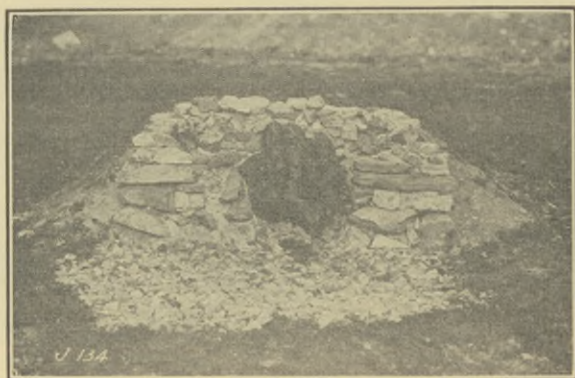


Plate 11. Straub Rock Pit Incinerator.

11. Garbage Stands. In semipermanent camps, garbage stands should be installed adjacent to the kitchens. The best garbage stands are built in the form of solid concrete blocks with center cores of stone and earth, and with an apron of 12 to 18 inches of concrete at the base. In height, the stand may be from 1 foot to 44 inches. The higher stands will have to be supplied with steps but are at the level of truck floors so as to facilitate can transfers. If concrete is not available, stands may be made of wood, the boards laid crosswise and separated at least 1 inch to prevent the retention of organic matter. Garbage stands should not be screened or whitewashed. The trend is away from screened garbage racks, since with *tight-fitting* cans the flies cannot get to the garbage, and, without screening, racks are more easily kept clean.

12. Care of Garbage Stands and Cans. a. In order to minimize the danger of spilling garbage during transportation, the cans should not be filled to within more than 4 inches of the top. The lids should be kept on at all times except when removed to deposit garbage. Care should be exercised that no garbage is spilled on the ground, and if solid garbage is spilled, it should be immediately collected and placed in a can.

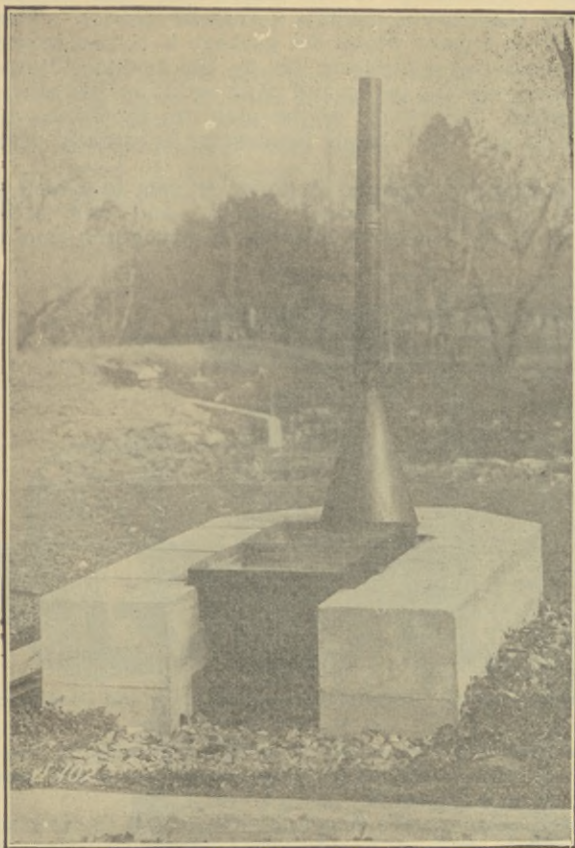


Plate 12. Guthrie Drying Pan Incinerator.

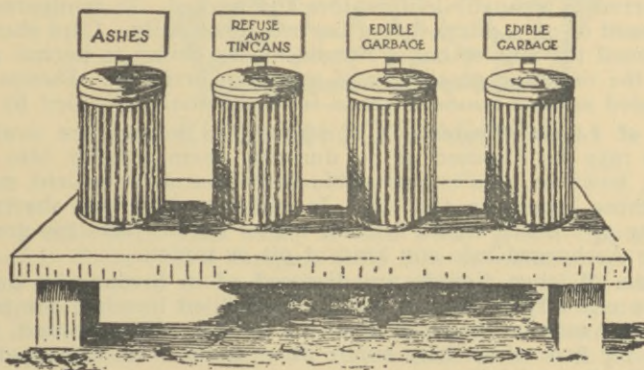


Plate 13. One Method of Labeling Garbage Cans for the Collection of Classified Garbage. Concrete Garbage Stand.

b. The platform should be scrubbed daily with a stiff scrubbing brush and hot soapy water, and the ground about the stand should be sprayed at weekly intervals with crude oil and firmly tamped. Intervals between collections should not be more than 2 days in the summer and 3 days in the winter. Garbage cans should be placed in sufficient numbers on the stand so that edible and nonedible garbage, ashes, and refuse can be kept separate. Markers may be used as shown in Plate 13. Garbage cans should not be whitewashed or painted.

13. Transfer Station. *a.* In large camps, where other than company incineration is used, it is usually necessary to install a transfer station. This may be at a central incinerator or at a point where the garbage is turned over to a contractor. This station should consist of a platform (20 by 100 feet in a large camp), at one end of which is a storeroom for paper and cans, while at the other end is a room where cans are washed. The height of the platform should be about on a level with the floor of a truck. A rubbish incinerator is usually installed near the platform.

b. Can-cleaning equipment consists of tanks or vats in which to soak cans in cleaning compound, adequate hot-water supply, and stiff scrubbing brushes. Equipment shown in Plate 14 may be installed to straighten cans and lids.

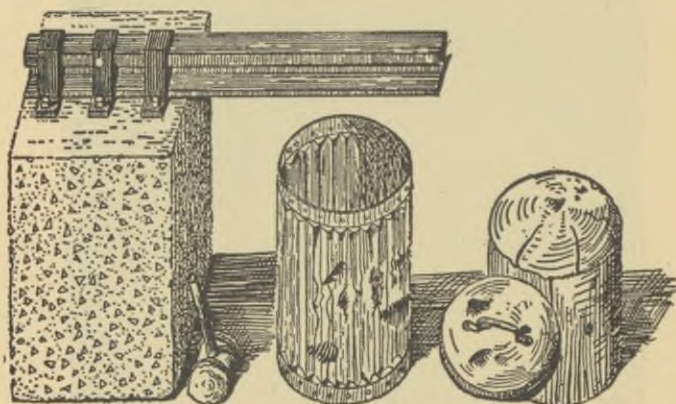


Plate 14. Device Used for Straightening Garbage Cans and Garbage-can Lids.

14. Tin Cans and Rubbish. Tin cans or similar noninflammable kitchen wastes should be burned out thoroughly in incinerators, pounded flat, and then disposed of either by burial or on a dump.

Accumulations of rubbish attract flies and rats, which in turn act as the transmitting agents of certain diseases to which man is susceptible. All rubbish, not garbage, should be collected daily in containers such as gunny sacks which are placed on poles at both ends of the company street and in latrines. It should then be transferred to company incinerators and burned. In semipermanent camps it may be disposed of on a dump, being burned there daily. Care should be taken that no unflattened tin cans or boxes remain on the dump to permit accumulation of water with the resulting possibility of mosquito breeding. Dumps should preferably be located several hundred yards from the tents occupied by troops.

15. Disposal of Liquid Wastes. In camps where sewers are available, liquid kitchen wastes may be disposed of by dumping them directly into sewer lines. In most camps, however, this is impossible and some arrangement must be made to dispose of these liquids in the soil. In order to facilitate absorption and to prevent clogging of the soil, liquid kitchen wastes should have the grease removed before they are discharged into any kind of pit or trench.

16. In Bivouac. Kitchen liquids are disposed of in bivouac by dumping them into trenches or pits. These pits or trenches are filled in when the troops depart. While waste water may be disposed of on the surface of the ground, it provides a breeding place for flies which may annoy other troops who encamp there or persons who live in that vicinity.

17. Soakage Pits. The ordinary kitchen soakage pit is built the same as the urine soakage pit except that it is equipped with a grease trap instead of a urine trough.

18. Grease Traps. Grease traps are of two general types, filter and baffle.

a. Filter grease trap. (1) Filter grease traps consist of galvanized pails, cans, etc., in the bottom of which a number of small holes are punched. The pail or can is placed in the center of the pit with the bottom about 2 inches below the surface. It is filled two-thirds full with a filtering material consisting of hay, grass, straw, or cloth which catches and retains a part of the grease and the debris such

as bread crumbs or vegetable fragments. Where a larger quantity of liquid is to be disposed of, a wooden barrel or a metal or wooden tub may be substituted for the pail or can.

(2) The ash barrel grease trap is a very satisfactory trap of the filter type. It is made by drilling about 30 holes in the bottom of an ordinary barrel. About 8 inches of gravel or coarse wood ashes are placed on the bottom and this is covered with about 18 inches of finer ashes. The top of the barrel is covered with a piece of burlap for a strainer, held in place with a barrel hoop. About twice a week the ashes should be removed and burned to remove the grease and then buried.

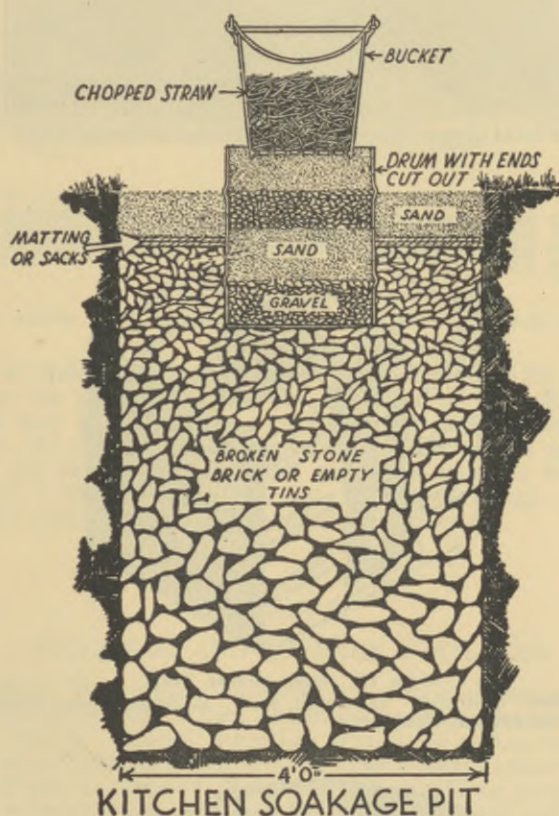


Plate 15. Pail Grease Trap.

b. Baffle grease traps. The baffle or cold water grease trap consists of a container which is divided by a hanging baffle into an influent and effluent chamber, the former having about twice the capacity of the latter. The lower edge of the baffle is separated from the bottom of the container by a space of about 1 inch. The outlet leads from the effluent chamber and is placed from 3 to 6 inches below the upper edge of the container. It may consist of a short piece of 1- or 2-inch pipe or a wooden trough. A strainer should be made of a perforated pail or box containing hay or straw to remove debris before the liquid passes into the container. When in use both chambers are filled at all times with cool water. When the warm liquid wastes strike the cool water in the influent chamber the grease rises to the surface and is prevented by the baffle from reaching the outlet to the soakage pit. Retained grease should be removed at daily intervals and the trap emptied and scrubbed weekly. Sediment removed at the time of cleaning should be burned or buried.

19. Soakage Trenches. A soakage trench consists of a central pit 2 feet square, 1 foot deep, from each corner of which a trench radiates outward for 6 feet. The



Plate 16. Soakage Pit and Grease Traps. Left, Cold Water Grease Trap; Right, Ash Barrel Grease Trap.

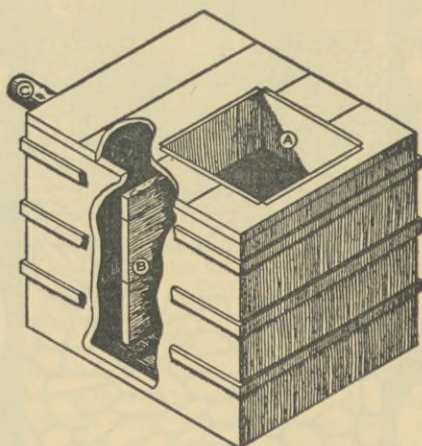


Plate 17. Baffle Grease Trap.

A—Strainer. B—Baffle. C—Outlet. D—Outlet Pipe. E—Space under baffle leading from the influent chamber to the effluent chamber.

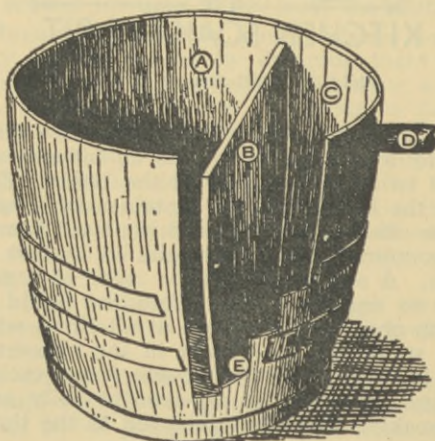


Plate 18. Baffle Grease Trap Made of a Half Barrel.

A—Influent chamber into which the greasy fluid is emptied. B—Baffle. C—Effluent chamber. D—Outlet pipe. E—Space under baffle leading from the influent chamber to the effluent chamber.

trenches are 1 foot wide, 1 foot deep where they leave the pit, sloping to a depth of 18 inches at the outer extremity. The central pit and the trenches are filled with rocks, broken bricks, or flattened tin cans. A pail with numerous small holes punched in the bottom and containing straw as filtering material is placed over the center of the pit as a grease trap. The soakage trench is used when the ground water table is so close to the surface that a soakage pit would be flooded, or where the condition of the ground makes the construction of a soakage pit impractical.

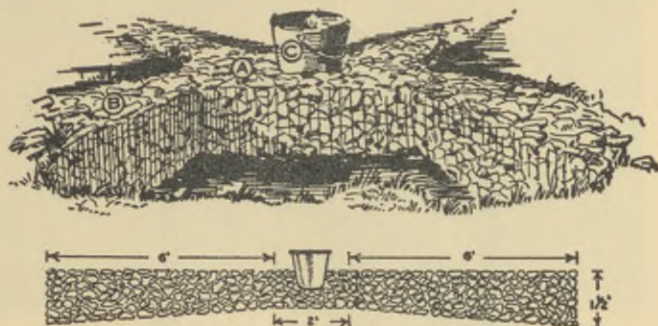


Plate 19. Soakage Trench.

A—Central square area. B—Radiating lateral trenches. C—Pail grease trap.

20. Operation of Soakage Pits and Trenches. In order for a soakage pit to function properly, the permeability of the soil must be such that the liquids are drained away so that there will be a rest period during which the pit contains little or no fluid. At times it may be desirable to have two pits using them on alternate days. All debris and as much grease as possible should be removed from liquid before it is allowed to flow into the pit or trench. If clogging tends to occur, a week's rest period each month may correct it.

SECTION IV

BUILDINGS AND STORAGE FACILITIES

21. Mess Buildings. Where mess buildings are provided they should be properly screened during the fly season. These buildings should be properly and adequately ventilated and lighted. Special attention should be given to floors as these, unless made of impervious material, will become grease soaked and unsightly.

22. Storage of Food. *a. General.* Food supplies should be protected from insects such as flies and roaches, from dust and dirt, and from rats and mice. Perishable foods should be stored at a temperature that will inhibit the growth of molds and disease organisms. Refrigeration at a temperature of 55° F. or less is desirable for meat and dairy products and for some vegetables and fruits. An important point in the storage of foods, particularly meat, is to avoid packing or hanging so closely that ventilation is impaired. Various devices may be improvised for the storage of food in temporary and semipermanent camps.

b. Storage in temporary camps. (1) In temporary camps food may be stored in water tight containers and immersed in springs or streams, care being taken to prevent contamination. Food may be buried below the surface of the ground where the temperature is lower, lining a pit with burlap, and placing boards on the bottom.

(2) A suspended food container consists of a screened box that permits free circulation of air but prevents contamination by insects. The cooling effect may be increased by wrapping the box in burlap which is kept damp. Fresh meat, bottled milk, and vegetables may be temporarily stored in such a container. It should not be used where there is much dust in the air.

(3) The underground ice box or cooling box is a simple device consisting of a double-walled box. It is constructed by placing a packing box within a large one, sunk into a pit in the ground so that the outer lid is slightly above the surface

of the ground. A space 3 to 6 inches wide, filled with sawdust, grass, hay, or straw, separates the outer walls and the two bottoms. Two lids are necessary, one for the inner and one for the outer box. A drainage ditch should be dug around the box and a drain pipe should lead through the bottom of the box to a

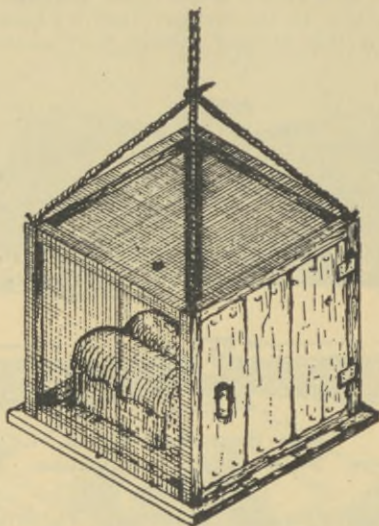


Plate 20. Suspended Food Container.

small soakage pit below. A box 4 feet long, 3 feet wide, and 3 feet deep, inside measurements, has sufficient capacity for the average company mess. If ice is available, an ice compartment should be constructed at the end containing the drain pipe. Also the box may be used above ground as an ice box. The cooling

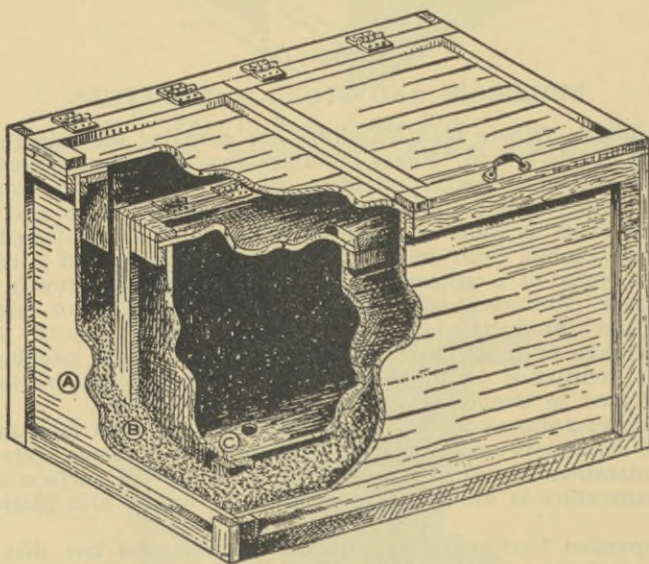


Plate 21. Underground Ice or Cooling Box.
A—Outer wall. B—Insulating material. C—Inner wall.

effect is increased by dampening the packing material between the walls or wetting down the earth around the box. To facilitate cleaning, the inner box should be easily removable. Meat, milk, vegetables, or other perishable foods may be stored in such an ice or cooling box.

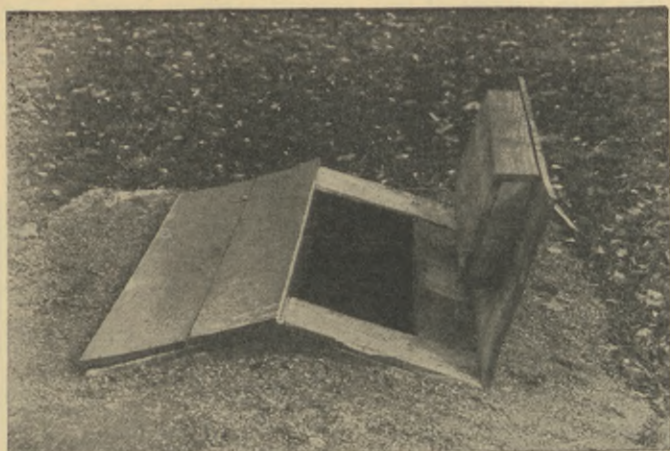


Plate 22. Underground Food Box.

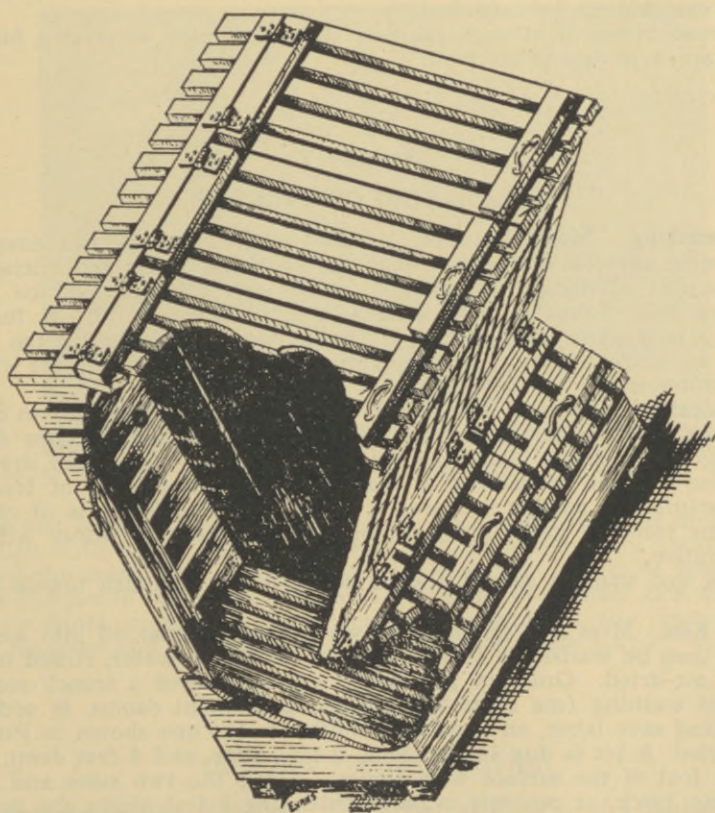


Plate 23. Vegetable Bin.

(4) In semipermanent camps, fresh or cured meats, milk, and vegetables may be kept in underground storage rooms constructed similar to an old-fashioned root cellar. The floor consists of well tamped earth or boards. The walls should be boarded. Ventilation is secured by windows at the ends of an outlet through the roof. Vegetables should be kept in vegetable bins. The bins are made of spaced

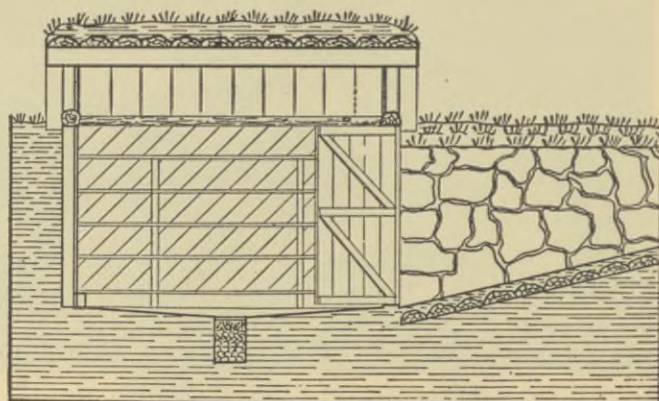


Plate 24. Underground Storeroom, Longitudinal Section.

slats to permit the circulation of air. The bottom should slope sufficiently to permit the older vegetables to be used first.

(5) Bread boxes or storage cabinets should be well ventilated but screened to prevent access of flies to the food.

SECTION V

CLEANSING OF UTENSILS

23. Dishwashing. More attention is now being given to the danger of the spread of communicable diseases through the media of dishes and kitchen utensils. In order to prevent danger of infection, dishes and utensils must be treated by heat or chemicals. Immersion in water at a temperature of 160° F. for 1 minute will destroy pathogenic organisms. If the temperature is lower the immersion time must be longer, until at a temperature of 140° to 145° F. the dishes must remain 30 minutes.

24. Chemical Disinfecting. Because of the difficulties encountered in disinfecting dishes by heat, certain chemicals have been found satisfactory. After dishes have been washed in hot soapy water and rinsed in hot clear water they are immersed in a chlorine solution containing at least 50 parts per million of free chlorine. When the solution is freshly prepared it should contain 200 parts of chlorine per million. One ounce of grade A hypochlorite to 25 gallons of water will give this strength solution.

25. Dishes and utensils should always be air-dried, and dish towels should not be used.

26. Mess Kits. Mess kits should have waste food scraped off into suitable container and then be washed in two changes of hot soapy water, rinsed in hot clear water, and air-dried. Ordinary galvanized iron cans over a trench may be used for mess kit washing (see Plate 25). In semipermanent camps, in order to conserve fuel and save labor, an apparatus similar to the one shown in Plate 26 may be constructed. A pit is dug 11 feet long, 2 feet wide, and 4 feet deep; it is filled to within 1 foot of the surface with stones. Along the two sides and one end a wall of stone, brick, or concrete is built, extending 2 feet above the ground level and forming a firebox. The water containers are made from 50-gallon oil drums, cut along the longitudinal axis, 4 inches above the center line. Drums with bungs should be used and so cut that the bungs will be at the most dependent part of the drum when it is placed on the firebox. Pieces of iron pipe of sufficient length

to extend above the water level are threaded at one end to fit the bung hole and drilled at the other end to receive an iron rod used to turn them in or out. After the drums are placed on the firebox, the space between the drums and walls, and between the ends of each drum, is filled with clay. A stack is placed at the

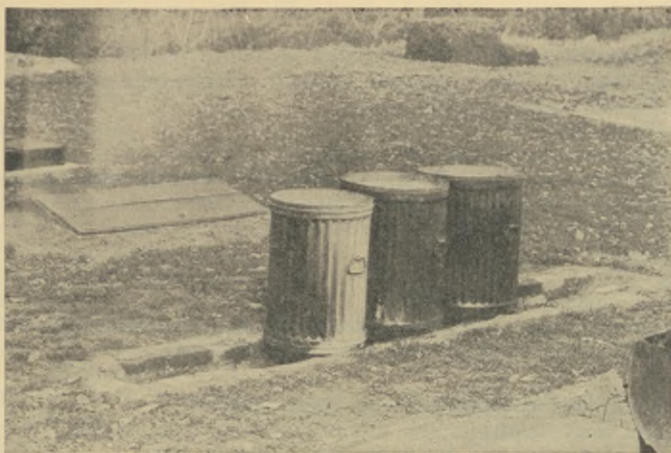


Plate 25. Fire Trench and Cans for Washing Mess Kits.

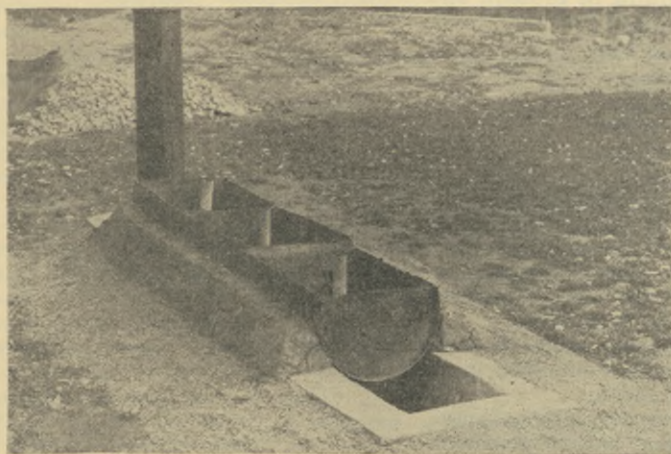


Plate 26. Appliance for Washing Mess Kits for Use in Semipermanent Camps.

closed end just beyond the last drum and the open space between drum and stack is also filled with clay. This device will require a relatively small amount of fuel to boil the water, and the draft will be such that it will be found desirable to place a damper in the stack. The men can wash their mess kits without being bothered by flame or smoke. When washing is completed, the pipes in the bung holes are removed and the water escapes into the soakage pit.

SECTION VI

OUTLINE FOR INSPECTION

27. Sanitary Inspection of Messes. The principal purpose of a sanitary inspection of a mess is to determine the existence and nature of any defects which would result in contamination of the food and the transmission of disease-producing organisms to the troops, or which would impair the nutritive value or lessen the acceptability of the food as served to the troops. Sanitary inspections are usually

made by medical officers, but it is advisable for the organization mess officer to use this outline as a check-sheet.

28. Outline For Sanitary Inspection of Mess. The following outline may be followed in making a complete sanitary inspection of a mess. It is suggested as a guide only:

a. Attendants:

Is mess sergeant qualified for position as to:

Knowledge of food requirements and preparation of food?

Ability to maintain discipline?

Business ability?

Are cooks adequately trained? How?

Have food handlers all had "food handlers'" examination and been certified as to health condition by the surgeon?

Are food handlers cleanly as to:

Clothing?

Hair?

Hands (inspect fingernails)?

Personal habits? Care in washing hands after urination and defecation.

Is there a convenient washroom for food handlers?

b. Menus:

Does food served correspond with menu posted?

Are menus well balanced and amount of food adequate?

Check file of menus and mess account balance sheet.

Note: Daily food supplied each man should yield at least 3000 calories, provide at least 100 grams of protein, and contain adequate vitamins.

c. Food supplies:

Meat and fish:

Source.

Quality.

Freshness.

Handling.

Storage.

Preparation.

Milk and dairy products:

Same consideration as meat.

Has bacteriological and chemical analysis been made?

Is milk raw or pasteurized?

Fruit and vegetables:

Is supply adequate and satisfactory?

Are men educated to their use?

Canned foods:

Is supply satisfactory?

Bread and bakery products:

Source.

Quality.

Delivery method.

Storage.

d. Food storages:

Refrigerator:

Is space adequate?

Condition and sufficiency.

Cleanliness.

Disposal of drip water.

e. Pantries:

General neatness, cleanliness, and adequacy of storage facilities.

Vegetable storage:

Have vegetable bins been provided?

Condition of vegetables in storage.

Do facilities for storage guard against undue wastage by rotting?

f. Bread boxes:

Sufficiency, cleanliness, and neatness.

g. Food preparation and serving:

Refer to cooks' training.

Is food served in a reasonably attractive manner?

Could you eat and enjoy the meals served and as served to the men in your organizations? If not, what corrections are advisable?

h. Police:

Dishwashing:

Does the method meet the requirements of Army Regulations?

Are trays, dishes, and utensils clean? Look between fork tines and around hilt of knife.

Kitchen utensils:

Are pots and pans kept grease free?

Are they properly stored when not in use?

Are knives and forks clean? Look around handles and hilts.

Is there a knife rack and a knife sharpener?

Are stoves kept clean?

Is fuel supply adequate?

Kitchen police:

Cleanliness of floors, walls, and ceilings.

Are dirty rags allowed to accumulate on ledges, top of bread box, top of refrigerator, etc.?

Are personal belongings of mess attendants allowed to accumulate in kitchen?

i. Waste disposal:

Is waste handled in a cleanly, satisfactory manner inside the kitchens and storerooms?

Is vegetable preparation and peeling carried out in a neat and satisfactory manner?

Is waste properly sorted and kept in proper receptacles?

Ashes.

Combustible trash and tin cans.

Edible garbage for piggery.

Nonedible garbage.

Are empty cans crushed and perforated before going to the trash can?

Has a trash and garbage stand been provided? Is it kept clean?

Is the surrounding area kept dry and free from soil pollution?

Is waste removed at reasonable intervals?

Are clean containers provided at reasonable intervals?

How and by whom are containers washed?

How are wastes disposed of:

Ashes to dump? Location of dump?

Combustible trash burned? Where?

Garbage incinerated? Or sold?

If garbage is sold, are terms of contract being met as to:

Frequency of collection?

Method of collection?

Cleanliness of cans?

j. Insects and rodents:

Is mess screened adequately?

Is there a supply of fly swatters or other fly destroyers? Are they used?

Have fly traps been provided and are they kept properly baited and set up for use?

Are roaches and other insects present? If so, what method is being used to control them?

Are rodents troublesome? What steps have been taken for their destruction?

SECTION VII

FLY CONTROL

29. General. *a. Importance.* Flies, especially the ordinary housefly, frequently transmit intestinal diseases. This transmission is accomplished in a mechanical manner. If the fly has access to human excreta it collects small amounts of excreta on its legs and body and in its digestive tract. If it later has access to food or eating utensils, some of the excreta is deposited on the food by defecation, regurgitation, and contact of food with the legs and body of the fly.

b. Development and characteristics. (1) A brief description of the development of the housefly and some of its characteristics are essential to the understanding of the control procedures recommended. In its development the fly passes through four stages—the egg, the larva, the pupa, and the adult. The eggs are oval, white, glistening bodies about 1/20 inch in length. They are deposited by the adult female in masses of 150-200 in warm, moist organic materials, preferably horse manure. The egg stage lasts about 12 hours, varying considerably with the temperature. The larvae (maggots) are cylindrical, whitish, segmented, wormlike creatures about 1/3 inch in length. They are very motile and feed upon the surrounding organic material, reaching maturity in 2 to 8 days. When mature the larvae migrate to a dry cool place and pupate. The larvae are quickly killed by a temperature of 115° F. The pupa is dark brown in color, has a hardened outer surface, and is about 1/4 inch in length. The stage lasts 2-8 days. The adult fly emerges from the pupal case and is ready to fly as soon as its wings harden. The female reaches sexual maturity and begins to deposit eggs in 3 to 20 days after emerging from the pupal case. Under favorable conditions the period from the egg to adult may be as short as 1 week.

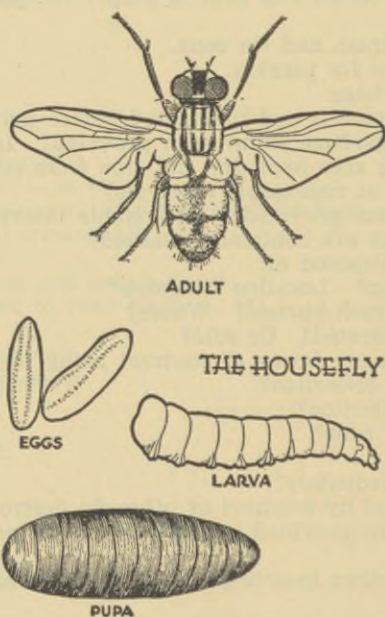


Plate 27. Housefly; Stages in Development.

Thus material in which the immature forms develop may produce flies if neglected for longer than 1 week.

(2) The characteristics of the fly which are important in its control include:

(a) Their breeding places of choice, which are horse manure, human excreta, and fermenting vegetable wastes.

(b) The necessity of moisture, warmth, and soluble food for the development of the larvae.

- (c) The fact that temperatures of 115° F. or above will kill the eggs and larvae.
- (d) The tendency of the larvae to migrate from the breeding material prior to pupation.
- (e) The ability of the larva and adult to crawl through loose manure or earth.
- (f) The attraction of adult flies to food by odor.
- (g) Their tendency to go toward light.
- (h) Their tendency to rest on vertical surfaces and hanging objects.
- (i) The optimum for breeding is 80-95° F.
- (j) The range of flight is 200-1000 yards.
- (k) The number is greatest in the late summer and early fall.
- (l) Continuous breeding may occur during the winter in heated buildings.

30. Control Measures. *a. General.* The control of flies depends upon a knowledge of the characteristics enumerated above and the necessary measures to render the customary breeding places unfavorable for breeding, to kill the larvae by use of larvicides, to kill the adult flies, to dispose of human excreta in such a manner that it will be inaccessible to flies, and to protect food from flies. Prevention of fly breeding is the most effective part of a fly control campaign. Constant vigilance is necessary.

b. Control of breeding places. The control of breeding places is essentially the problem of the proper disposal of horse manure, human excreta, and garbage. The disposal of horse manure in semipermanent camps may be accomplished by *composting*, which is the close packing of manure on a platform. In properly composted manure a temperature of 140-160° F. is reached at a depth of 1 foot below the surface; such a temperature will quickly kill the fly egg and larva. By the use of larvicides the fly larvae on the surface can be destroyed. Plates



Plate 28. Manure Compost Pile with Ditches for the Control of Migrating Larvae.

28 and 29 illustrate the proper construction of a compost platform. The compost pile should be located over 1000 yards from the camp and where it will not be an unsightly nuisance. A compost platform is constructed by leveling off an area of ground 50 feet long and 20 feet wide, digging a trench around the area 12 inches wide and 12 inches deep with vertical sides, and constructing a second trench, very shallow, not over 3 inches deep and 4 inches wide, located just within the edge of the platform.

The manure is placed on the platform as follows: Beginning at one corner, place the manure on an area 3½ feet long and 10 feet wide, piling it to a height of 4 to 5 feet, packing it down very tightly, and dressing the sides neatly. The sides must at all times be kept vertical. The second day's supply of manure is placed on the adjacent corner in a similar manner. On the third day the supply of manure is placed immediately adjacent to the first pile and on the fourth day, adjacent to the second pile, and on the fifth day the supply is piled on top of

the first pile. The manure is thus placed on the platform in the succeeding small sections as shown in the diagram. This is done for the purpose of confining the fly breeding to the smallest possible area. The manure should be kept moist so as to promote decomposition. The sides of the pile should be sprayed daily with a mixture of cresol, kerosene, and fuel oil. Crude oil or a light road oil is used in the trenches, the earth in the trench being kept visibly moist with oil. In the preparation of the platform all vegetation should be removed for a distance of 2 feet from the edges, the earth here tamped down firmly and oiled thoroughly; similarly, the earth beyond the trenches should be freed from vegetation, packed down, and oiled. The trenches are to be kept clean at all times. A platform this size should care for the manure of 100 animals for 2 months.

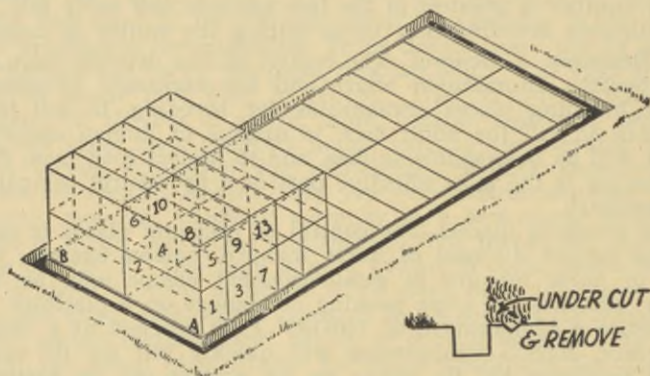


Plate 29. Compost Pile. Scheme for Placing Manure on Pile.
Numbered spaces each represent 1 day's accumulation of manure.

c. *Larvicides*. Larvicides are used chiefly in connection with compost piles and latrines. The following larvicides are effective in destroying fly larvae and are listed in order of efficiency:

- | | |
|----------------------|-----------|
| (1) Cresol | 2 parts. |
| Kerosene | 20 parts. |
| Fuel oil | 78 parts. |
| (2) Cresol | 2 parts. |
| Soap suds | 98 parts. |
| (3) Waste motor oil. | |
| (4) Crude oil. | |

The above larvicides have the disadvantage that they render the compost somewhat unsatisfactory as fertilizer. The following larvicide, while not rapid in action, is very efficient and has the added advantage that it does not render the compost unsatisfactory for fertilizer:

- | | |
|----------------------------------|-------------|
| Commercial sodium arsenite | 4 pounds |
| Molasses | 2 parts |
| Water | 50 gallons. |

d. *Destruction of adult flies*. (1) *Swatting*. Swatting is one of the essential methods of destruction of flies which have entered a screened building. It is, however, labor consuming.

(2) *Poisons*. Poisons are easy to use and effective. Formaldehyde and sodium salicylate are efficient fly poisons. The formulas for preparing them are:

- | | |
|---|------------|
| (a) Commercial formalin | 2 parts. |
| Milk or sweetened water or milk and 50 percent lime water | 98 parts. |
| (b) Sodium salicylate | 1 part. |
| Sweetened water (1 teaspoonful brown sugar to 1 pint water) | 100 parts. |

A satisfactory method of using poisons is to fill a drinking glass $\frac{3}{4}$ full of the solution, place over the top of the tumbler a circular piece of blotting paper, the diameter of which is 2 inches more than the diameter of the tumbler, and cover with an inverted saucer. The whole apparatus is then inverted and a match is

inserted under the edge of the glass. The liquids seep out, keeping the blotting paper moist.

(3) *Fly sprays.* Fly sprays are useful in mess halls, especially when applied to groups of flies on the wall. The standard quartermaster insecticide is satisfactory for this purpose. Another satisfactory spray may be made as follows: Soak 1 pound of crude pyrethrum powder in 1 gallon of kerosene for 2 or 3 days. Then pour off the fluid for use as a spray.

(4) *Flypaper and wire.* Flypaper and wire are very useful when hung from the ceiling of mess halls. Commercial types are of course easiest to use but satisfactory ones can be made. The mucilage on the wire or paper is prepared by heating (without boiling) together one part by weight of castor oil and two parts white rosin. The wire used consists of ordinary bailing wire, several 18- to 36-inch pieces being twisted together and coated with the mucilage by dipping the wire into the mucilage container. The flypaper consists essentially of narrow strips of paper, wrapping or glazed, 18 to 36 inches in length, each side of which is coated with fly mucilage. When they have become covered with flies the wires are wiped with a cloth to remove the flies and mucilage and are recoated. The used paper is burned.

31. Types of Traps. *a.* Fly traps vary in design and size but all consist of two main parts, the bait chamber and the trap chamber. The bait chamber is the lower and darker part of the trap into which the flies are enticed by the odor of the bait. The trap chamber is the upper part and is connected with the bait chamber by an aperture through which the flies crawl toward the light after having fed on the bait.

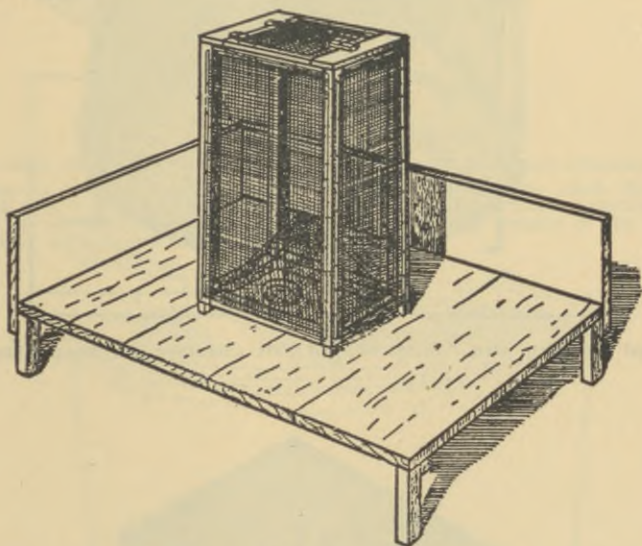


Plate 30. Square Fly Trap with Broad Windshield to Protect the Trap from the Wind.

(1) The *square trap* is from 12 to 18 inches square and 18 to 24 inches in height (see Plate 30).

(2) The *round trap* is similar to the square trap except as to shape. Nail keg hoops are valuable in the preparation of the framework.

(3) The *box trap* is made in the same manner as the square trap except that the sides are made of boards. The cone and lid are made of screening.

(4) The *triangular trap* should not be less than 12 inches high and 12 inches long and made as shown in Plate 33. If traps are less than 12 inches in length the solid ends exclude much of the light necessary to attract flies into the trap chamber.

b. Comparative effectiveness of square, round, triangular, and box traps. The square and round traps are more effective than the triangular trap, principally because the light enters the trap chamber from all sides. They are, however, more

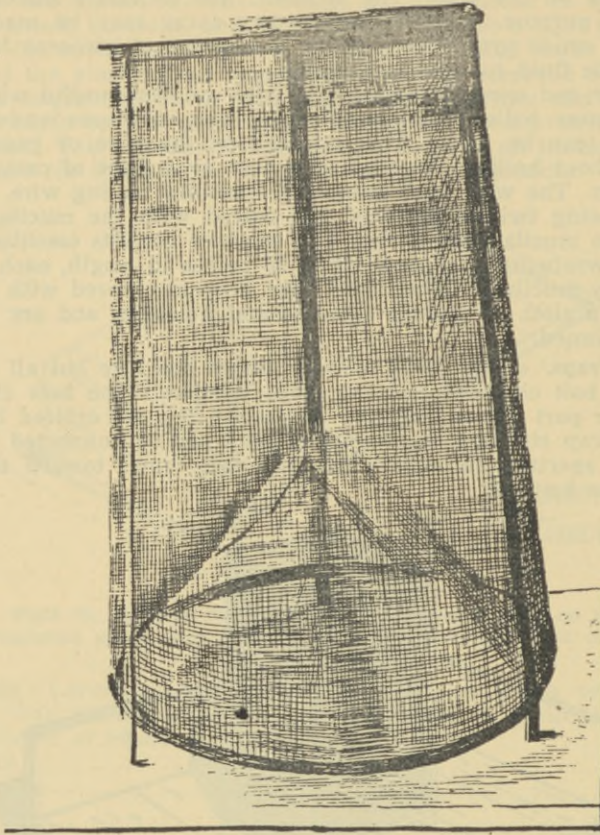


Plate 31. Round Fly Trap with Conical Shaped Bait Chamber and Removable Top or Lid.

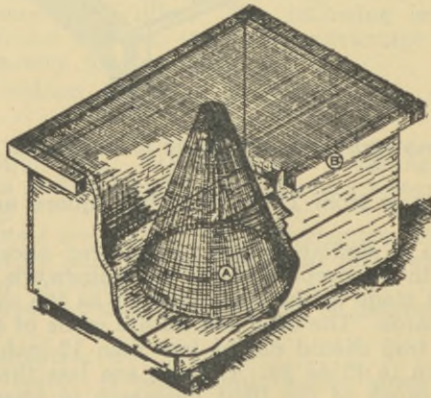


Plate 32. Fly Trap Constructed of Packing Box. Corner Cut Away to Show Method of Installing Cone.

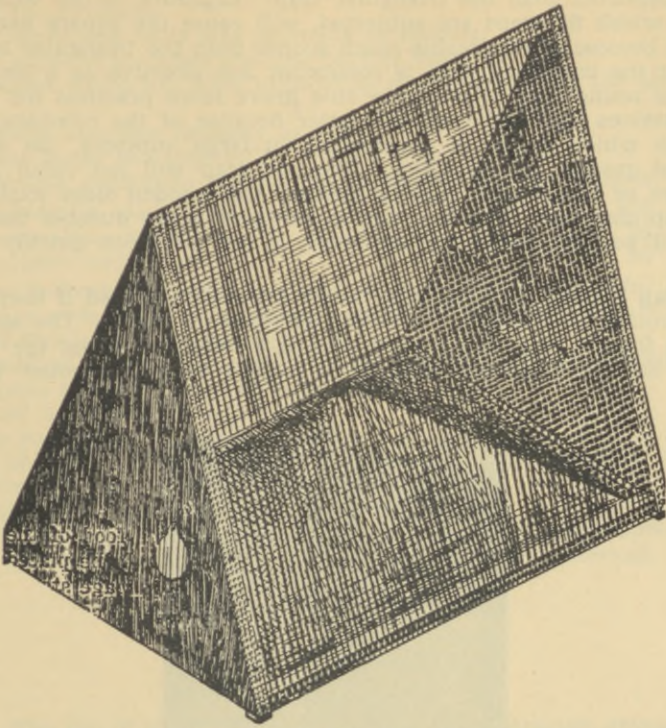


Plate 33. Triangular Fly Trap with Cone Shaped Bait Chamber.

Single opening at apex of cone leading into trap chamber. The small tin disk covers an opening through which flies may be removed from the trap chamber. Another type, probably more effective, uses an inside screen of the same shape as the outside of the trap, with small holes spaced about four inches apart.

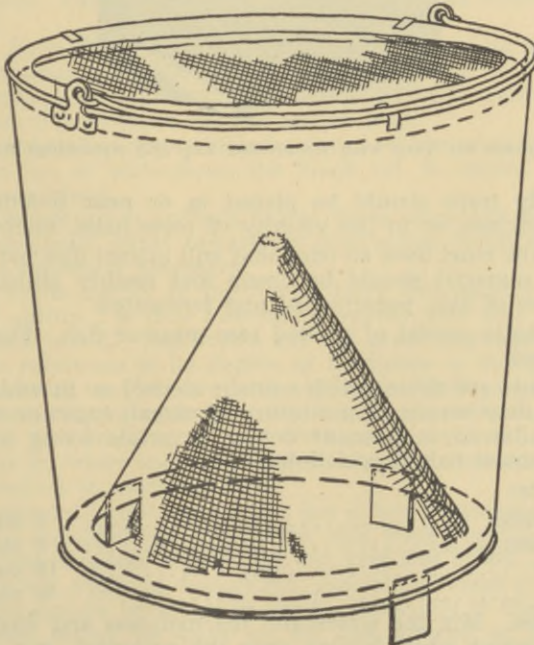


Plate 34. Fly Trap, Showing Method of Construction, Using Ordinary Metal Bucket.

difficult to construct than the triangular trap. Exposure to the weather, and the handling to which fly traps are subjected, will cause the square and round traps to warp and become unserviceable much sooner than the triangular traps. Despite the fact that the triangular trap is somewhat less effective as a single unit than the square or round trap, it will as a rule prove more practical for use in camps and large stations than either of the latter because of the comparative ease and rapidity with which it can be constructed in large numbers, the availability of material, and greater serviceability. The box trap will not catch as many flies as the square or round trap, largely because the wooden sides exclude the light from the trap chamber. The box trap is, however, more durable than any of the others and if packing boxes are available, it can be more quickly and cheaply constructed.

32. Fly Trap Stands. The efficiency of fly traps is increased if they are elevated above the ground on stands or on boxes, benches or tables. The stand affords a smooth base for the trap and a place to alight before entering the trap. It also protects the bait from dirt and may be so constructed as to protect trap from the wind.

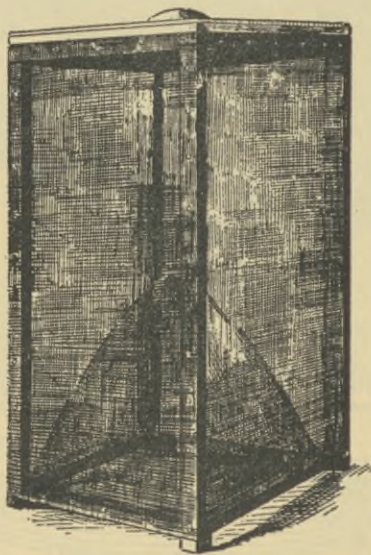


Plate 35. Square Fly Trap with Removable Top and Pyramidal Bait Chamber.

33. Location. Fly traps should be placed in or near breeding places such as manure piles or latrines, or in the vicinity of mess halls, kitchens, or dumps.

34. Fly Baits. Baits must have an odor that will attract flies but will not constitute a nuisance. The material should be cheap and readily obtainable. In general, there are two types of bait, *putrefactive* and *fermented*:

a. Putrefactive baits consist of spoiled raw meat or fish. Fish heads or canned salmon may be used.

b. Fermented baits are those which contain alcohol or in which alcohol is being formed. Usually, they consist of a mixture of cereal, sugar or molasses, yeast and water, which is allowed to ferment before or while being used as a bait. A formula for a cornmeal bait is as follows:

(1) Ingredients:

Cornmeal	8 ounces (by volume).
Molasses	5 ounces
Water	16 ounces
Yeast	$\frac{1}{2}$ cake

(2) *Preparation.* Mix the water and the molasses and heat to boiling. Pour the molasses and water while boiling over the cornmeal, stir, and allow to cool. Add the yeast and allow to stand exposed to the air for 3 or 4 days.

(3) Bran or cornstarch, or bran and cornstarch, may be substituted for the cornmeal if the latter is not available. Sirup made of water and sugar may be substituted for the molasses.

(4) Other fermented baits may be made as follows:

(a) Two parts of molasses and one part of vinegar.

(b) Molasses which has been allowed to stand exposed to the air for 3 or 4 days.

(c) Crushed, overripe bananas in milk.

(d) Brown sugar and sour milk.

Under comparable conditions various baits may be rated as follows:

Putrefying meat	100
Fermenting cornmeal	95
Molasses and vinegar	80

35. Care. The following directions should be followed in caring for fly traps:

a. Place bait in wide shallow containers so that volatile constituents are readily evaporated and flies have easy access to bait.

b. There should be at least 3 inches between edge of bait pan and edge of trap.

c. Two bait pans should be used in large traps.

d. Baits should be inspected once daily.

e. Solid baits such as meat or fish should not be allowed to become dry.

f. Bait pans should be kept filled to desired level and be cleaned and refilled when scum forms on surface.

g. All baits should be kept free from dirt and dust.

h. Empty traps whenever a sufficient number of flies accumulate so as to interfere with light, otherwise empty traps at about weekly intervals.

SECTION VIII

RAT CONTROL

36. General. The rat is probably the most expensive parasitic animal living at the expense of man. In addition to huge economic losses caused by rats these animals are causative factors in the spread of several diseases as follows:

a. *Bubonic plague.* Rat acts as reservoir and rat flea transmits the disease.

b. *Endemic typhus.* Same manner as plague.

c. *Infectious jaundice.* Rat contaminates food with excreta containing *leptospira-icterohaemorrhagiae*.

d. *Rat bite fever.* *Spirillum minus* transferred to man by bite of infected rat.

e. May harbor intestinal parasites, particularly tapeworms.

f. May transfer pathogenic organisms from feces to food mechanically.

g. Factors in spread of *trichinella spiralis* among hogs.

37. Classification. The genus *rattus* includes three species of sanitary importance: These are the brown rat, *R. norvegicus*, the black rat, *R. rattus*, and the roof or Egyptian rat, *R. alexandrinus*.

38. Habits. Rats are nocturnal animals but at times come out in the daylight. In order to make an intelligent effort toward its destruction some knowledge of the habits of the various species is necessary.

a. The brown rat keeps mainly to the lower floors and basements of buildings, as it lacks climbing ability. It is a burrowing animal and will burrow into the hardest soil to live and breed. The brown rat has great gnawing ability and will eat anything without reference to its degree of freshness or decay.

b. The black rat and the roof rat are both excellent climbers and live in hollow walls, garrets, or loose material such as boxes, barrels, or rubbish. These rats are cleanly in their habits and prefer grain and fresh, clean food.

c. All rats are great travelers and are found on ships, in boxcars, and at times go great distances themselves in search of food.

39. Control Procedures. Control procedures are either suppressive or destructive. Suppressive measures are designed to prevent rats from reaching a food supply and to deny them access to spaces where they can nest and breed. Destructive procedures include poisoning, trapping, fumigation, and employment of natural enemies.

40. Ratproofing. Temporary buildings in camps, especially if they are to be used as storehouses, should either be built up off the ground or ratproofed. Rat-

proofing consists in the use of concrete floors and walls of concrete or of brick and stone laid in cement mortar, with the occlusion of all openings with metal flashings, grating, or screening. See TM 8-255 (now published as Army Medical Bulletin No. 23) for methods of ratproofing buildings. Should buildings which are not ratproof be used to store food in, the food should be elevated or stored in containers which prevent rats from gaining access to the food.

41. Poisoning. a. Poisoning is an effective rat control measure where there are large numbers of rats but it will not kill all of the rats as many will soon learn not to touch the bait. The remainder may be killed or trapped.

b. One of the best poisons is red squill. This may be mixed with either canned salmon, ground fresh meat, or cooked cornmeal in the proportion of $\frac{1}{2}$ ounce of commercial red squill to 1 pound of the food base. It is well to mix the squill with several different food bases as some rats may prefer the meat or fish rather than the cereal, or the reverse may be true. Oven-dried rather than sun-dried squill should be used as it is much more effective.

c. Barium carbonate is another very good poison and it has similar advantages to squill in that it is relatively nonpoisonous to children, dogs, and cats. It is mixed the same way as squill.

b. Arsenious oxide, phosphorus, strychnine, and thallium are also used but have the disadvantage of being highly poisonous to all animals.

42. Bait Preparation. The consistency of bait should be such that it can be cut or shaped into small balls, cubes, or cakes. Balls or cakes should be about $\frac{1}{2}$ inch in diameter and should be well moistened rather than hard or dry. Bait should not be handled but mixed with a knife or spoon as the human odor may cause the rat to shun the bait. The baits are best wrapped in plain squares of paper, the corners being brought together and twisted into a torpedo-shaped package. The men who wrap the baits should wear rubber gloves and when the baits are placed, a pair of forceps should be used to handle them.

43. Bait Distribution. Baits are best distributed late in the afternoon so that they will be fresh when the rats start to search for food. The baits should be laid in places that are easily accessible to and frequented by rats. Generally the best results are obtained when the baits are placed along rat runways leading from rat harborages. These runways usually lie alongside of walls or other similar objects. The baits may be placed singly or in groups. Frequently, several kinds of bait may be used in one place as, for example, a ground meat bait together with a cereal bait. Single baits or groups of bait should be placed not more than 10 to 20 feet apart along runways or in areas frequented by rats in search of food.

44. Prebaiting. In order to accustom rats to eating the kind of food materials which will be used to carry the poison, unpoisoned baits which are exactly like those that are to be employed later, except that they contain no poison, may be distributed for several days prior to placing the poisoned baits. The uneaten baits should be collected daily and replaced with fresh material. When the unpoisoned baits are eaten freely by the rats, all those that remain uneaten should be collected and a comparatively large number of poisoned baits distributed. Frequently, this procedure will result in the destruction of a large proportion of the rat population.

45. Trapping. a. Trapping is an effective rat control measure, but requires greater skill and more labor than poisoning. A readily accessible food supply decreases the efficiency of trapping as a rat control measure.

b. Rats soon become suspicious of traps, particularly if the traps are unskillfully set, and will then consistently avoid them. Where many rats are present, a comparatively large number of traps should be set at the beginning of the campaign in order to destroy as many rats as possible before they learn to avoid the traps.

c. Trapping is a very practicable and efficient procedure for the control of rats in large warehouses or storerooms if it is persistently and systematically carried out. It also has the advantage that it can be constantly employed to destroy new arrivals where the continued exposure of poison would be undesirable.

46. Types of Traps. There are two general types of traps, snap (guillotine or spring) traps and cage traps. Rats soon become suspicious of cage traps so that the snap trap is to be preferred. The trap should be strong and durable and preferably made of steel.

47. Trap Baits. Baits may be fried bacon, fish, cheese, liver, fresh bread or doughnuts, cantaloupes, or tomatoes. Fried bacon, cheese, and doughnuts as a

rule prove the most attractive baits. If trapping is continuous the kind of bait should be changed frequently.

48. Trap Setting. Bait should be large and fastened to the trigger securely. It may be tied on with string or thread. Traps should be placed in locations normally frequented by rats. Where the trap is set along a runway, it should be set with trigger end against the wall. The trap may be disguised by covering it wholly or in part and prebaiting may be used at first by not setting spring of trap. The trigger should be so set that the slightest movement of the bait will spring the trap. All traps should be scalded or flamed at intervals to remove the odor derived from the hands. Traps may be deodorized by dipping in hot melted paraffin.

49. Fumigation. a. Hydrocyanic acid gas and sulphur dioxide are the gases commonly used for rat destruction. The difficulty in using these gases in the field is so great that they are of little value.

b. Rat burrows in dumps, around the exterior of buildings, or in other locations may be fumigated and the rats killed by carbon monoxide delivered through the exhaust pipe of an automobile. Where the burrows are accessible, a flexible pipe or a rubber hose is attached to the exhaust pipe and the other end is passed into the burrow. The carburetor should be adjusted for a rich mixture. In gassing the average burrow, the engine should be allowed to run at moderate speed for at least 10 minutes. The burrows and harborages treated in this manner should be made as airtight as possible by sealing the cracks and the openings of connecting burrows with earth.

c. Carbon disulphide on balls of cotton or waste may be plugged in rat burrows. This is more effective in damp weather and when ground is damp.

50. Surveys, General. Rat surveys are conducted to determine the presence of rats infected with plague or to delimit the areas harboring infected rats. Surveys may also be made for the purpose of estimating the degree of rat infestation in a building or area with a view to deciding upon the control measures to be employed.

51. Survey to Determine Presence of Plague Infected Rats. a. If a rat survey is made for the purpose of determining if plague infected rats are present, the suspected area is trapped in order to obtain specimens which will represent a cross section of the rat population. The rats thus secured are sent at once to a laboratory for examination for evidence of plague infection. Usually, trapping should be continued until an infected rat is found or, if the area is within a town or thickly populated section, until from 30 to 50 rats have been examined for every 100 persons living in the area.

b. If an infected rat is captured, it is a strong indication that a number of other plague rats are present in the locality. The point where the infected rat was captured is considered as a center of infection. The trapping activities are extended to gradually increasing distances from this center until infected rats are no longer found and the circumference of the infected area is determined. The area thus mapped out may be subjected to intensive rat eradication measures which progress from the circumference inward toward the center.

52. Survey to Determine Degree of Rat Infestation. Prior to instituting an antirrat campaign in a military station or camp, a survey should be made to determine the extent of the rat infestation and should include the following factors:

- a. The location of burrows and harborages.
- b. The kinds of food materials available to rats.
- c. To what extent the food materials that are accessible to rats can be rendered inaccessible.
- d. The kind of control measures that will probably be the most successful under local conditions.

As the rat instinctively seeks concealment, the degree to which a given building or area is infested must be determined by signs of the activities of rats rather than by the number that are to be seen. These signs consist of damaged food, the presence of rat runways as evidenced by tracks and marks of dragging tails in the dust, or by greasy appearing, discolored marks on woodwork made by the feet and tails of the rats, burrows and harborages, freshly gnawed wood, or rat excreta.

53. Organization of Antirrat Campaigns. The results of a rat survey of a station or camp will indicate the kinds of control measures that should be instituted. These

necessarily will vary according to the conditions but, given average conditions with moderate rat infestation, successful control can usually be established and maintained by reducing the food supply to a minimum and by ratproofing to eliminate harborages, followed by an intensive poisoning campaign with persistent and systematic trapping thereafter. Slight infestation may be controlled by protection of food materials and by poisoning. In any event, a definite and predetermined plan of action, trained personnel, and constant supervision are necessary for success.

SECTION IX

WATER STERILIZATION

54. Water-Sterilizing Bag (Lyster Bag). The water-sterilizing bag is made of heavy canvas or rubberized cloth and has a capacity of 36 gallons. These bags are issued to all organizations at the rate of one for each 100 men or fraction thereof. The water-sterilizing bag is used primarily for the *distribution* of water previously disinfected by a water-purification unit or otherwise. Water can be purified in a water-sterilizing bag only by chlorination, and owing to the difficulty of chlorinating small quantities of water having a varying organic content, it is used for the



Plate 36. Water-Sterilizing Bag Suspended from Tripod.

disinfection of water only when no other facilities for obtaining purified water are available. The purification of water in the sterilizing bag is essentially an emergency measure. The proper disinfection of water is essential in preventing disease among troops operating in the field. Where the water-sterilizing bag must be used for this purpose, the chlorination of the water should be under the direct supervision of Medical Department personnel. Ordinarily, however, as the disinfection of the water is a function of the company concerned, the actual work of chlorination is delegated, ultimately, to the personnel of the company kitchen. Consequently, the chlorination of the water supply for the unit concerned is frequently left to the kitchen police who, as a rule, are untrained in the technique of water chlorination. As a result, the water may be underchlorinated and therefore contaminated, or overchlorinated to a degree which renders it nonpotable.

55. Technique For Sterilizing Water in Water-Sterilizing Bag. The water should be as clear as possible. Clarification may be aided by allowing the water to settle in a barrel or galvanized can and then decanting or straining. The steps then used are as follows:

- a. Fill the bag to the 36-gallon mark, or if this mark is not present, to within 4 inches of the top.
- b. Draw a small quantity of water through one of the faucets into a canteen cup.
- c. Break an ampule of the calcium hypochlorite into the water in the cup and

with a clean stick rub it into a thin paste containing no visible lumps. Then add sufficient water to fill the cup two-thirds full.

d. Empty the solution of calcium hypochlorite in the cup into the water in the bag and stir thoroughly with a clean stick which is long enough to reach the bottom of the bag. Then flush out each of the faucets.

e. After the calcium hypochlorite has been in contact with the water in the bag for at least 10 minutes, wash out the faucets by allowing a small amount of water to run through it onto the ground. Then fill a clean cup about two thirds full of water from one of the faucets.

f. Add one cc (approximately 15 drops) of the orthotolidine solution to the water in the cup and allow it to stand for about 5 minutes so that the color will develop. Because of the reflected light, the color of the water in the cup is more intense than it would be if the same water were placed in a glass tube. A well-marked yellow color indicates that the water contains about the proper amount of residual chlorine. An orange color is evidence of overchlorination.

g. If no residual chlorine is present at the end of the 10 minute contact period, the chlorination procedure, as outlined above, is repeated. Where it is suspected that the calcium hypochlorite is inert, a preliminary test with orthotolidine should be made immediately after the addition of the calcium hypochlorite solution to determine if the water contains any free chlorine at that time.

h. As a factor of safety, the water should be allowed to stand for 20 minutes after the end of the contact period, or for 30 minutes after the addition of the calcium hypochlorite, before being used for drinking purposes.

i. The calcium hypochlorite now furnished is the kind known as "Grade A" hypo., and contains about 70 per cent available chlorine. This is the equivalent of 2.5 parts per million free chlorine when added to a bagful of water. The organic matter in most water supplies in the field will utilize a great deal of this free chlorine so that the residual chlorine will be reduced to 0.5 to 2 parts per million. If there is little or no organic matter present only a fractional part of the tube of hypochlorite should be used. When there is any doubt as to the purity of water furnished a unit it should be chlorinated.

56. Other Emergency Measures. If water sterilizing bags are not available, the water may be sterilized in the unit water cans, clean, galvanized iron cans, pails, or barrels. A proportional amount of calcium hypochlorite is used and the method of chlorination is the same as with the water sterilizing bag.

APPENDIX I

ISSUING TABLE OF PROVISIONS PER MAN PER MEAL

CRACKERS:

Oysters for table	1/3	lb.
Breading	1/20	"
Soda for table	1/16	"

BREAD FRESH:

Fresh for table	1/3	lb.
Pudding	1/6	"
French toast	1/4	"
Dressing	1/6	"
Breading	1/16	"
Croutons	1/8	"
Hamburger	1/16	"
Plain toast	1/4	"

FLOUR:

Bread for table	1/4	lb.
Cakes plain	1/10	"
Pie	1/10	"
Rolls	1/4	"
Baking powder biscuit	1/6	"
Hot cakes	1/6	"
Thickening	1/30	"
Dumplings	1/8	"
Fritters	1/6	"
Doughnuts	1/6	"
Turnovers	1/10	"
Custard pie	1/20	"
Sea pie	1/8	"
Plum duff	1/12	"
Cottage pudding	1/8	"
Batter	1/20	"
Yorkshire pudding	1/8	"
Roux	1/20	"
Buckwheat for hot cakes	1/8	"
Cornmeal for mush	1/8	"
Cornmeal for corn bread	1/16	"
Cornmeal for corn cakes	1/16	"
Cornmeal, fried	1/8	"
Cornmeal for breading	1/40	"
Crullers	1/8	"
Coffee cakes	1/4	"
Corn bread	1/10	"
Jelly roll	1/15	"
Cookies	1/60	"
Gravy	1/50	"

BACON TINNED:

Fried straight	1/3	lb.
With liver	1/10	"
For chowder	1/50	"
Fried with eggs	1/7	"
Boiled	1/4	"
With baked fish	1/50	"
For beans	1/20	"
Potato salad	1/8	"

CHIPPED BEEF:

On toast	1/10	lb.
----------	------	-----

CODFISH TINNED:

Creamed	1/5	lb.
Hash	1/8	"
Chowder	1/16	"
Cakes	1/8	"
Salad	1/16	"
Cakes breaded	1/4	"

SALMON:

Croquettes	1/8	lb.
Cold	1/3	"
Salad	1/6	"
Hash	1/8	"
Baked	1/8	"
Loaf	1/4	"
Escalloped	1/4	"
Creamed	1/4	"

SARDINES:

On toast	1/4	lb.
Salad	1/8	"

VIENNA SAUSAGE:

Chopped	1/3	lb.
Plain	1/3	"
Fried	1/3	"
Sandwiches	1/16	"

LUNCHEON MEAT:

Fried	1/4	lb.
Cold	1/5	"
Fried with eggs	1/8	"
Omelet	1/16	"
Sandwiches	1/8	"

CORNED BEEF FRESH:

Boiled	1/5	lb.
Hash	1/4	"

CORNED BEEF TINNED:

For hash	1/8	lb.
Cold sliced	1/6	lb.
Mulligan	1/4	"
Omelet	1/12	"
Minced meat	1/8	"
Sandwiches	1/12	"
Cold	3/4	"
Meat cakes	1/4	"

BACON SMOKED:

Boiled	1/3	lb.
Fried straight	1/4	"
Fried with eggs	1/8	"

HAM SUGAR CURED:

Boiled	3/5	lb.
Fried	3/4	"
Baked	3/5	"
Omelet	1/15	"

SHOULDER SUGAR CURED:

Boiled	2/3	lb.
--------	-----	-----

FRANKFURTERS:

Steamed	1/3	lb.
Chopped	1/3	"
Griddled	1/3	"

BOLOGNA:

Fried	1/2	lb.
Cold	1/7	"
Omelet	1/16	"
Hash	1/8	"

TONGUE SMOKED:

Cold	1/4	lb.
Boiled	1/4	"

BEEF FRESH:

Minced	1/3	lb.
Boiled	3/4	"
Chili	1/8	"
Chop suey	2/5	"
Pot roast	2/3	"
A-La-Mode	3/4	"
Steak	3/4	"
Stew	1/3	"
Croquettes	1/3	"
Goulash	1/3	"
Pot pie	1/3	"
Hamburger	1/3	"
Curry	1/2	"
Breaded strips	1/2	"
Loaf	1/3	"
Roast	2/5	"
Railroad hash	1/3	"
Braised	2/3	"
Hash	1/4	"
Creamed on toast	1/3	"
Cold roast	1/2	"

SALT PORK:

Lean boiled	1/2	lb.
Chowder	1/50	"
For beans	1/25	"

SALT MACKEREL:

Broiled	1/2	lb.
Boiled	1/2	"
Fried	1/2	"

MUTTON FRESH:

Roast	2/3	lb.
Stew	1/2	"
Chops	3/4	"
Fricassee	1/2	"
Boiled	3/5	"
Sea Pie	1/3	"
Curry	1/4	"

PORK LOINS:

Roast	3/4	lb.
Chops plain	3/5	"
Chop suey	1/3	"
Pork pie	1/3	"
Boiled	3/5	"
Chops breaded	1/2	"

PORK SAUSAGE:

Fried	1/2	lb.
Boiled	2/5	"
Cakes	1/2	"

VEAL FRESH:

Roast	2/3	lb.
Stew	3/8	"
Cutlets breaded	3/4	"
Fricassee	1/2	"
Loaf	1/3	"
Croquettes	1/3	"
Salad	1/3	"

LIVER:

Fried	3/8	lb.
-------------	-----	-----

HAMBURGER:

Loaf	1/4	lb.
Cakes	1/4	"
Minced meat	1/6	"
Stuffed peppers	1/6	"

CHICKEN OR FOWL:

Roast	4/5	lb.
Fried	3/4	"
Fricassee	3/4	"
Salad with potatoes	1/2	"
Salad with celery	1/2	"
Stew	2/5	"
Croquettes	3/5	"
Chop suey	2/5	"

FISH FRESH:

Boiled	1/3	"
Baked	2/3	"
Cakes	1/8	"
Chowder	1/16	"

EGGS FRESH:

Fried	1/6	doz.
Boiled	1/6	"
Scrambled	1/6	"
Hot cakes	1/120	"
Mayonnaise dressing	1/150	"
Batter	1/120	"
Plain omelette	1/6	"
Dumplings	1/200	"
Ham omelette	1/8	"
Cakes	1/50	"
French toast	1/100	"
Cookies	1/150	"
Pumpkin pie	1/60	"
Custard pie	1/30	"
Corn bread	1/15	"
Hamburger	1/100	"
Puddings	1/100	"
Fritters	1/120	"
Croquettes	1/100	"

BEANS NAVY:

Baked	1/29	gal.
Soup	1/80	"
Boiled	1/25	"

BEANS LIMA:

Baked	1/35 gal.
Boiled	1/50 "

BEANS KIDNEY:

Chili	1/60 gal.
Boiled	1/30 "
Baked	1/29 "

PEAS SPLIT:

Soup	1/80 gal.
------	-----------

TURKEY:

Roast	3/4 lb.
Salad	1/3 "

STRING BEANS TINNED:

Pickles	1/3 lb.
Boiled	1/4 "
Salad	1/8 "

CORN TINNED:

Stewed	1/3 lb.
Pudding	1/4 "
Fritters	1/16 "
Chowder	1/16 "
Succotash	1/8 "

PEAS TINNED:

Creamed	1/4 lb.
Soup	1/6 "
With carrots	1/8 "

SPINACH TINNED:

Boiled	1/3 lb.
--------	---------

TOMATOES TINNED:

Stewed	1/4 lb.
Soup	1/8 "
Soups	1/40 "
Beans	1/20 "
Gravy	1/45 "
Pot roast	1/40 "
Stew	1/20 "
Sauce	1/10 "
Chop suey	1/20 "
Spanish rice	1/8 "
Macaroni	1/8 "
Cold	1/4 "
Chili Concarni	1/20 "
Mashed	1/4 "

BEETS TINNED:

Pickled	1/6 lb.
Salad	1/20 "

TURNIPS FRESH:

Mashed	2/5 lb.
For stew	1/20 "
Mashed with potatoes	1/4 "
Boiled	1/3 "
New England Dinner	1/5 "
Pot Roast	1/20 "
Vegetable Soup	1/50 "

ASPARAGUS TINNED:

On toast	1/4 lb.
Creamed	1/4 "

LIMA BEANS TINNED:

Boiled	1/4 lb.
Salad	1/8 "
Succotash	1/8 "

TOMATOES FRESH:

Sliced	1/3 lb.
Salad	1/6 "

BEETS FRESH:

Pickled	1/4 lb.
Salad	1/10 "

ONIONS GREEN FRESH:

Plain	1/5 lb.
Salad	1/20 "

SQUASH FRESH:

Creamed	1/2 lb.
Stewed	2/3 "
For pie	1/2 "
Baked	3/5 "

PUMPKIN FRESH:

Creamed	1/2 lb.
Stewed	2/3 "
For pie	1/2 "
Baked	3/5 "

STRING BEANS FRESH:

Boiled	2/3 lb.
Salad	2/5 "

PEAS IN POD:

Creamed	3/5 lb.
Stewed	3/4 "

CORN ON COB:

Plain	3/4 lb.
-------	---------

SPINACH FRESH:

Boiled	4/5 lb.
--------	---------

CAULIFLOWER:

Creamed	4/5 lb.
Au Gratin	4/5 "

LETTUCE:

Sugared	1/5 lb.
With Salad	1/15 "

CARROTS FRESH:

Stew	1/20 lb.
Creamed	1/4 "
Pot roast	1/20 "
With peas	1/8 "
For soups	1/50 "

RADISHES:

Plain	1/6 lb.
Salad	1/20 "

RHUBARB FRESH:

For pie	1/4 lb.
Sauce	1/4 "

PARSNIPS FRESH:

Fried	1/2 lb.
Creamed	1/3 "
Baked	1/2 "

EGG PLANT:

Fried	1/5	lb.
Baked stuffed	1/3	"

PEPPERS RED AND GREEN:

Chili	1/20	lb.
Stuffed	1/6	"
Spanish sauce	1/50	"
Chop suey	1/100	"
Salad	1/20	"
Seasoning agent	1/100	"

ASPARAGUS FRESH:

Creamed	1/3	lb.
---------------	-----	-----

PARSLEY:

For garnishing	1/100	lb.
----------------------	-------	-----

POTATOES IRISH:

Mashed	3/5	lb.
Boiled peeled	1/2	"
With jackets	2/5	"
German fried	3/4	"
French fried	3/4	"
Stew	1/2	"
Salad	2/5	"
Baked peeled	3/5	"
Lyonnaise	1/2	"
Escaloped	1/2	"
Baked with jackets	1/2	"
Au gratin	3/5	"
For hash	3/5	"
Croquettes	1/2	"
Hash brown	2/3	"
Creamed	1/2	"
For soup	3/20	"
Chowder	1/10	"
Potato cakes	3/5	"
Fish cakes	1/2	"
Stuffed baked	2/3	"
Railroad hash	1/2	"
For yeast	1/200	"

CUCUMBERS:

For salad	1/7	lb.
Plain	2/5	"

CELERY:

Chop suey	1/15	lb.
Plain	1/4	"
For salad	1/3	"
For soup	1/30	"
Creamed	1/30	"

POTATOES SWEET:

Boiled	3/5	lb.
Candied	4/5	"
Pie	1/5	"
Fried	3/4	"
Baked	3/4	"

ONIONS FRESH:

Fried	3/5	lb.
Dressing	1/20	"
Boiled	2/5	"
Creamed	2/5	"

Chop suey	1/5	lb.
Soups	1/25	"
Salad	1/15	"
Hash	1/20	"
Stew	1/20	"
Hamburger	1/30	"
Chowder	1/25	"
Pot roast	1/50	"
Gravies	1/50	"
Spanish Omelet	1/40	"
Lyonnaise Potatoes	1/20	"

CABBAGE FRESH:

Boiled	2/3	lb.
Cole slaw	1/3	"
Hot slaw	3/5	"
Chop suey	1/4	"
Vegetable soup	1/20	"
Fried cabbage	2/3	"
Creamed	3/5	"
New England style	1/2	"

RICE:

Steamed	1/8	lb.
Croquettes	1/6	"
Pudding	1/10	"
Cakes	1/10	"
Soup	1/50	"
As cereal	1/8	"
Spanish style	1/10	"

ROLLED OATS:

For cereal	1/10	lb.
------------------	------	-----

TAPIOCA:

Plain pudding	1/10	lb.
Fruit pudding	1/15	"

APPLES DRIED:

Sauce	1/10	lb.
Pie	1/7	"
Dumplings	1/8	"
Pudding	1/20	"
Apple cakes	1/20	"
Plum duff	1/50	"
Turnovers	1/10	"

CITRON:

Fruit cake	1/13	lb.
Plum duff	1/13	"
Plain cake	1/50	"

CURRANTS:

Pudding	1/100	lb.
Pie	1/5	"
Currant cake	1/50	"
Plum duff	1/20	"
Cinnamon buns	1/15	"
Fruit cake	1/20	"

COCONUT:

Pie	1/10	lb.
Cake	1/50	"
Fruit pudding	1/50	"

PEACHES DRIED:

Pie1/7 lb.

CORN STARCH:

Pudding1/30 lb.

Puddings1/200 "

Tomato sauce1/200 "

BARLEY:

For soup1/50 lb.

HOMINY GRITS:

As cereal1/10 lb.

Fried1/8 "

Plum duff1/30 "

Turnovers1/5 "

Fruit Salad1/25 "

Fritters1/10 "

APRICOTS TINNED:

Plain2/5 lb.

Pie1/3 "

Turnovers1/6 "

Fruit salad1/30 "

Puddings1/6 "

Short Cake1/12 "

PEACHES TINNED:

Plain1/2 lb.

Pie2/5 "

Turnovers1/4 "

Salad1/7 "

Puddings1/6 "

Short cakes1/12 "

PEARS TINNED:

Plain1/2 lb.

Pie2/5 "

Turnovers1/4 "

PINEAPPLE TINNED:

Plain2/5 lb.

Pudding1/20 "

Pie2/5 "

Cake1/7 "

Salad1/8 "

PRUNES:

Plain1/5 lb.

Pie1/4 "

Turnovers1/10 "

Stewed1/8 "

Cake1/20 "

RAISINS:

Pie1/15 lb.

Plain cake1/50 "

Fruit cake1/40 "

Bread pudding1/50 "

Raisin pudding1/10 "

Plum duff1/30 "

Bread1/50 "

APPLES TINNED:

Pie1/6 lb.

Apple cake1/5 "

Sauce1/7 "

Puddings1/12 "

Dumplings1/5 "

CHERRIES:

Plain1/3 lb.

Pie1/5 "

GRAPES:

Plain1/3 lb.

STRAWBERRIES:

Cake1/4 lb.

Plain1/3 "

BLACKBERRIES:

Plain1/4 lb.

Pie1/5 "

BLUEBERRIES:

Plain1/4 lb.

Pie1/5 "

HUCKLEBERRIES:

Plain1/4 lb.

Pie1/5 "

RASPBERRIES:

Plain1/3 lb.

Pie1/5 "

CRANBERRIES:

Sauce1/7 lb.

Pie1/5 "

Turnovers1/6 "

JAMS:

Plain1/6 lb.

Turnovers1/20 "

Cakes1/20 "

APPLE BUTTER:

Plain1/20 lb.

MINCEMEAT:

Pie1/10 lb.

Plum duff1/30 "

Turnovers1/20 "

PEACHES FRESH:

Plain1/2 lb.

PEARS FRESH:

Plain1/2 lb.

Baked1/3 "

Apple cake1/100 "

Fritters1/10 "

BANANAS:

Plain1/3 lb.

Cake1/8 "

Salad1/16 "

Pie1/16 "

LEMONS:

For iced tea	1/70	lb.
Lemonade	1/13	"
Pie	1/20	"

ORANGES:

Plain	3/7	lb.
Fruit salad	1/16	"

COFFEE:

Plain	1/30	lb.
Early morning	1/60	"

COCOA:

Plain	1/25	lb.
Pudding	1/200	"
Pie	1/75	"
Chocolate cake	1/100	"
Layer cake	1/150	"

TEA:

Plain	1/100	lb.
Iced tea	1/160	"

WATERMELON:

Plain	5/4	lb.
-------------	-----	-----

CANTALOUPE:

Plain	3/4	lb.
-------------	-----	-----

PLUMS:

Plain	1/3	lb.
-------------	-----	-----

GRAPEFRUIT:

Plain	2/3	lb.
-------------	-----	-----

PINEAPPLE FRESH:

Plain	1/2	lb.
For fritters	1/2	"

APPLES FRESH:

Plain	1/3	lb.
Pie	1/4	"
Salad	1/15	"
Sauce	1/3	"
Dumplings	1/3	"

MILK FRESH:

For cereal	1/16	gal.
Oyster stew	1/35	"

CATSUP:

Plain	1/100	"
-------------	-------	---

BUTTER:

For cakes	1/75	lb.
For table	1/60	"

CHEESE:

Table	1/8	lb.
Macaroni	1/75	"
Au Gratin	1/75	"

BAKING POWDER:

Cake	1/150	lb.
Biscuits	1/75	"
Hot cakes	1/50	"
Corn bread	1/75	"
Dumplings	1/75	"

MACARONI:

Baked	1/15	lb.
-------------	------	-----

VERMICELLI:

For soup	1/50	lb.
----------------	------	-----

MILK EVAPORATED:

Coffee	1/50	lb.
Pudding	1/100	"
Cocoa	1/125	"
Cake	1/50	"
Soup	1/80	"
Ice cream	1/4	"
Cereals	1/10	"
Oysters	1/8	"
Custard pie	1/3	"
Mashed potatoes	1/50	"
Minced meat	1/75	"
Pumpkin pie	1/90	"
Cream pie	1/5	"
Creamed vegetables	1/100	"
Baking powder biscuits	1/75	"
Hot cakes	1/65	"
Cream sauce	1/100	"
Chicken fricassee	1/60	"

PICKLES:

Plain	1/12	lb.
-------------	------	-----

SAUERKRAUT:

Plain	1/4	lb.
-------------	-----	-----

SUGAR:

Pie	1/20	lb.
Cake	1/15	"
Bread	1/200	"
Coffee	1/25	"
Tea	1/30	"
Puddings	1/25	"
Cranberry sauce	1/3	"
Cereals	1/10	"
Cocoa	1/25	"

OYSTERS:

Dressing	1/100	gals.
Stew	1/20	"

CLAMS:

For chowder	1/25	gal.
-------------------	------	------

APPENDIX II

TABLES AND USEFUL INFORMATION

1. Weights and Measures. *a. Avoirdupois Weight.*

- 16 ounces equal 1 pound.
100 pounds equal 1 hundredweight.
20 hundredweight equal 1 ton.

b. Dry measure.

- 2 pints =1 quart =1.101 liters.
8 quarts =1 peck =8.811 liters.
4 pecks =1 bushel =35.24 liters.

c. Liquid measure.

- 4 gills =1 pint =473.25 cubic centimeters.
2 pints =1 quart =0.9465 liters.
4 quarts =1 gallon =3.786 liters.
31½ gallons =1 barrel.
2 barrels =1 hogshead.

d. Miscellaneous weights.

- (1) 10 eggs, average size without shell, weigh 1 pound.
(2) Each of the following equals approximately 1 bushel:

- 48 pounds apples.
50 pounds carrots.
58 pounds onions, dry.
45 pounds parsnips.
60 pounds potatoes, irish.
54 pounds potatoes, sweet.
56 pounds tomatoes, fresh.
55 pounds turnips.
70 pounds corn on the cob.

(3) The cup, which is part of the individual equipment of each soldier, will be found very convenient for determining quantities. The cup holds 1½ liquid pints.

1 level cupful of—	Pounds	Ounces	1 level cupful of—	Pound	Ounces
Apples, evaporated ..	0	7	Oatmeal	0	8
Beans, chili	1	4	Peaches, evaporated .	0	14
Beans, issue	1	6	Peas, dried	1	5
Beans, kidney	1	3	Prunes	0	14
Beans, lima	1	3	Raisins	0	14
Bread crumbs	0	13	Rice	1	5
Coffee, R. & G.	0	9	Salt, coarse	1	11
Corn, sweet, dried ..	0	14	Salt, issue	1	12
Corn meal	1	2	Sirup	2	2
Currants	1	5	Sugar, cut-loaf	0	14
Eggs, broken	1	11	Sugar, granulated ...	1	14
Flour	0	14	Tea, black	0	5
Hominy	1	2	Tea, oolong	0	6
Milk, fresh	1	9	Tea, green	0	9

One 3-gallon bucket of potatoes weighs 17 pounds, and when peeled they will weigh about 15 pounds.

One 3-gallon bucket of onions weighs about 14 pounds, and when peeled they will weigh about 11 pounds.

- (4) The no. 55 (1¾-quart size) dipper, level full, holds the following:

	Pounds		Pounds
Apples, evaporated	1¼	Oil, cottonseed, etc.	3¾
Beans, dry	2½	Peaches, evaporated	2
Coffee, ground	2	Prunes	2
Corn meal	2¾	Raisins	2
Fat (butter or lard)	3¾	Rice	3¾
Flour or cornstarch	2	Sugar	3½
Oats, rolled	1¼	Tea	1

(5) The no. 56 (1-quart size) dipper holds slightly more than one-half as much as the no. 55.

2. Weights and Measures of Fruits and Vegetables.

Items	Weight (pounds)	Measurement
Apples	48	1 bushel.
Apples	1	2½—No. 3 each (medium).
Apples, sliced	1½	1 No. 56 dipper (1 quart).
Bananas	1	3 each (medium).
Beans, fresh lima	32	1 bushel.
Beans, fresh snap	30	1 bushel.
Beets	52	1 bushel.
Beets	1	3-4 each (medium).
Cabbage	40-50	1 bushel.
Cabbage	2½-3	1 head.
Carrots	50	1 bushel.
Carrots	1	3-6 each (medium).
Cauliflower, stripped, raw	1-3	1 head.
Cucumbers	48	1 bushel.
Eggplant	33	1 bushel.
Eggplant, 1 medium, sliced	1	9 slices.
Grapes	50	1 bushel.
Lettuce	18-19	1 bushel.
Onions, dry	50	1 bushel.
Onions, dry	1	4-5 each (medium).
Parsley	30	1 bushel.
Parsnips	45-50	1 bushel.
Peaches, fresh	48	1 bushel.
Peaches, fresh	1	3-5 each (medium).
Pears, fresh	52	1 bushel.
Pears, fresh	1	3-4 each (medium).
Peas, fresh, in pods	30	1 bushel.
Peppers, fresh green	25	1 bushel (125).
Peppers, fresh green	1	5-7 each (medium).
Pineapple, fresh	2	1 each (medium).
Potatoes, irish	60	1 bushel.
Potatoes, irish	1	2-4 each (medium).
Potatoes, sweet	50-54	1 bushel.
Potatoes, sweet	1	3-4 each (medium).
Radishes	1	80-90 each (medium).
Radishes		6-12 per bunch.
Rhubarb, raw, diced	1	1 No. 56 dipper (1 quart).
Rutabagas	56	1 bushel.
Spinach	18	1 bushel.
Squash	45	1 bushel.
Tomatoes, fresh	50-60	1 bushel.
Tomatoes, fresh	1	4 each (medium).
Turnips	52	1 bushel.
Turnips	1	2-3 each (medium).

NOTE.—One 3-gallon bucket of potatoes weighs 17 pounds, and when peeled will weigh about 15 pounds. One 3-gallon bucket of onions weighs about 14 pounds, and when peeled will weigh about 11 pounds.

3. Weights, measurements, and equivalents of other foods. All measurements are level.

Food	M1910 spoon	Mess kit cup $1\frac{1}{2}$ pints)		No. 56 dipper (1 quart)		No. 55 dipper ($1\frac{1}{4}$ quarts)	
	Ounces	Pounds	Ounces	Pounds	Ounces	Pounds	Ounces
Allspice, ground	$\frac{3}{8}$						
Apples, evaporated			7		9	1	
Apricots, evaporated		1		1	5	2	5
Baking powder	$\frac{3}{8}$	1		1	6	2	7
Baking soda	$\frac{1}{2}$	1	4	1	11	3	
Barley		1	8	2		3	8
Beans, dry:							
Kidney		1	3	1	9	2	12
Lima		1	4	1	10	2	14
Navy		1	5	1	12	3	
Beef, ground, raw		1	8	2		3	8
Bread, crumbs, dried			8		11	1	3
Butter		1	8	2		3	8
Celery, cubed			12	1		1	12
Cheese:							
American cheddar, grated or							
ground			12	1		1	12
Cottage		1	8	2		3	8
Chili powder	$\frac{1}{4}$						
Cinnamon, ground	$\frac{1}{4}$						
Cloves, ground	$\frac{1}{4}$						
Cocoa	$\frac{1}{4}$		11		14	1	8
Coconut, shredded			7		9	1	
Coffee			10		$13\frac{1}{2}$	1	8
Corn meal, yellow		1		1	5	2	4
Cornstarch	$\frac{1}{2}$		15	1	4	2	3
Cream of tartar	$\frac{1}{8}$						
Curry powder	$\frac{1}{8}$						
Eggs:							
Dried	$\frac{1}{4}$		9		12	1	5
Whole without shell		1	8	2		3	8
White		1	8	2		3	8
Yolk		1	8	2		3	8
Flour, issue:							
Sifted	$\frac{1}{4}$		12	1		1	12
Unsifted	$\frac{1}{4}$		$12\frac{3}{4}$		$16\frac{1}{2}$	1	$12\frac{1}{2}$
Gelatin	$\frac{1}{4}$		12	1		1	12
Ginger, ground	$\frac{1}{2}$						
Lard substitute		1	8	2		3	8
Lentils			14	1	3	2	2
Mace	$\frac{1}{8}$						
Milk, powdered	$\frac{1}{4}$		12	1		1	12
Mustard, dried	$\frac{1}{4}$						
Nutmeg, ground	$\frac{1}{4}$						
Oats, rolled			9		12	1	5
Onions, diced			11		15	1	10
Paprika	$\frac{1}{8}$						
Parsley, chopped			9		12	1	5
Peaches, evaporated			14	1	2	2	
Peas, split		1	5	1	12	3	1
Pepper, black	$\frac{1}{4}$						
Peppers, green, chopped			12	1		1	12
Prunes, evaporated			14	1	2	2	
Poultry seasoning	$\frac{1}{8}$						
Raisins, seedless		1		1	4	2	5
Rice		1	8	2		3	8
Sage	$\frac{1}{4}$						
Salt, issue	$\frac{5}{8}$	1	13	2	6	4	4
Sugar:							
Brown (loose pack)	$\frac{1}{4}$		14	1	2	2	
Confectioners	$\frac{1}{4}$		14	1	2	2	
Granulated	$\frac{1}{2}$	1	5	1	12	3	
Tapioca:							
Granulated		1	3	1	10	2	11
Pearl		1	2	1	8	2	10
Tea			$7\frac{1}{2}$		10	1	2
Vanilla	$\frac{1}{2}$						

4. How to measure. All measurements are level. Draw a knife across the top of the measure when filled, so that the surface is level.

a. Mess kit cup or dipper. To measure dry ingredients such as granulated sugar and flour, fill cup or dipper to desired level, and do not pack or shake. Flour

should always be sifted once before measuring. When shortening, such as butter or other fats is measured, it should be soft enough to pack, if cup or dipper is to be completely filled. In measuring a lumpy product, break up lumps before measuring.

b. *Tablespoon.* To measure dry ingredients or shortening by tablespoon, fill to overflowing and level with straight edge of knife. To divide in half, fill and level, and divide lengthwise with a knife. For quarters, cut another line directly across the center of the first one.

c. *Equivalent Table.*

3 teaspoons	=1 tablespoon.
16 tablespoons dry ingredients	=1 cup.
12 tablespoons liquid ingredients	=1 cup.
2 cups liquid	=1 pint.
4 cups liquid	=1 quart.
9 to 10 eggs (minus shell)	=1 pound.
5 whole eggs	=1 cup or 8 ounces.
8 egg whites	=1 cup or 8 ounces.
12 egg yolks	=1 cup or 8 ounces.

d. *Equivalent weights and measures, spoons, cups, etc.*

Volume ¹							Weight		
Level tea- spoonful	Rounding tea- spoonful	Heaping tea- spoonful	Level table- spoonful	Cupful	Pint	Quart	Flour	Granu- lated sugar	Shorten- ing
1							1/12 oz.	1/6 oz.	1/4 oz.
2							1/6 oz.	1/3 oz.	1/2 oz.
3	1						1/4 oz.	1/2 oz.	3/4 oz.
4		1	1	1/16			1/2 oz.	3/4 oz.	1 oz.
6	2						3/4 oz.	1 oz.	1 1/4 oz.
	3		2	1/8	1/16		1 oz.	2 ozs.	2 ozs.
	6	3	4	1/4	1/8	1/16	1 oz.	2 ozs.	2 ozs.
		6	8	1/2	1/4	1/8	2 ozs.	4 ozs.	4 ozs.
			16	1	1/2	1/4	4 ozs.	8 ozs.	8 ozs.
				2	1	1/2	8 ozs.	1 lb.	1 lb.
				3	1 1/2	3/4	12 ozs.	1 1/2 lbs.	1 1/2 lbs.
				4	2	1	1 lb.	2 lbs.	2 lbs.

5. **Boiling point of water under various pressures.** The following table shows approximate temperatures possible to attain with pressure cookers:

1.5 pounds of pressure	217° F.
3.5 pounds of pressure	222° F.
5 pounds of pressure	230° F.
10 pounds of pressure	240° F.
15 pounds of pressure	250° F.

Note. Since temperatures attained with use of pressure cooker are high, as indicated above, the cooking time is proportionately shortened.

6. *Egg conversion table.*

	Fresh eggs	Powdered whole egg		Added water	
		Measure	Weight (ounces)	Measure	Weight (ounces)
Standard measuring cup	1	2 tablespoonfuls	1/2	2 tablespoonfuls	1
(8 fluid ounces)	6	3/4 cup	2 1/4	3/4 cup	7
	12	1 1/2 cups	4 1/4	1 1/2 cups	14
	12	1/2 cup	4 1/2	1/2 cup	14
Army mess kit cup	24	1 cup	9	1 1/2 cups	28
(24 fluid ounces)	36	1 1/2 cups	13 1/2	1 1/2 cups	40

7. Liquid measure conversion tables.

United States Measure	United States measures				Imperial measure (British)				Metric measure		Weight of indicated volume of water	
	Gallons	Qts.	Pints	Gills	Gallons	Quarts	Pints	Gills	Liter	Cubic centimeter	Pounds (avoirdupois)	Kilograms
1 gallon	1	4	8	32	0.833	3.33	6.66	26.66	3.785	3785.4	8.33	3.785
1 quart	.25	1	2	8	.208	.833	1.666	6.67	.946	946.6	2.08	.946
1 pint	.125	.5	1	4	.104	.417	.833	3.33	.473	473.2	1.04	.473
1 gill	.031	.125	.25	1	.026	.104	.208	.833	.118	118.3	.26	.118
Imperial Measure (British)												
1 gallon	1.2	4.8	9.6	38.4	1	4	8	32	4.543	4543.5	10.	4.543
1 quart	.3	1.2	2.4	9.6	.25	1	2	8	1.136	1135.9	2.5	1.136
1 pint	.15	.6	1.2	4.8	.125	.5	1	4	.568	567.9	1.25	.568
1 gill	.038	.15	.3	1.2	.031	.125	.25	1	.142	142.0	.312	.142
Metric Measure												
1 liter	.264	1.057	2.11	8.45	.220	.880	1.761	7.044	1.	1000	2.20	1
1 cubic centimeter	.0003	.001	.002	.008	.0002	.0009	.002	.007	.001	1	.002	.001

8. Milk conversion table. Conversion of milk in forms other than liquid milk to approximate equivalent in liquid whole milk.

Liquid whole milk (pounds)	Evaporated milk			Dry whole milk				Dry skim milk					
	Milk (14½-ounce cans)	Water		Milk (whole dry)		Water		Milk (dry skim)		Butter or shortening		Water	
		Pounds	Ounces	Pounds	Ounces	Pounds	Ounces	Pounds	Ounces	Pounds	Ounces	Pounds	Ounces
2.1 (1 quart)	1	1			4	1	12		3			1	14
8.6 (1 gallon)	4½	4		1		4			12			4	6
5	2½	2½			10	4	6		7			3	12
10	5½	5		1	3	8	13		14			6	6
20	11	10		2	6	17	10	1	12			11	9
30	16½	15		3	9	25	7	2	10	1		17	6
40	22	20		4	12	35	4	3	8	1		26	2
50	27½	25		5	15	43	1	4	6	1		35	14
60	33	30		7	2	51	14	5	5	2		43	10
70	38½	35		8	5	60	11	6	3	2		52	7
80	44	40		9	12	70	4	7	1	2		61	3
90	49½	45		10	14	79	2	8		3		70	14
100	55	50		12		88		9		3		78	8

NOTE. While Federal standards require the use of butterfat in reconstituting dry skim milk to whole milk, for Army bread-making purposes either the same weight as butter in lard or lard substitute may be used.

Explanation of use of milk conversion chart: A certain formula for bread requires the use of 60 pounds of liquid. In lieu of all water, it is desired to use half (30 pounds) of water and half (30 pounds) of milk. By referring to conversion table, it will be seen that either of the following may be used for the milk ingredients: 30 pounds of liquid whole milk or—15 cans of evaporated milk+15 pounds of water or—2 pounds 10 ounces of dry skim milk +1 pound of shortening +25 pounds 6 ounces of water or—3 pounds 9 ounces of dry whole milk+25 pounds 7 ounces of water.

Formula using all water	Formula using half water, half milk (evaporated milk as milk ingredient)	Formula using half water, half milk (dry skim milk as milk ingredient)	Formula using half water, milk (dry whole milk as milk ingredient)
Flour ----- 100 lb.	Flour ----- 100 lb.	Flour ----- 100 lb.	Flour ----- 100 lb.
Water ----- 60 lb.	Water ----- 45 lb.	Water ----- 56 lb. 6 oz.	Water ----- 55 lb.
Milk -----	Milk, evaporated 15 cans	Dry skim milk 2 lb. 10 oz.	Dry whole milk -- 3 lb.
Yeast ----- 2 lb.	Yeast ----- 2 lb.	Yeast ----- 2 lb.	Yeast ----- 2 lb.
Sugar ----- 3 lb.	Sugar ----- 3 lb.	Sugar ----- 3 lb.	Sugar ----- 3 lb.
Salt ----- 2 lb.	Salt ----- 2 lb.	Salt ----- 2 lb.	Salt ----- 2 lb.
Shortening ----- 2 lb.	Shortening ----- 2 lb.	Shortening ----- 3 lb.	Shortening ----- 2 lb.

NOTE. The conversion table may be used for any other combination of water and whole milk to be used in the dough.

9. Oven counts and oven temperatures.

Counts	Degrees Fahrenheit	Common name for oven temperature
8	450 to 500	Hot.
9 to 12	400 to 450	Quick.
12 to 16	325 to 400	Medium.
16 to 18	250 to 325	Moderate.
18 to 20	200 to 250	Slow.

NOTE. It must be remembered that an oven count will vary according to the individual and will also vary as the hand of the person making the count is sensitive or insensitive to heat. This is affected by the occupation of the man making the count. Cooks and others accustomed to working in heat are able to keep their hands in a hot oven longer than persons not accustomed to heat. Therefore, the only absolutely accurate method of determining oven temperature is by a thermometer. However, if no thermometer is available, the hand-second method will give fairly satisfactory results.

10. Table of Oven Temperatures as Determined by Hand-Second Counts.

	First counts for searing	Counts for cooking after searing	Time
Meats:			
Beef roast, 5-pound pieces	10	18	20 minutes per pound.
Mutton roast, 5-pound pieces	12	20	20 minutes per pound.
Pork roast, 5-pound pieces	15	20	30 minutes per pound.
Veal roast, 5-pound pieces	12	18	30 minutes per pound.

	Counts	Time
Fowl:		
Turkey roast, 12 pounds each	18	20 minutes per pound.
Chicken roast, 3 pounds each	18	30 minutes per pound.
Duck roast, 3 pounds each	18	30 minutes per pound.
Salmon hash	16	15 minutes per pound.
Vegetables:		
Beans, dry	22	6 to 8 hours.
Carrots, according to size	16	20 minutes
Parsnips, according to size	18	40 to 60 minutes.
Potatoes, baked, according to size	12	30 to 40 minutes.
Potatoes, browned	15	20 to 30 minutes.
Potatoes, cheesy	12	30 minutes.
Potatoes, hashed	12	30 minutes.
Potatoes, lyonnaise	12	15 to 30 minutes.
Potatoes, sweet, according to size	16	40 to 60 minutes.
Squash, according to size	18	30 to 40 minutes.

	Counts	Time
Breads:		
Braided bread, 2-ounce	14	20 to 25 minutes.
Cinnamon rolls, 2-ounce	12	10 to 15 minutes.
Jenny linds, 16-ounce	20	30 to 40 minutes.
Muffins, 2-ounce	15	20 to 30 minutes.
Parkerhouse rolls, 2-ounce	12	10 to 15 minutes.
Raisin buns, 2-ounce	18	35 to 40 minutes.
Sandwich buns, 2-ounce	12	10 to 15 minutes.
Tea bun, 2-ounce	18	35 to 40 minutes.
French bread, 18-ounce (13 inches long)	20	40 minutes.
Cakes:		
Apple, 16-ounce (6 by 10 inches)	15	20 to 30 minutes.
Coffee, 16-ounce (6 by 10 inches)	15	15 to 20 minutes.
Pies		
Pudding, bread	12	30 to 40 minutes.
Custard	15	30 to 40 minutes.
	16	20 to 30 minutes.

11. a. Conversion of Fahrenheit degrees to centigrade degrees of temperature.

Rule. Subtract 32 from Fahrenheit degrees. Multiply the result by 5/9 and this result is the corresponding degrees centigrade.

Fahrenheit = Centigrade

0	—17.8
10	—12.2
15	—9.4
20	—6.7
32	0.
35	1.7
40	4.4
45	7.2
50	10.0
55	12.8
60	15.6
65	18.3
70	21.1
75	23.9
80	26.7

Fahrenheit = Centigrade

85	29.4
90	32.2
95	35.0
100	37.8
110	43.3
120	48.9
130	65.6
200	93.3
212	100.0
250	121.1
300	148.9
350	176.7
400	204.4
450	232.2
500	260.0

b. Conversion of centigrade degrees to Fahrenheit degrees of temperature.

Rule. Multiply centigrade degrees by 9/5 and add 32. The result is the equivalent in Fahrenheit degrees.

Centigrade = Fahrenheit

0	32
10	50
15	59
20	68
25	77
30	86
35	95
40	104
45	113

Centigrade = Fahrenheit

50	122
75	167
100	212
125	257
150	302
175	347
200	392
225	437
250	482

12. Conversion of avoirdupois to metric system of weights.

1 pound or 16 ounces=453.6 grams or 0.454 kilograms.

1 ounce or 0.0625 pounds=28.35 grams or 0.0283 kilograms.

Note. For practical calculations use 453 grams as being equal to 1 pound, and 28 grams as equal to 1 ounce.

13. Conversion of ounces to pounds; pounds to ounces; and fractions of pounds to decimals of pounds.

Rule. To change pounds to ounces multiply by 16. To change ounces to pounds divide by 16.

Pounds			Pounds		
Ounces	Fractions	Decimals	Ounces	Fractions	Decimals
1	$\frac{1}{16}$	0.0625	15	$\frac{15}{16}$	0.938
2	$\frac{1}{8}$	0.125	16	1	1.000
3	$\frac{3}{16}$	0.188	17	$1\frac{1}{16}$	1.063
4	$\frac{1}{4}$	0.25	18	$1\frac{1}{8}$	1.125
5	$\frac{5}{16}$	0.313	19	$1\frac{3}{16}$	1.188
6	$\frac{3}{8}$	0.375	20	$1\frac{1}{4}$	1.25
7	$\frac{7}{16}$	0.438	30	$1\frac{7}{8}$	1.875
8	$\frac{1}{2}$	0.5	40	$2\frac{1}{2}$	2.5
9	$\frac{9}{16}$	0.563	50	$3\frac{1}{8}$	3.125
10	$\frac{5}{8}$	0.625	60	$3\frac{3}{4}$	3.75
11	$1\frac{1}{16}$	0.688	70	$4\frac{3}{8}$	4.375
12	$\frac{3}{4}$	0.75	80	5	5.000
13	$1\frac{1}{8}$	0.813	90	$5\frac{5}{8}$	5.625
14	$\frac{7}{8}$	0.875	100	$6\frac{1}{4}$	6.25

Note. For a given number of ounces or fraction or decimal of pounds not listed above, add two or more numbers listed above which will equal given number and then add the corresponding equivalents.

14. Weights of water and pails of water.

One pint of water=approximately 1 pound.

One quart of water=approximately 2 pounds, 1½ ounces.

One gallon water=approximately 8.35 pounds.

A 10-quart pail of water contains 20 pounds 14 ounces of water.

A 12-quart pail of water contains 25 pounds of water.

A 14-quart pail of water contains 29 pounds 3 ounces of water.

15. Soap, making. *a. Boiled hard soap.* Dissolve 1 pound of soda lye (sodium hydroxide, ordinary issue lye) in 2 quarts of water. In another container (5-gallon capacity) melt 5 pounds of clean fat or tallow, scrap or drippings, in 2 gallons of water. As soon as all the fat is melted add about ¼ pint of the dissolved lye. Boil over a slow fire. Taste from time to time until the biting taste of the soap liquid has disappeared. Add water to replace that boiled away. Add another ¼ pint of lye as before and continue boiling, tasting, and adding lye and water in the same manner until the lye is consumed. The liquid will then become like honey in consistency and will be transparent as it drops from a spoon. Add about ½ pound of salt. Boil until the soap separates from the lye water, has lost its honeylike appearance, and drops off a spoon or wooden paddle like greasy water. A small quantity pressed between the thumb and first finger will not feel greasy but will flatten into thin scales if the soap is finished. Simmer about 10 minutes and the process is complete. Skim off the soap which floats on the surface, place in a suitable mold or molds and set aside to harden.

b. Soft soap. Use 1 quart of the soap made according to the above formula but not hardened. Boil in a large kettle with 4 gallons of water until clear and uniform in appearance. Set aside to cool.

c. Inspection of soap. (1) Cut a piece of soap in two and place the tongue on the fresh surface.

(a) If the soap is very sharp to the taste, not enough grease has been used.

(b) If the soap feels very greasy, too much grease has been used.

(c) If the soap tastes sharp and also feels greasy, it has not been mixed or boiled properly.

(2) A soap that is sharp to the taste and makes a good lather is much preferred for scrubbing purposes.

d. If the hard soap in process of setting is slightly soft and it appears that it will not harden, this difficulty may be overcome by attaching a short piece of rubber hose to the spout of an ordinary teakettle and placing the other end of the hose in the bottom of the soap kettle, thus introducing steam. In this way heat is obtained by using wet steam instead of the heat being applied to the bottom of the kettle. Available steam may also be drawn from boilers in lieu of the kettle method. A drier mixture and a harder soap result.

16. Window washing. For efficient and economical window washing, to 1½ gallons of water add 1 tablespoonful of kerosene. Dampen a soft cloth in this mixture and use for cleaning. Then rub with a dry cloth which polishes as well as dries the window. When the drying cloth becomes old and worn it may be used as a washing cloth and replaced by a fresh one. When long, high windows are involved, and it is impracticable to wash by hand, the cloth may be attached to a handle with a crossbar at the end, similar to a squeegee. (The squeegee is simply a handle and a crossbar at the end, into which has been pressed a strip of hard rubber.) The use of the squeegee is not recommended, as it does not dry the windows thoroughly and requires the use of a drying cloth afterward. The above quantity of water and kerosene is usually sufficient for a day's work, but when the windows are very dirty or greasy a large quantity is necessary.

APPENDIX NO. 3
MINIMUM STANDARD TEN-DAY MENU

Components	1st Day	2d Day	3d Day	4th Day	5th Day
Breakfast	Fruit	Prunes	Oranges	Bananas	Apples
	Cereal	Oatmeal	Grape Nuts	Cornmeal & Bran	Wheaties
	Main Dish	Scrambled Eggs	Corn Fritters, Bacon, Maple Sir.	Fried Ham & Hominy	Hot Cakes, Maple Sirup, Sausage
	Potatoes	Fried Potatoes	Fresh Milk	Fresh Milk	Fresh Milk
Dinner	Drink	Fresh Milk	Coffee, Milk & Sugar	Coffee, Milk & Sugar	Coffee, Milk & Sugar
	Bread and Spread	Dry Toast, Butter	Dry Toast, Butter	Dry Toast, Butter	Butter
	Soup	Bean	Split Pea	Tomato	Vegetable
	Main Dish	Roast Beef	Hamburger	Roast Shoulder	Veal Cutlets
Supper	Potatoes	Boiled Potatoes	Baked Potatoes	Mashed Potatoes	Baked Potatoes
	Vegetables	Creamed Corn	String Beans	Buttered Asparagus	Buttered Peas
	Salad	Celery	Lettuce & Tomato	Beet	Banana
	Desserts	Cocoanut Pie	Pumpkin Pie	Blueberry Pie	Raisin Pie
Dinner	Drink	Coffee, Milk & Sugar	Coffee, Milk & Sugar	Coffee, Milk & Sugar	Coffee, Milk & Sugar
	Bread and Spread	Cinnamon Rolls, Butter	Oatmeal Muffins, Butter	Hot Rolls, Butter	Cinnamon Rolls, Butter
	Main Dish	Spareribs	Chili Con Carne	Spanish Omelet	Frankfurters, Mustard
	Potatoes	Creamed Potatoes	Pickled Beets	French Fried	Boiled Potatoes
Supper	Vegetables	Sliced Tomatoes	Rice-Raisin Pudding	Lettuce w/French Dressing	Pickle Relish
	Salad	Chocolate Cake	Coffee, Milk & Sugar	Jelly Roll	Baked Apples
	Desserts	Coffee, Milk & Sugar	Hot Rolls, Butter	Coffee, Milk & Sugar	Coffee, Milk & Sugar
	Drink	Bread, Butter		Bread, Butter	Bread, Butter
Supper	Bread and Spread				

APPENDIX No. 3
MINIMUM STANDARD TEN-DAY MENU

Components		6th Day	7th Day	8th Day	9th Day	10th Day
Breakfast	Fruit	Oranges	Prunes	Bananas	Grapefruit	Apples
	Cereal	Oatmeal	Puffed Rice	Oatmeal & Bran	Wheat Shreds or	Farina or Cream of
	Main Dish	Fried Eggs	Corn Fritters	Scrambled Eggs	Shredded Wheat	Wheat
	Potatoes	Fried Potatoes	Bacon, Maple Sir.	Fried Potatoes	Hot Cakes, Sausage	Ham Omelet
Dinner	Drink	Fresh Milk	Fresh Milk	Fresh Milk	Maple Sirup	Fried Potatoes
	Bread and Spread	Coffee, Milk & Sugar Toast, Butter	Coffee, Milk & Sugar Butter	Coffee, Milk & Sugar Toast, Butter	Fresh Milk	Fresh Milk
	Soup	Bean	Tomato	Duck or Chicken	Coffee, Milk & Sugar Butter	Coffee, Milk & Sugar
	Main Dish	Braised Beef	Long Island Duck or Chicken	Baked Ham	Split Pea	Tomato
Supper	Potatoes	Boiled Potatoes	French Fried	Mashed Potatoes	Roast Beef	Pork Chops
	Vegetable	Succotash	String Beans	Peas	Boiled Potatoes	Baked Potatoes
	Salad	Cole Slaw	Celery	Vegetable	Creamed Carrots	Pickled Beets
	Desserts	Fresh Apple Pie	Cranberry Pie	Pumpkin Pie	w/Onions	Tomato & Lettuce
Supper	Drink	Coffee, Milk & Sugar	Coffee, Milk & Sugar	Coffee, Milk & Sugar	Blueberry Pie	Raisin Pie
	Bread and Spread	Bran Muffins, Butter	Corn Bread, Butter	Biscuits, Butter	Hot Rolls, Butter	Coffee, Milk & Sugar
	Main Dish	Macaroni & Cheese	Fresh Beef Hash	Spaghetti & Meat Balls, Italian Sauce	Stuffed Peppers	Beef Stew
	Potatoes	Pickled Beets	Deviled Eggs	Fruit	Mashed Potatoes	w/Vegetables
Supper	Vegetables	Pineapple Rings in Sweet Dough	Bread Pudding	Oatmeal Cookies	Olives	Celery
	Salad	Coffee, Milk & Sugar	Coffee, Milk & Sugar	Coffee, Milk & Sugar	Cake	Cottage Pudding
	Desserts	Bread, Butter	Hot Rolls, Butter	Bread, Butter	Coffee, Milk & Sugar Bread, Butter	Coffee, Milk & Sugar
	Drink					Hot Rolls, Butter
	Bread and Spread					

INDEX

- Accounting
 - field ration accounting, 30
 - ration, travel, 30
- Acid, ascorbic, 32
- Action of yeast in dough, 101
- Adjustment of water temperature (baking), 107
- Alimentary pastes, inspection and storage, 244
- Alligator pears, inspection and storage, 221
- Allspice, 159
- Angel food cake, 135
- Apple-and-cabbage salad, recipe, 345
- Apple-and-celery salad, recipe, 345
- Apple-and-rice pudding, recipe, 340
- Apple cake recipe, 341
- Apple cobbler, recipe, 333
- Apple pie, recipe, 336
- Apple pudding, recipe, 338
- Apple rolls, recipe, 330
- Applesauce cake, 133
- Applesauce recipe, 330
- Apples, baked, recipe, 330
- Apples, fresh, inspection of, 221
- Apples, fresh, storage of, 221
- Apricot shine, 129
- Apricots, dried, stewed, recipe, 331
- Army boneless beef, 181
- Army gasoline field range, M1917, 56
- Arrangement of field kitchen, 46
- Ascorbic acid, 32
- Asparagus, 162
 - inspection and storage, 225
 - recipe, 320
- Avocados, inspection and storage, 221
- Avoirdupois to metric system, conversion table, 394
- Bacon
 - fried bacon, recipe, 305
 - inspection of, 273
 - simmered bacon, recipe, 305
- Bacon-and liver, recipe, 313
- Baggage car, installation of field range No. 1 in, 61
- Baked apples, recipe, 330
- Baked bean salad, recipe, 345
- Baked beans, recipe, 320
- Baked goods, 5
- Baked Indian pudding, recipe, 339
- Bakepans, black iron, 44
- Baking
 - adjustment of water temperature, 107
 - cake baking in general, 129
 - cakes, baking, 133
 - cake formulas and procedure, 132
 - definition of, 76, 91, 197
 - definitions of baking terminology, 91
 - fermentation in baking, 101
 - fermentation periods, 110
 - field baking expedients, 140
 - handling and baking pies, 138
 - ice calculation, 103
 - improvers, 106
 - milk, use of, 106
 - open trench, baking in, 142
 - pies, baking, 136
 - salt, use of, 104
 - shortening, use of, 105
 - steam in oven, 113
 - sugar and substitutes, 104
 - terms, definitions of, 91
 - yeast in dough, action of, 101
- Baking powder, 145
 - inspection and storage, 237
- Baking-powder biscuits, recipe, 342
- Baking soda, 145
- Balanced diet, 32
- Balanced menu, 32
- Banana cream pie, recipe, 337
- Banana pudding, recipe, 338
- Bananas, inspection and storage, 222
- Barbecue, definition of, 197
- Barbecue sauce, recipe, 318
- Barley, inspection and storage, 242
- Barley-and-tomato-soup, recipe, 301
- Barley soup, recipe, 301
- Basic dough, rolls, recipe, 343
- Basic sweet dough, formula, 126
- Basic sweet dough, recipe, 340
- Basic yellow cake, 132
- Basting, definition, 77, 198
- Batter
 - definition of, 91
 - flour batter, recipe, 317
- Bavarian cabbage, recipe, 322
- Bean puree, recipe, 304
- Bean soup, recipe, 301
- Beans
 - baked beans, recipe, 320
 - baked bean salad, recipe, 345
 - canned beans, recipe, 321
 - dried beans, inspection and storage, 233
 - dried beans, 145
 - dried beans, types and kinds, 233
 - dried beans, simmered, recipe, 321
 - stringless bean salad, recipe, 345
- Beans, lima
 - see Lima beans
- Beans, snap
 - see Snap beans
- Beans, string
 - see Stringbeans

Beef

- à la mode, recipe, 305
- boneless beef, 181
- braised beef, recipe, 306
- braised beef with vegetables, recipe, 306
- carcass, cutting, 172
- carcass, weight, 170
- chart showing location, structure and names of bones, 171
- chart showing locations of wholesale cuts, 170
- chipped beef on toast, recipe, 307
- corned beef, inspection of, 271
- corned beef, recipe, 306
- creamed beef, recipe, 306
- curry of beef, recipe, 306
- cuts and their uses, 179
- cuts divided for cooking, 180
- cuts for small messes, 182
- cutting beef, 171
- cutting test, 179
- dressing recipe, 307
- dried beef, inspection, 275
- dried beef on toast, recipe, 307
- forequarter, cutting, 172
- fricasseed beef, recipe, 307
- fritters, recipe, 307
- general, 170
- hamburger, recipe, 309
- handling beef, 262
- hash, recipe, 307
- hearts, stuffed, recipe, 307
- hindquarter, cutting, 176
- inspection of beef, 260
- loaf, beef, recipe, 308
- pot roast, 201
- pot roast recipe, 306, 308
- potpie recipe, 308
- roast beef, recipe, 308
- rolls, recipe, 309
- short ribs, recipe, 315
- simmered beef, recipe, 309
- sliced beef on toast, recipe, 307
- soup, recipe, 301
- Spanish beef recipe, 309
- specifications for cooking, 202
- storage of beef, 262
- sundry cuts, cooking, 202
- transportation of beef, 262
- Turkish beef, recipe, 309
- Beefsteak and onions, recipe, 310
- Beefsteak and mushrooms, recipe, 310
- Beefsteak potpie, recipe, 310
- Beefsteak, recipe, 309
- Beet salad, pickled, recipe, 345
- Beets
 - canned beets, recipe, 322
 - Fresh beets, 162
 - Fresh beets, boiled, recipe, 322
 - harvard beets, recipe, 322
 - inspection and storage, 225

- pickled beets, recipe, 322
- Bellies, pork, inspection of, 270
- Bench, definition, 91
- Berries, inspection and storage, 222
- Beverages, 88
 - chocolate recipe, 349
 - cocoa recipe, 349
 - hot coffee recipe, 349
 - hot tea recipe, 349
 - iced, tea recipe, 349
 - inspection and storage, 246
 - lemonade recipe, 349
 - making cocoa, 90
 - making coffee, 88
 - making tea, 89
- Bill of fare, daily, 30
- Bill of fare, form for, 26
- Biscuits
 - baking powder biscuits, recipe, 342
 - cheese biscuits, recipe, 343
 - sour milk biscuits, recipe, 343
- Blanching (canning), definition of, 215
- Bleached flour, 96
- Boiled dressing, recipe, 347
- Boiling, definition, 76, 198
- Boiling point of water under various pressures, 391
- Bologna, 197
 - inspection of, 280
- Bologna sausage, fried, recipe, 314
- Boneless beef, 181
- Bones
 - beef, chart showing names of, 171
 - lamb, chart showing names of, 185
 - pork, chart showing names of, 188
 - veal, chart showing names of, 194
- Boning fish, 212
- Bouillon, definition of, 77, 198
- Brains, 195
 - brains-and-eggs, recipe, 310
 - cooking brains, 202
 - inspection of, 269
 - recipe for, 310
- Braising, definition, 76, 198
 - how to braise meats, 205
 - meats, braising, 201
 - timetable for braising, 206
- Bread
 - apple rolls, recipe, 330
 - baking powder biscuits, recipe, 342
 - basic dough rolls, recipe, 343
 - break making equipment, 107
 - bread rope, 142
 - cheese biscuits, recipe, 343
 - cinnamon rolls, recipe, 342
 - cinnamon rolls, recipe, 344
 - cooling bread, 113
 - cornbread, recipe, 343
 - cornbread (sour milk), recipe, 343
 - definition of bread, 91
 - factors affecting growth of yeast, 102

- faults in bread, 122
- faults in aroma and taste, 125
- faults in grain, 125
- faults in color of crumb, 125
- field bread, 122
- finger rolls, recipe, 344
- formulas, percentage method, 113
- fruit rolls, recipe, 330
- garrison bread, formula and procedure, 113
- gingerbread, recipe, 343
- mold, 143
- pan rolls, recipe, 344
- parker house rolls, recipe, 342, 344
- raisin bread, formula and procedure, 119
- raisin bread, recipe, 344
- rye bread, formula and procedure, 118
- scoring factors, 44
- soft bun bread, recipe, 344
- storage of bread, 113
- sourmilk biscuits, recipe, 343
- whole wheat bread, formula and procedure, 117
- Bread pudding with sauce, recipe for 339
- Breakfast cereals, 147
- Broccoli, 162
 - inspection and storage, 227
- Broil, pan
 - see panbroil
- Broiling
 - definition, 76, 198
 - how to panbroil meats, 207
 - meats, broiling, 201
 - oven broiling, definition, 76
 - pan broiling, definition, 76
 - pan broiling meats, 201
 - poultry, broiling, 214
- Broth, definition, 77, 198
- Brown, definition, 198
- Brown betty, recipe, 331
- Brown gravy, 83
 - recipe, 317
- Buckled cans, definition, 214
- Buckwheat cakes, recipe, 299
- Buns
 - butterfly buns, 127
 - cinnamon buns, 127
 - definition, 91
 - hot cross buns, 127
 - sandwich buns, recipe, 345
- Burning-in pans, 44
- Butter, 147
 - drawn butter, definition, 77
 - inspection, 286
 - sponge cake, butter, 135
 - topping, butter, for coffee cake, 128
- Butterfly buns, 127
- Buttermilk, 157
- Butters, fruit, 155
- Cabbage, 162
 - Bavarian cabbage, recipe, 322
 - boiled cabbage, recipe, 323
 - cream of cabbage soup, recipe, 302
 - fried cabbage recipe, 323
 - inspection and storage, 226
 - recipe, 322
 - salad, cabbage, recipe, 345
- Cabbage-and-apple salad, recipe, 345
- Cake
 - angel food cake, 135
 - apple cake, recipe, 341
 - applesauce cake, 133
 - baking cakes, 133
 - baking cakes, general, 129
 - basic yellow cake, 132
 - buckwheat cakes, recipe, 299
 - butter sponge cake, 135
 - chocolate cake, recipe, 331
 - coffee cake, 127
 - coffee cake, butter topping for, 128
 - coffee cake, lattice top fruit, 128
 - coffee cake, recipe, 341
 - corn cakes, recipe, 299, 331
 - definition of cake, 91
 - eggless cake, recipe, 331
 - finishing cakes, 134
 - formulas and procedure, 132
 - fruit cake, dark, recipe, 331
 - fruit top coffee cake, 128
 - fudge cake, 132
 - griddle cakes, 140
 - icing recipe, 335
 - ingredients for cakes, 131
 - leavening agents for cakes, 131
 - marble cake, recipe, 332
 - panning cakes, 133
 - quick cake, recipe, 332
 - raised cake, recipe, 332
 - reference table of ingredients (facing p. 126)
 - scaling cakes, 133
 - spice cake, 133
 - spice cake, recipe, 332
 - sponge cake, 135
 - sponge cake, recipe, 333
 - types of cake, 130
 - wheat cakes, recipe, 300
 - white cake, recipe, 333
 - with shortening, 130
 - without shortening, 130, 134
- Calcium, 31
- Calcium hypochlorite, 380
- Campaigns, antirats, 379
- Can capacity table, 220
- Can
 - definition, 215
 - sizes, 220
- Candy, inspection of, 256
- Canned fish, 147

- Canned foods, 147
 - causes of spoilage, 219
 - inspection, 148
 - keeping qualities, 149
 - storage, 149
- Canned fruits, 148
 - chilling, 148
 - inspection, 218
 - standards, 218
 - storage, 219
- Canned meats, 147, 166
 - inspection, 282
 - storage, 283
- Canned seafood, 147
- Canned specialties, 148
- Canned vegetables
 - grades, 217
 - inspection, 217
 - storage, 219
- Canning
 - definition, 215
 - definition of blanching, 215
 - definition of buckled cans, 215
 - definition of collapsed can, 216
 - definition of collar can, 216
 - definition of crimping, 216
 - definition of exhausting, 216
 - definition of flat sour, 216
 - definition of flipper, 216
 - definition of incubating, 216
 - definition of leaker, 216
 - definition of pack, 216
 - definition of pinholing, 216
 - definition of processing, 217
 - definition of springer, 217
 - definition of spangling, 217
 - definition of swell, 217
- Cans, tin
 - see tincans
- Car, baggage, installation of field range
 - No. 1 in, 61
- Caramel, definition, 91
- Caraway seed, definition, 91
- Carbohydrates, 31
- Carcass beef, cutting, 172
- Care of ranges and cooking utensils, 42
- Carrot puree, recipe, 304
- Carrots, 162
 - baked carrots, recipe, 323
 - candied carrots, recipe, 323
 - inspection and storage, 226
 - mashed carrots, recipe, 323
- Carrying rack, definition, 91
- Carving and serving meats, 205
- Cauliflower, 162
 - inspection and storage, 226
- Celery, 163
 - cream of celery soup, recipe, 302
 - inspection and storage, 227
 - salad, recipe, 346
- Celery-and-apple salad, recipe, 345
- Centigrade degrees, conversion to Fahrenheit, 394
- Cereals
 - breakfast cereals, 147
 - buckwheat cakes, recipe, 299
 - cooking cereals, 87
 - corn meal mush, recipes, 300
 - definitions, 237
 - hominy grits, recipes, 300
 - hot cakes, recipe, 300
 - inspection and storage, 237
 - of barley, 242
 - of cornmeal, 241
 - of dry cereals, 242
 - of prepared cereals, 242
 - of rice, 234
 - of rolled oats, 241
 - of wheat farina, 241
 - oatmeal, recipe, 301
 - rolled wheat mush, recipe, 300
 - wheat cakes, recipe, 300
- Cervelat, inspection, 281
- Cheese, 149
 - biscuit, cheese, recipe, 343
 - grated cheese and onions, recipe, 325
 - inspection and storage, 288
 - omelet, cheese, recipe, 314
- Cheese-and-macaroni, recipe, 324
- Chemical disinfecting, 366
- Cherries, fresh, inspection and storage, 222
- Chicken
 - creamed chicken recipe, 310
 - fricassee chicken, recipe, 311
 - fried chicken, recipe, 311
 - inspection and storage, 288
 - kinds and uses, 212
 - roast chicken, recipe, 311
 - salad, chicken, recipe, 346
 - soup, chicken, recipe, 302
 - stew, chicken, with dumplings, recipe, 311
- Chili con carne, recipe, 312
- Chilling canned fruits, 148
- Chipped beef on toast, recipe, 307
- Chocolate, 150
 - beverage, recipe, 349
 - chocolate cake recipe, 331
 - inspection, 256
 - meringue pie, chocolate, recipe, 337
 - sauce, sweet, recipe for, 319
- Chop suey hash recipe, 313
- Chop suey stew, recipe, 316
- Chowder
 - clam chowder, recipe, 302
 - codfish chowder, recipe, 302
 - corn chowder, recipe, 302
 - potato chowder, recipe, 304
- Chuck steak with onions, recipe, 312
- Cinnamon, 159
 - buns, cinnamon, 127

- rolls, cinnamon, recipe, 342, 344
- sugar topping cinnamon, 129
- Citrus fruits, inspection and storage, 224
- Clam chowder, recipe, 304
- Classification of foods, 33
- Clay oven, 141
- Cleaning and care of utensils, 44
- Cleaning fish, 212
- Cleaning poultry, 213
- Cleanliness of cooks, 41
- Cleanliness, personal, 352
- Cleaver, meat cutting, 169
- Cloves, 160
- Cobbler, apple, recipe, 333
- Cobbler, fruit, recipe 333
- Cocoa
 - icing, 129
 - making cocoa, 90
 - recipe for cocoa, 349
- Coconut cream pie, recipe, 337
- Codfish cakes, recipe, 319
- Codfish chowder, recipe, 302
- Codfish, cream sauce for, 318
- Coffee, 150
 - inspection and storage, 246
 - hot coffee recipe, 349
 - making coffee, 88
- Coffee cake, 127
 - butter topping for, 128
 - fruit coffee cake, 128
 - fruit top for, 128
 - lattice top for, 128
 - recipe, 341
- Cold storage
 - see also refrigeration, preservation;
- Cole slaw, recipe, 347
- Collapsed can, definition, 216
- Collar can, definition, 216
- Collection of garbage, 358
- Color, preservation in vegetable cookery, 85
- Composition of grains, 94
- Compost pile, 371
- Consomme, definition, 77, 198
- Conversion tables
 - avoirdupois to metric system, 394
 - Centigrade to Fahrenheit, 394
 - egg conversion, 391
 - liquid measure, 392
 - milk conversion, 392
 - pounds and ounces, 394
- Cook, duties of, 9
- Cookers, fireless, 69
- Cookies, 135
 - inspection and storage, 246
 - molasses cookies, 136
 - oatmeal cookies, 136
 - sugar cookies, 136
- Cooking
 - assembling ingredients and utensils, 41
 - beef cuts divided for cooking, 180
 - by pressure, definition, 76
 - cereals, cooking, 87
 - definite plan of work, 41
 - desserts, cooking, 87
 - eggs, cooking, 85
 - field cooking, 46
 - fish, cooking, 84
 - general, 76
 - gravy, cooking, 83
 - in fat, 80
 - in water, 80
 - meats, cooking of, 197
 - principles of, 199
 - methods and terms defined, 76
 - poultry, cooking, 214
 - preparation of foods, 77
 - preservation of color in vegetable cookery, 85
 - preservation of flavor in vegetable cookery, 85
 - preservation of nutrients in vegetable cookery, 86
 - stoves and ranges, directions for use, 41
 - terminology, 76
 - timetable for cooking meats in water, 210
 - use of heat in cooking, 78
 - vegetable cookery, 85
- Cooking oils, 157
- Cooking utensils, care of, 42
 - see also utensils
- Cooks, cleanliness of, 41
- Cooling bread, 113
- Corn, 163
 - fried corn, recipe, 323
 - green corn, inspection and storage, 227
 - scalloped corn, recipe, 324
- Corn bread, definition, 91
 - recipe, 343
 - sour milk, recipe, 343
- Corn cakes, recipe, 299, 331
- Corn, canned, recipe, 323
- Corn chowder, recipe, 302
- Corn fritters, recipe, 323
- Cornmeal, 150
 - inspection and storage, 241
 - mush, cornmeal, recipes, 300
- Corn oil, 157
- Corned beef, inspection, 271
 - recipe, 306
- Cornstarch, 151
 - pudding, cornstarch, recipe, 339
- Cottonseed oil, 157
- Counts, hand-second, table of temperatures, 393
- Counts, oven, and oven temperatures, table, 393
- Crackers, inspection and storage, 245
- Cranberry sauce, recipe, 318

- Cream filling for pies, 139
- Cream gravy, recipe, 318
- Cream icing, 129
- Cream of cabbage soup, recipe, 302
- Cream of celery soup, recipe, 302
- Cream of tomato soup, recipe, 303
- Cream sauce for codfish, recipe, 318
- Creamed beef, recipe, 306
- Creoles, southern, recipe, 315
- Crimping (canning) definition, 216
- Crullers, definition, 92
 - recipe, 334
- Crumb, definition, 92
- Crust, definition, 92
- Crust, pie, 136
- Cucumber-and-onion salad, recipe, 346
- Cucumbers, 163
 - inspection and storage, 227
- Cumin, 160
- Curry of beef, recipe, 306
- Curry powder, 160
- Custard, egg, recipe, 334
- Custard pies, 139
 - recipe, 337
- Custards, 88
- Cuts
 - beef, chart showing locations of, 170
 - beef, divided for cooking, 180
 - beef, market cuts, 182
 - beef, uses of, 179
 - lamb, chart showing names of, 184
 - pork, chart showing names, 187
 - veal, chart showing names, 193
- Cutting
 - beef, 171
 - beef cutting test, 179
 - beef forequarter, 172
 - beef hindquarter, 176
 - carcass beef, 172
 - lamb, 183
 - lamb triangle, 183
 - meat cutting in general, 166
 - smoked meats, 191
 - veal, 192
- Dairy products, inspection and storage, 284
 - inspection of butter, 286
 - inspection of cheese, 288
 - inspection of milk, 284
- Dark fruit cake, recipe, 331
- Deep fat fryers, 43
- Deep fat frying, definition, 76, 80
- Defects of pies, 139
- Definitions
 - of baking, 76, 91, 197
 - of baking terms, 91
 - of barbecue, 197
 - of baste, 77, 198
 - of batter, 91
 - of bench, 91
 - of blanching in canning, 215
 - of boiling, 76, 198
 - of bouillon, 77, 198
 - of braising, 76, 198
 - of bread, 91
 - of broiling, 76, 198
 - of broth, 77, 198
 - of brown, 198
 - of buns, 91
 - of buckled cans, 215
 - of cake, 91
 - of canning, 215
 - of caramel, 91
 - of caraway seed, 91
 - of carrying rack, 91
 - of cereals, 237
 - of collapsed can, 216
 - of collar can, 216
 - of consommé, 77, 198
 - of cooking terms, 76
 - of cornbread, 91
 - of crimping in canning, 216
 - of crullers, 92
 - of crumb, 92
 - of crust, 92
 - of deep fat frying, 76
 - of dough, 92
 - of doughnuts, 92
 - of drawn butter, 77
 - of dredge, 92
 - of dried fruits and vegetables, 233
 - of exhausting in canning, 216
 - of fermentation, 92
 - of flat sour in canning, 216
 - of flipper in canning, 216
 - of fricasseeing, 76, 198
 - of frying, 76, 198
 - of gluten, 92
 - of grits, 92
 - of hominy, 92
 - of hops, 92
 - of icing, 92
 - of incubating in canning, 216
 - of ingredients, 92
 - of lard, 77
 - of larding, 198
 - of lardoon, 77, 198
 - of leaker in canning, 216
 - of leaven, 92
 - of loaf, 92
 - of marinate, 77, 198
 - of meat, 257
 - of mess management, 8
 - of oven broiling, 76
 - of pack in canning, 216
 - of pan broiling, 76, 198
 - of pan fry, 198
 - of parboil, 77, 198
 - of pinholing in canning, 216
 - of pot roast, 77, 198
 - of pressure cooking, 76
 - of processing in canning, 217

- of proofing period, 93
- of proofroom, 93
- of protein, 93
- of pyrometer, 93
- of rations, 14
- of roast, 76, 198
- of sauteing, 77, 198
- of scald, 93
- of searing, 77, 198
- of shortening, 93
- of simmering, 77, 198
- of slack dough, 93
- of spangling in canning, 217
- of sponge, 93
- of springer in canning, 217
- of steaming, 77, 198
- of stewing, 77, 198
- of stiff dough, 93
- of stock, 77, 198
- of swell in canning, 217
- of temperature, 93
- of vitamins, 93
- Degrees of temperature
 - conversion table, Centigrade to Fahrenheit, 394
- Description and composition of grains, 94
 - Desserts, cooking, 87
- Diets
 - balanced diets, 32
 - rules for balanced diets, 32
 - value of meat in diet, 166
 - water in diet, 32
- Discipline, messhall, 3
- Diseases, intestinal, 351
- Dishwashing, 366
- Disinfecting
 - chemical disinfecting, 366
- Disposal of kitchen wastes, 353
 - Disposition of infested flour, 142
- Dough
 - definition, 92
 - fermentation, 109
 - mixing, 108
 - rolls, basic dough, recipe, 343
 - short and long time dough, 121
 - slack dough, definition, 93
 - stiff dough, definition, 93
 - sweet basic dough, recipe, 340
 - sweet dough, formula for, 126
 - sweet dough, products from, 126, 127
 - temperature of, 109
- Doughnuts, 128
 - definition, 92
 - jelly doughnuts, recipe, 342
 - recipe for doughnuts, 342
 - soft icing for, 129
- Drawing poultry, 213
- Drawn butter, definition, 77
- Dredge, definition, of, 92
- Dressings, 86
 - beef dressing, recipe, 307
 - boiled dressing, recipe, 347
 - eggless salad dressing, recipe, 348
 - french dressing, recipe, 348
 - mayonnaise dressing, recipe, 348
 - mustard salad dressing, recipe, 348
 - salad dressings, 151
 - sour cream dressing, recipe, 348
 - thousand island dressing, recipe, 348
 - tomato french dressing recipe, 348
- Dried fruits, 88
 - definitions, 233
 - inspection and storage, 233, 235
- Dried vegetables, 161
- Dry cereals, inspection and storage, 242
- Dry milk, 157
- Duck
 - inspection, 290
 - roast duck, recipe, 312
- Dumplings
 - chicken stew with dumplings, recipe, 311
 - recipe for, 312
- Duties of mess officer, 8
- Duties of mess sergeant, 9
- Duties of personnel, 8
- Egg conversion table, 391
- Egg custard recipe, 334
- Eggless cake, recipe, 331
- Eggplant, 163
 - inspection and storage, 227
 - recipe for, 324
- Eggs, 151
 - cooking, 85
 - inspection, 291
- Eggs-and-brains, recipe, 310
- El Rancho stew, recipe, 316
- Electric ranges, 42
- Endive, 163
- Energy foods, 30
- Equipment and supplies, mess, 21
- Equipment, bread making, 107
- Exhausting (canning), definition, 216
- Extracts, flavoring, 152
 - inspection and storage, 255
 - lemon extract, 255
 - orange extract, 255
 - vanilla extract, 255
- Factors affecting growth of yeast in bread baking, 102
- Fahrenheit degrees
 - conversion table of Centigrade degrees, 394
- Family flour, 152
- Farina, wheat, inspection and storage, 241
- Fat backs, inspection, 270

- Fats, 31
 - cooking in, 80
 - deep fat frying, 43, 80
 - rendered, replacing lard, 156
 - shallow fat, frying in, 81
- Faults in aroma and taste, bread, 125
- Faults in color of bread crumb, 125
- Faults in bread grain, 125
- Fermentation
 - definition, 92
 - in baking, 101
 - in dough, 109
 - periods of fermentation in baking, 110
- Field baking expedients, 140
- Field bread, 122
- Field cooking, 46
- Field kitchen, arrangement of, 46
- Field ovens, 140
- Field range
 - gasoline range M1937, 56
 - installing and handling, 46
 - range M1937, installation and use on troop trains, 65
 - range No. 1, 47
 - range No. 1, installation in baggage car, 61
 - range No. 2, 48
- Field ration, 15, 16
 - accounting, 30
 - handling, 18
- Filipino ration, 14
- Filling, cream, for pies, 139
- Filling, fruit, for coffee cake, 128
- Filling, soft, for pies, 139
- Finger rolls, recipe, 344
- Fireless cookers, 69
- Fish, 211
 - baked fish recipe, 319
 - boning fish, 212
 - canned fish, 147
 - cleaning fish, 212
 - cookery, 84
 - fresh fish, 211
 - fried fresh fish, recipe, 320
 - frozen fish, 196
 - frozen fish, thawing, 196
 - frozen fish, thawing table, 197
 - inspection, 292
 - putrid fish, 212
 - skinning fish, 212
 - Spanish fish sauce, recipe, 319
 - stale fish, 212
- Flat sour, definition, 216
- Flavor
 - see also Garnishing
 - preservation of in vegetable cookery, 85
- Flavoring extracts, 152
 - inspection and storage, 255
- Flies
 - control of flies, 370
 - fly poisons, 372
 - fly traps, 373
- Flipper (canning) definition, 216
- Flour, 152
 - batter, recipe, 317
 - bleached flour, 96
 - disposition of infested flour, 142
 - family flour, 152
 - graham flour, 153
 - inspection and storage, 238
 - pastry flour, 153
 - rats and mice in flour, 142
 - self-rising, 153
 - storage of flour, 96
 - testing, 97
 - wheat flour, 95
- Food handlers, 352
- Food, canned, 147
 - see also Canned foods
 - inspection, 148
 - keeping qualities of, 149
 - storage, 149
- Food Classification, 33
- Foods,
 - energy foods, 30
 - functions of, 33
 - inspection, 10
 - preparation for cooking, 77
 - seasoning, 83
 - storage of, 11, 363
 - suspended food container, 364
 - table of weights and measures, 390
- Forced issues, 30
- Forequarter
 - beef, cutting, 172
 - veal, 194
- Form 469, 22, 28
- Frankfurter sausage in blankets, recipe, 315
- Frankfurter sausage, recipe, 315
- Fresh fish, 211
- Fresh fruits, grades, 221
- Fresh fruits, inspection, 221
- Fresh pork, general, 186
- Fresh vegetables, grades, 221
- Fresh vegetables, inspection, 221
- French dressing, recipe, 348
- French toast, recipe, 301
- Fricasseeing, definition, 76, 198
- Fricasseeing poultry, 214
- Fritters
 - beef fritters, recipe, 307
 - oatmeal, recipe, 334
- Frozen meats and fish, 196
 - thawing, 196
 - thawing table, 197
- Fruit butters, 155
- Fruit cake, dark, recipe, 331
- Fruit cobbler, recipe, 333
- Fruit coffee cake, lattice top for, 128

- Fruit filling for fruit and lattice top
 - fruit coffee cake, 128
- Fruit pies, 137
 - recipe, 336
- Fruit rolls, recipe, 330
- Fruit top coffee cake, 128
- Fruits, canned, 148
 - chilling, 148
 - inspection, 218
 - standards of, 218
 - storage, 219
- Fruits, dried, 88, 153
 - definitions, 233
 - inspection and storage, 233, 235
 - stewed, recipe, 334
- Fruits, fresh, 153
 - grades 221
 - inspection, 221
 - inspection factor table, 231
- Fruits, general, 153
 - inspection and storage of citrus fruits, 224
 - sirups from, 148
 - table of weights and measures, 389
- Fryers
 - see also Utensils
 - deep fat fryers, 43
- Frying
 - deep fat frying, definition of, 76
 - definition, 76, 198
 - how to fry meats, 207
 - in deep fat, 80
 - in shallow fat, 81
 - meats, frying, 201
 - moist foods, frying, 81
 - poultry, frying, 214
 - table of time and temperatures, 43
 - temperature table for deep fat frying, 207
- Frying pans
 - see also Utensils
- Fudge cake, 132
- Fumigation, rats, 379
- Functions of food, 33
- Garbage, 353
 - collection of, 358
 - stands, 358
 - transfer station, 360
- Garnishing, 45
- Garrison bread
 - formula and procedure, 113
- Garrison ration, 16
- Gas ranges, 43
- Gasoline field range, M1937, 56
- Geese, inspection of, 290
- Gelatin, 87, 154
 - recipe, 334
- German boiled potatoes, recipe, 327
- Ginger, 160
- Gingerbread, recipe, 343
- Giblet gravy, recipe, 318
- Glossy icing, 129
- Glove, metal mesh, 169
- Gluten, definition, 92
- Goose, roast, recipe, 312
- Grades of canned vegetables, 217
- Graham flour, 153
- Grain,
 - description and composition, 94
 - milling, 94
- Grapefruit, inspection and storage, 224
- Grapes, inspection and storage, 222
- Gravy
 - brown gravy, 83
 - brown gravy recipe, 317
 - cooking, 83
 - cream gravy, recipe, 318
 - giblet gravy, recipe, 318
 - stock gravy, recipe, 318
- Grease traps, 360
- Green pea soup, recipe 303
- Greens inspection and storage, 227
- Greens, recipe, 324
- Griddle cakes, 140
- Grinding, meat cuts for, 210
- Grits, definition, 92
- Grits, hominy, 155
- Ground meat and its uses, 210
 - suggestions for using, 211
- Gumbo, 163
- Ham
 - baked ham, recipe, 312
 - inspection, 271
 - omelet, ham, recipe, 314
 - simmered ham, recipe, 312
 - smoked ham, 191
 - smothered ham recipe, 313
- Hamburger, beef, recipe, 309, 313
- Hard rolls, baking, 119
- Harvard beets, recipe, 322
- Hash
 - beef hash, recipe, 307
 - chop suey hash, recipe, 313
 - salmon hash, recipe, 320
- Hearts, 196
 - beef hearts, stuffed, recipe, 307
 - cooking hearts, 203
 - inspection, 266
- Heat, use of in cooking, 78
- Hindquarter
 - beef, cutting, 176
 - veal, 194
- Hogs, general, 186
- Hominy
 - definition, 92
 - recipe, 324
- Hominy grits, 155
 - recipes, 300
- Honey, inspection, 256
- Hops, definition, 92
- Hot cakes, recipe, 300
- Hot cross buns, 127
- How to make a menu, 34
- How to measure, 390

Ice

see also refrigeration; preservation
calculation in baking, 103
flavored ice, recipe, 335
issues, 22

Ice cream, 90

recipe, 335

Icebox

see also refrigeration; preservation
underground icebox, 364

Iced tea, recipe, 349

Icing

cocoa icing, 129
cream icing, 129
definition, 92
glossy icing, 129
recipe for, 335
royal icing, 129
soft icing for doughnuts, 129

Improvers, baking, 106

Incinerators, 354

Incubating (canning), definition, 216

Indian pudding, baked, recipe, 339

Ingredients

cake ingredients reference table,
facing p. 126
definition, 92

Insects

larvacides, 372

Inspection

of alimentary pastes, 244
of alligator pears, 221
of apples, 221
of asparagus, 225
of avocados, 221
of bacon, 273
of baking powder, 237
of bananas, 222
of barley, 242
of beef, 260
of beets, 225
of berries, 222
of beverages, 246
of bologna, 280
of brains, 269
of broccoli, 227
of butter, 286
of cabbage, 226
of candy, 256
of canned foods, 148
of canned fruits, 218
of canned meats, 282
of canned vegetables, 217
of carrots, 226
of cauliflower, 226
of celery, 227
of cereals, 237
of cervelat, 281
of cheese, 288
of cherries, 222
of chickens, 288
of chocolate, 256

of citrus fruits, 224

of coffee, 246

of cookies, 246

of corn, 227

of cornmeal, 241

of corned beef, 271

of crackers, 245

of cucumbers, 227

of dairy products, 284

of dried beans, 233

of dried beef, 275

of dried fruits and vegetables, 233,
235

of dry cereals, 242

of ducks, 290

of eggplant, 227

of eggs, 291

of fatbacks, 270

of fish, 292

of flavoring extracts, 255

of flour, 238

of foods, 10

of fresh fruits, 221

of fresh vegetables, 221

of geese, 290

of grapefruit, 224

of grapes, 222

of greens, 227

of hams, 271

of hearts, 266

of honey, 256

of jam, 256

of jelly, 257

of kidneys, 268

of lamb, 264

of lard, 281

of lard substitute, 281

of lemon extract, 255

of lemons, 224

of lettuce, 228

of lima beans, 225

of livers, 266

of macaroni, 244

of meat, 258

of milk, 284

of meat specialties, 266

of mustard, 253

of mutton, 265

of noodles, 244

of olives, 252

of onions, 228

of orange extract, 255

of oranges, 224

of peaches, 223

of pears, 223

of peas, 228

of pickles, 252

of plums, 223

of pork, 263

of pork bellies, 270

of potatoes, 229

of poultry, 288

- of prepared cereals, 242
- of prunes, 223
- of radishes, 229
- of relishes, 252
- of rice, 234
- of rolled oats, 241
- of salt, 254
- of sauces, 253
- of sausage, 279
- of sirup, 256
- of snap beans, 225
- of spaghetti, 244
- of spinach, 227, 229
- of stringbeans, 225
- of sweet potatoes, 229
- of sweetbreads, 268
- of tea, 250
- of tomatoes, 230
- of tongues, 269
- of turkeys, 290
- of turnips, 230
- of vanilla extract, 255
- of veal, 264
- of vinegar, 254
- of wheat farina, 241
- of Worcestershire sauce, 253
- of yeast, 236
- Inspection factor table, fresh fruits and vegetables, 231
- Inspection, outline for, 368
- Inspection, sanitary, 367
- Inspectors, 6
- Installation and use of field range M1937 on troop trains, 65
- Installation of field range No. 1 in baggage car, 61
- Installation of kitchen trucks, 68
- Intestinal diseases, 351
- Iodine, 31
- Irish stew, recipe, 316
- Iron, 31
- Issues,
 - forced issues, 30
 - ice issues, 22
 - method of ration issue, 14
 - table of provisions per man per meal, 382
- Italian spaghetti, recipe, 315
- Jams, 155
 - inspection, 256
- Jelly doughnuts, recipe, 342
- Jellies, 155
 - inspection, 257
- Keeping qualities of canned foods, 149
- Kidneys, 196
 - cooking kidneys, 203
 - inspection, 268
- Kinds of rations, 14
- Kitchen, field, arrangement of, 46
- Kitchen organization, 2
- Kitchen personnel, duties of, 8
- Kitchen planning and supervision, 9
- Kitchen police, 2
 - duties, 9
- Kitchen trucks, installation of, 68
- Kitchen wastes, disposal of, 353
- Knives,
 - meat cutting, 167
 - steeling, 167
- Lamb, 182
 - chart showing location and names of bones, 185
 - chart showing location and names of wholesale cuts, 184
 - cooking, 204
 - cutting, 183
 - cutting triangle, 183
 - inspection, 264
 - storage, 265
- Lard, 155
 - definition, 77
 - inspection, 281
 - replaced by rendered or other fats, 156
 - substitute, 155
 - inspection, 281
- Larding, definition, 198
- Lardoon, definition, 77, 198
- Larvacides, 372
- Lattice top fruit coffee cake, 128
- Leaker (canning) definition, 216
- Leaven, 102
 - definition, 92
 - cake leavening agents, 131
- Leftovers
 - leftover turnips, recipe, 330
- Lemon cream pie recipe, 337
- Lemon extract
 - inspection and storage, 255
- Lemon sauce, sweet, recipe for, 319
- Lemonade, recipe, 349
- Lemons
 - inspection and storage, 224
- Lentil soup, recipe, 303
- Lettuce, 163
 - inspection and storage, 228
 - lettuce salad, recipe, 346
- Lima bean puree, recipe, 304
- Lima beans
 - canned, recipe, 321
 - dry, simmered, recipe, 321
 - fresh, 162
 - inspection and storage, 225
- Liquid measure conversion tables, 392
- Liquor from vegetables, 148
- Liver, 196
 - cooking, 203
 - inspection, 266
- Liver-and bacon, recipe, 313
- Loaf, definition, 92
- Long-time doughs, 121
- Lyonnaise potatoes, recipe, 327
- Lyster bag, 380

- Macaroni, 156
 - inspection and storage, 244
- Macaroni-and-cheese, recipe, 324
- Macaroni-and-tomato soup, recipe, 303
- Manure piles, 371
- Maple sirup, 159
- Marble cake recipe, 332
- Marinate, definition, 77, 198
- Masticators, steak, 202
- Mayonnaise, 151
 - dressing, recipe, 348
- Meals
 - issuing table of provisions per man, 382
- Measures and weights
 - how to measure, 390
 - liquid measure conversion tables, 392
 - measures and weights, 295
 - table for fruits and vegetables, 389
 - table of measures and weights, 296, 388
 - table of food weights and equivalents, 390
- Meat
 - braising, 201, 205
 - broiling, 201
 - canned, 147, 166
 - inspection, 282
 - storage, 283
 - carving and serving, 205
 - cookery tables, 205
 - cooking of, 197
 - principles, 199
 - cuts for grinding, 210
 - cutting, general, 166
 - cutting tools, 166
 - definitions, 257
 - frozen meats, 196
 - frozen meats, thawing, 196
 - frozen meats, thawing table, 197
 - frying meats, 201, 207
 - general, 166
 - ground meat and its uses, 210
 - suggestions for using, 211
 - inspection, 258
 - pan broiling, 201, 207
 - roasting, 200, 208
 - timetable for, 209
 - searing, 201
 - seasoning, 198
 - smoked, 191
 - cutting, 191
 - specialties, 195
 - inspection, 266
 - table of, 195
 - stewing, 201, 209
 - timetable for cooking in water, 210
 - value in diet, 166
- Meat loaf, recipe, 313
- Meat saw, 169
- Menus, 34
 - balanced menu, 32
 - daily bill of fare, 30
 - form for bill of fare, 26
 - how to make a menu, 34
 - minimum standard 10-day menu, 396
 - planning, 34
 - sample menu, 35
 - substitution lists, 36
 - variety, 4
- Meringue, recipe, 336
- Mess equipment and supplies, 21
- Mess management, definition, 8
- Mess officer, duties, 8
- Mess personnel, duties, 8
- Mess records, 21
- Mess sanitation, general, 350
- Mess sergeant, duties, 9
- Messhall discipline, 3
- Messing on troop trains, 68
- Messkits, cleaning, 366
- Metal mesh glove, 169
- Methods of cooking, and terms defined, 76
- Metric system to avoirdupois, table of conversion, 394
- Mice and rats in flour, 142
- Milk
 - baking, uses in, 106
 - buttermilk, 157
 - condensed milk, 156
 - conversion table, 392
 - dry milk, 157
 - evaporated milk, 156
 - fresh milk, 157
 - inspection and storage, 284
 - milk toast recipe, 301
- Milling of grain, 94
- Mince pie recipe, 338
- Mincemeat, recipe, 336
- Minerals, 31
- Minimum standard 10-day menu, 396
- Mixing dough, 108
- Most foods, frying, 81
- Molasses cookies, 136
- Mold (bread) 143
- Muffins, 139
- Mush, cornmeal, recipes, 300
- Mush, rolled wheat, recipe, 300
- Mushrooms-and-beefsteak recipe, 310
- Mustard, 160
 - inspection and storage, 253
- Mustard salad dressing, recipe, 348
- Mutton
 - chops, recipe, 313
 - cooking, 204
 - inspection, 265
 - potpie, recipe, 313
 - simmered, recipe, 313
 - stew, recipe, 313

- Niacin, 32
- Noodle soup, recipe, 303
- Noodles, 156
 - inspection and storage, 244
 - recipe, 303
- Nutmeg, 160
- Nutrients
 - preservation in vegetable cookery, 86
- Nutrition, general, 30
- Oatmeal
 - cookies, 136
 - fritters, recipe, 334
 - recipe for, 301
- Oats, rolled, inspection and storage, 241
- Officer, mess
 - see Mess Officer
- Oils
 - cooking oils, 157
 - corn oil, 157
 - cottonseed oil, 157
 - olive oil, 157
 - peanut oil, 157
 - salad oil, 157
- Okra, 163
- Oleomargarine, 157
- Olive oil, 157
- Olives, 158
 - inspection and storage, 252
- Omelets
 - cheese omelet, recipe, 314
 - ham omelet, recipe, 314
 - plain omelet, recipe, 313
 - tomato omelet, recipe, 314
- Onions, 163
 - boiled, recipe, 324
 - dry, inspection and storage, 228
 - fried, recipe, 325
 - green, inspection and storage, 228
- Onions-and-Beefsteak, recipe, 310
- Onion-and-Cucumber salad, recipe, 346
- Onions-and-grated cheese, recipe, 325
- Orange extract
 - inspection and storage, 255
- Oranges
 - inspection and storage, 224
- Organization of kitchen, 2
- Ounces and pounds, table of conversion, 394
- Outline for inspection, 368
- Oven broiling, definition, 76
- Oven, clay, 141
- Oven counts, 79
 - and oven temperatures, table, 393
- Oven, field, 140
- Oven, steam in, 113
- Oven temperatures, and oven counts, table, 393
 - practical method of determining, 79
- table determined by hand-second counts, 393
- Oxtail soup, recipe, 303
- Oxtails, 196
 - cooking, 203
- Oyster stew, recipe, 303
- Oysters
 - fried oysters, recipe, 320
 - scalloped, recipe, 320
- Pack (canning) definition, 216
- Pan broiling, definition, 76, 198
- Pan fry, definition, 198
- Panning cakes, 133
- Pan rolls, recipe, 344
- Pans
 - see also utensils
 - burning-in pans, 44
- Parboil, definition, 77, 198
- Parker house rolls, 127
 - recipe, 344
- Parsley, 164
- Parsnips, 164
 - baked parsnips, recipe, 325
 - mashed, recipe, 325
 - sugared, recipe, 325
- Pastes, alimentary, inspection and storage, 244
- Pastry flour, 153
- Peanut oil, 157
- Pea puree recipe, 304
- Peaches
 - fresh, inspection and storage, 223
 - stewed dried peaches, recipe, 336
- Pears, alligator
 - see Alligator pears
- Pears, fresh, inspection and storage, 223
- Peas, 164
 - creamed, canned, recipe, 325
 - fresh, inspection and storage, 228
 - green, recipe, 325
- Peas-and-tomato puree, recipe, 304
- Pepper, 159
- Peppers, 164
- Percentage method, bread formulas, 113
- Personal cleanliness, 352
- Pickles, 158
 - inspection and storage, 252
- Piccalilli salad, recipe, 346
- Pies
 - apple pie, recipe, 336
 - baking, 136
 - banana cream pie, recipe, 337
 - chocolate meringue, recipe, 337
 - coconut cream pie, recipe, 337
 - cream fillings, 139
 - crust, 136
 - recipes, 336
 - custard pies, 139
 - recipe, 337

- defects of pies, 139
- fruit pies, 137
 - recipes, 336
- handling and baking, 138
- kinds of pies, 137
- lemon cream pie, recipe, 337
- meringue recipe, 336
- mince pie, recipe, 338
- pumpkin or squash pies, 139
 - recipe, 338
- soft fillings, 139
- squash pie, recipe, 338
- stewed dried peaches, recipe, 336
- Pimento salad, recipe, 346
- Pinholing (canning) definition, 216
- Place of pork in Army mess, 187
- Placing foods on dishes, 44
- Plain omelet recipe, 313
- Plan of work for cooking, 41
- Planning
 - kitchen planning and supervision, 9
 - planning the menu, 34
- Plum pudding
 - recipe, 339
 - sauce recipe, 318
- Plums, fresh, inspection and storage, 223
- Pointers about pork, 187
- Poppy seed, 160
- Pork
 - bellies, inspection, 270
 - chart showing location and names of bones, 188
 - chart showing location and names of wholesale cuts, 187
 - chops, recipe, 314
 - cooking, 203
 - cutlets, recipe, 314
 - fresh pork, 186
 - preparing, 189
 - inspection, 263
 - place of pork in Army mess, 187
 - pointers about pork, 187
 - roast, recipe, 314
 - sausage in blankets, recipe, 314
 - sausage recipe, 314
 - storage, 263
 - sundry cuts, cooking, 204
- Potato cakes, recipe, 326
- Potato chowder, recipe, 304
- Potato puree, recipe, 304
- Potato salad, recipe, 346
- Potato soup, recipe, 304
- Potatoes
 - au gratin, recipe, 326
 - baked, recipe, 326
 - boiled, recipe, 326
 - boiled in jackets, recipe, 326
 - browned, recipe, 326
 - cheesed, recipe, 326
 - creamed, recipe, 326
 - french baked, recipe, 327
 - french fried, recipe, 327
 - fried, recipe, 327
 - German boiled, recipe, 327
 - hash browned, recipe, 327
 - Irish potatoes, 164
 - inspection and storage, 229
 - Lyonnaise, recipe, 327
 - mashed, recipe, 327
 - sauteed, recipe, 327
- Potpie
 - beef potpie, recipe, 308
 - beefsteak potpie, recipe, 310
 - mutton potpie, recipe, 313
- Pot roast
 - beef pot roast, 201
 - recipe, 306, 308
 - definition, 77, 198
- Pots
 - see also Utensils
- Poultry, 212
 - broiling, 214
 - chickens, kinds and uses, 212
 - cleaning, 213
 - drawing, 213
 - fricasseeing, 214
 - frying, 214
 - inspection and storage, 288
 - inspection and storage of chickens, 288
 - inspection of ducks, 290
 - inspection of geese, 290
 - inspection of turkeys, 290
 - methods of cooking, 214
 - stewing, 214
 - turkeys, kinds and uses, 213
- Pounds and ounces, table of conversion, 394
- Powder, baking, 145
- Preparation of foods for cooking, 77
- Prepared cereals, inspection and storage, 242
- Preparing fresh pork, 189
- Preservation
 - keeping qualities of canned foods, 149
 - of color, vegetable, cookery, 85
 - of flavor, vegetable, cookery, 85
 - of foods. See Refrigeration
 - of nutrients, vegetable cookery, 86
- Preserves, 155
- Pressure cooking, definition, 76
- Pressures
 - boiling point of water under various pressures, 391
- Prickly pears
 - see Avocados
- Principles of cooking meats, 199
- Processing (canning), definition, 217
- Products from basic sweet dough, 127
- Proofing period, definition, 93
- Proofroom, definition, 93

- Proteins, 31
 - definition, 93
- Prunes, fresh
 - inspection and storage, 223
- Prunes, stewed, recipe, 338
- Puddings, 87
 - apple pudding, recipe, 338
 - banana, pudding, recipe 338
 - bread pudding with sauce, recipe, 339
 - cornstarch pudding, recipe, 339
 - Indian pudding, baked, recipe, 339
 - Plum pudding, recipe, 339
 - sauce recipe, 318
 - rice pudding, recipe, 339
 - rice-and-apple pudding, recipe, 340
 - sweet potato pudding, recipe, 340
 - tapioca pudding, recipe, 340
 - Yorkshire pudding, recipe, 317
- Pumpkin
 - baked pumpkin, recipe, 328
 - fresh pumpkin, 164
 - pumpkin pies, 139
 - recipe, 338
- Purees
 - bean, 304
 - carrots, 304
 - green peas, 304
 - green peas and tomatoes, 304
 - lima beans, 304
 - potatoes, 304
 - split peas, 304
- Putrid fish, 212
- Pyrometer, definition, 93
- Quick cake recipe, 332
- Rack, carrying, definition of, 91
- Radishes, 164
 - inspection and storage, 229
- Raised cake recipe, 332
- Raisin bread,
 - formula and procedure, 119
 - recipe, 344
- Ranges
 - see also Cookers
 - directions for use, 41
 - electric ranges, 42
 - field gasoline range, M1937, 56
 - installation on troop trains, 65
 - field range No. 1, 47
 - installation in baggage car, 61
 - field range No. 2, 48
 - gas ranges, 43
 - installing and handling, 46
- Rations
 - definition, 14
 - field ration, 15, 16
 - accounting, 30
 - Filipino, 14
 - handling, 18
 - garrison, 16
 - kinds, 14
 - method of issue, 14
 - methods of supply, 20
 - returns, 22
 - savings, 4, 22
 - supply methods, 20
 - travel ration, 15, 19
- Rats
 - antirrat campaigns, 379
 - control, 377
 - fumigation, 379
 - in flour, 142
 - survey of rats, 379
 - traps, 378
- Raw vegetable salad, recipe, 347
- Reblueing utensils, 44
- Recipes, index to, 296
- Recipes, introduction, 295
- Records, 5
 - record cards, stock (form 424), 30
 - mess records, 21
 - stock record form, 27
- Reference table of cake ingredients,
 - facing page 126
- Refrigeration, 11
- Reindeer, cooking, 205
- Religious taboos, 4
- Relishes
 - inspection and storage, 252
- Rendered fats replacing lard, 156
- Requisitions, 21
- Rhubarb sauce, recipe, 318
- Rice, 158
 - boiled rice, recipe, 328
 - curried rice, recipe, 328
 - fried rice, recipe, 328
 - inspection and storage, 234
 - rice pudding, recipe, 339
 - soup, recipe, 304
 - Spanish rice, recipe, 328
 - Steamed rice, recipe, 329
- Rice-and-apple pudding, recipe, 340
- Rice-and-tomato soup, recipe, 305
- Roast, pot
 - see Pot roast
- Roasting, definition, 76, 198
 - how to roast meats, 200, 208
 - roast pork, recipe 314
 - roast turkey, recipe, 317
 - roast veal, recipe, 317
 - timetable for roasting meats, 209
- Rodents
 - see also Rats
 - Rats and mice in flour, 142
- Rolled oats
 - inspection and storage, 241
- Rolls
 - Apple rolls, recipe, 330
 - baking hard and soft rolls, 119
 - basic dough, recipe for, 343
 - cinnamon rolls, recipe, 342, 344
 - finger rolls, recipe, 344
 - fruit rolls, recipe for, 330

- pan rolls, recipe, 344
- parker house rolls, 127, 342, 344
- Rope (bread), 142
- Royal icing, 129
- Rubbish disposal, 360
- Rules for balanced diet, 32
- Rye bread, formula and procedure, 118
- Rye flour, 153
- Sage, 160
- Salad dressings, 151
 - eggless, 348
- Salads, 86
 - Apple-and-celery salad recipe, 345
 - baked bean salad, recipe, 345
 - cabbage-and-apple salad, recipe, 345
 - cabbage salad, recipe, 345
 - celery salad, recipe, 346
 - chicken salad, recipe, 346
 - cucumber-and-onion salad, recipe, 346
 - lettuce salad, recipe, 346
 - oil, salad, 157
 - piccalilli salad recipe, 346
 - pickled beet salad, recipe, 345
 - pimiento salad, recipe, 346
 - potato salad, recipe, 346
 - raw vegetable salad, recipe, 347
 - salmon salad, recipe, 347
 - stringless bean salad, recipe, 345
 - vegetable salad, recipe, 347
- Salmon
 - cakes, recipe, 320
 - hash, recipe, 320
 - salad, recipe, 347
- Salt, 158
 - baking, 104
 - inspection and storage, 254
- Sample menu, 35
- Sandwich buns, recipe, 345
- Sanitary inspection, 367
- Sanitation, mess, general, 350
- Sauces
 - barbecue, recipe, 318
 - chocolate, sweet, recipe, 319
 - cranberry, recipe, 318
 - cream, for codfish, 318
 - inspection and storage, 253
 - lemon, sweet, recipe, 319
 - plum pudding, recipe, 318
 - rhubarb, 318
 - Spanish fish sauce, recipe, 318
 - tomato sauce, recipe, 319
 - inspection and storage, 253
 - vanilla, sweet sauce, recipe, 319
 - inspection and storage, 253
- Sauerkraut, 158
 - recipe for, 329
- Sausage, 197
 - bologna, fried, recipe, 314
 - cooking, 205
 - frankfurters in blankets, recipe, 315
 - frankfurters, recipe, 315
 - inspection, 279
 - pork sausage in blankets, recipe, 314
 - pork sausage recipe, 314
- Sauteing
 - definition, 77, 198
- Savings, ration
 - see Rations savings
- Saw, meat, 169
- Scald, definition, 93
- Scalding cakes, 133
- Scallions, 164
- Scoring factors, bread, 44
- Sea food
 - see also Fish; Oysters, etc.
 - boning fish, 212
 - canned fish, 147
 - canned sea food, 147
 - clam chowder recipe, 302
 - cleaning fish, 212
 - codfish cakes, recipe, 319
 - codfish chowder, recipe, 302
 - cream sauce for codfish, recipe, 318
 - fish, 211
 - cookery, 84
 - fresh fish, 211
 - frozen fish, 196
 - thawing frozen fish, 196
 - thawing table for frozen fish, 197
 - inspection, 292
 - putrid fish, 212
 - skinning fish, 212
 - stale fish, 212
 - fried oysters, recipe, 320
 - oyster stew, recipe, 303
 - oysters, scalloped, recipe, 320
- Searing definition, 77, 198
 - meats, 201
- Seasoning
 - foods, 82
 - meats, 198
- Self-rising flour, 153
- Sergeant, mess
 - see Mess Sergeant
- Serving
 - carving and serving meats, 205
 - placing foods on dishes, 44
 - service of meals, 44
 - serving on troop trains, 68
- Short-and-long-time doughs, 121
- Short ribs of beef, recipe, 315
- Shortcakes, 87
- Shortening
 - baking, 105
 - cakes with, 130
 - cakes without, 130, 134
 - definition, 93
- Simmering, 199
 - definition, 77, 198

- Sirup, 159
 - from fruits, 148
 - inspection, 256
 - maple sirup, 159
- Sizes of cans, 220
- Skillets
 - see also Utensils
- Skinning fish, 212
- Slack dough, definition, 93
- Slaw, recipe, 347
- Smoked meats
 - cutting, 191
 - general, 191
 - ham, smoked, 191
- Snap beans, inspection and storage, 225
- Soaking pits, 360
- Soakage trenches, 361
- Soapmaking, 395
- Soda, baking, 145
- Soft bun bread, recipe, 344
- Soft rolls, baking, 119
- Soft icing for doughnuts, 129
- Soups, 82
 - see also Chowder; Purees;
 - barley soup recipe, 301
 - barley-and-tomato soup, recipe, 301
 - bean soup recipe, 301
 - beef soup, recipe, 301
 - chicken soup, recipe, 302
 - cream of cabbage soup, recipe, 302
 - cream of celery soup, recipe, 302
 - cream of tomato soup, recipe, 303
 - greenpea soup, recipe, 303
 - gumbo, 163
 - lentil soup, recipe, 303
 - macaroni-and-tomato soup, recipe, 303
 - noodle soup, recipe, 303
 - okra, 163
 - oxtail soup, recipe, 303
 - potato soup recipe, 304
 - rice soup, recipe, 304
 - split pea soup, recipe, 304
 - stock for soup, 82
 - tomato soup, recipe, 305
 - tomato-and-macaroni soup, recipe, 303
 - tomato-and-rice soup, recipe, 305
 - vegetable soup, recipe, 305
- Sour cream dressing, recipe, 348
- Sour milk biscuits, recipe, 343
- Sour milk cornbread, recipe, 343
- Southern creoles, recipe, 315
- Spaghetti, 156
 - inspection and storage, 244
 - Italian style, recipe, 315
- Spangling (canning), definition, 217
- Spanish beef, recipe, 309
- Spanish fish sauce, recipe, 319
- Spareribs, recipe, 315
- Specification beef, cooking, 202
- Spiced cake, 133
 - recipe, 332
- Spices, 159
 - inspection and storage, 255
- Spinach, 165
 - inspection and storage, 227, 229
- Split pea puree, recipe, 304
- Split pea soup, recipe, 304
- Spoilage
 - causes of canned foods spoilage, 219
 - disposition of infested flour, 142
- Sponge, definition, 93
- Sponge cake, 135
 - butter sponge cake, 135
 - recipe, 333
- Springer (canning), definition, 217
- Squash, 165
 - baked squash, recipe, 329
 - canned baked squash, recipe, 329
 - mashed squash, recipe, 329
 - pies, 139
 - recipe, 338
- Stale fish, 212
- Standards of canned fruits, 218
- Stands, garbage
 - see Garbage stands
- Starch, 160
 - starchy vegetables, 161
- Steak, chuck, with onions, recipe, 312
- Steak masticators, 202
- Steam in oven, baking, 113
- Steaming, definition, 77, 198
- Sterilization, water, 380
 - see also Lyster bag
- Stew
 - chop suey stew, recipe, 316
 - definition, 198
 - El rancho stew, recipe, 316
 - Irish stew, recipe, 316
 - meats, how to stew, 209
 - mutton stew recipe, 313
 - oyster stew, recipe, 303
 - pan stew, recipe, 316
- Stewing, definition, 77
 - meats, 201
 - poultry, 214
- Stiff dough, definition, 93
- Stock, definition, 77, 198
 - for soup, 82
- Stock gravy recipe, 318
- Stock record cards (form 424), 30
- Stock record forms, 27
- Stollen, recipe, 342
- Storage
 - alimentary pastes, 244
 - alligator pears, 221
 - apples, 221
 - asparagus, 225
 - avocados, 221
 - baking powder, 237
 - bananas, 222
 - barley, 242

- beans, dried, 233
- beef, 262
- beets, 225
- berries, 222
- beverages, 246
- bread, 113
- broccoli, 227
- cabbage, 226
- canned foods, 149
- canned fruits, 219
- canned meats, 283
- canned vegetables, 219
- carrots, 226
- cauliflower, 226
- celery, 227
- cereals, 237
- cereals, dry, 242
- cereals, prepared, 242
- cheese, 288
- cherries, 222
- chickens, 288
- citrus fruits, 224
- coffee, 246
- cookies, 246
- corn, 227
- cornmeal, 241
- crackers, 245
- cucumbers, 227
- dairy products, 284
- dried fruit, 235
- dried fruits and vegetables, 233
- eggplant, 227
- flavoring extracts, 255
- flour, 96, 238
- foods, 11, 363
- grapefruit, 224
- grapes, 222
- greens, 227
- lamb, 265
- lemon extract, 255
- lemons, 224
- lettuce, 228
- lima beans, 225
- macaroni, 244
- milk, 284
- mustard, 253
- noodles, 244
- olives, 252
- onions, 228
- orange extract, 255
- oranges, 224
- peaches, 223
- pears, 223
- peas, 228
- pickles, 252
- plums, 223
- pork, 263
- potatoes, 229
- poultry, 288
- prunes, 223
- radishes, 229
- relishes, 252
- rice, 234
- rolled oats, 241
- salt, 254
- saucers, 253
- snap beans, 225
- spaghetti, 244
- spices, 255
- spinach, 227, 229
- stringbeans, 225
- suspended food container, 364
- sweet potatoes, 229
- tea, 250
- tomato sauce, 253
- tomatoes, 230
- turnips, 230
- vanilla extract, 255
- vinegar, 254
- wheat farina, 241
- Worcestershire sauce, 253
- yeast, 236
- Storeroom, 13
- Stoves and ranges, directions for use, 41
- "Stretching", 6
- Stringbeans, 162
 - canned, recipe, 321
 - fresh, recipe, 322
 - inspection and storage, 225
- Stringless bean salad, recipe, 345
- Struesel topping, 128
- Substitution lists (menu), 36
- Succotash, recipe, 329
- Sugar, 160
 - baking with substitutes, 104
 - cookies, 136
 - cinnamon topping, 129
- Suggestions for using ground meat, 211
- Supply
 - mess equipment and supplies, 21
 - methods of ration supply, 20
- Survey, rats, 379
- Suspended food container, 364
- Sweet dough
 - basic, recipe for, 340
 - formula for, 126
 - products from, 127
 - products, general, 126
- Sweet potatoes, 158
 - baked, recipe, 328
 - boiled, recipe, 328
 - candied, recipe, 328
 - fried, recipe, 328
 - Inspection and storage, 229
 - pudding, recipe, 340
- Sweetbreads, 195
 - cooking, 203
 - inspection, 268
- Swell (canning), definition, 217
- Syrup
 - see Sirup
- Tables
 - avoirdupois to metric system, con-

- version, 394
- beef cuts divided according to cooking uses, 180
- can capacity, 220
- Centigrade to Fahrenheit degrees, 394
- deep-fat frying temperatures, 207
- egg conversion table, 391
- Fahrenheit to Centigrade degrees, 394
- frying, time and temperatures for, 43
- liquid measure conversion, 392
- meat cookery, 205
- meat specialties, 195
- milk conversion, 392
- oven counts and temperatures, 393
- oven temperatures determined by hand-second counts, 393
- pounds and ounces, 394
- provisions per man per meal, 382
- thawing frozen meats and fish, 197
- water weights, 395
- weights and measures, 296, 388
 - food equivalents, 390
- fruits and vegetables, 389
- Taboos, religious, 4
- Tails, cooking, 203
- Tamales, recipe, 316
- Tapioca, 160
 - pudding, recipe, 340
- Tea, 161
 - hot tea, recipe, 349
 - iced tea, recipe, 349
 - inspection and storage, 250
 - making tea, 89
- Temperatures
 - definition, 93
 - conversion of Centigrade to Fahrenheit degrees, 394
 - for deep fat frying, 207
 - for dough, 109
 - frying temperatures, 43
 - oven temperatures, determining, 79
 - oven counts and temperatures, 393
 - oven temperatures determined by hand-second counts, 393
 - water temperature in baking, 107
- Ten-day menu, minimum standard, 396
- Terminology
 - see also Definitions
 - chart showing cuts of beef, 170
 - chart showing names of beef bones, 171
 - chart showing names of lamb bones, 185
 - chart showing names of lamb cuts, 184
 - chart showing names of pork cuts, 187
 - chart showing names of pork bones, 188
 - chart showing names of veal bones, 194
 - chart showing names of veal cuts, 193
 - market cuts of beef, 182
 - methods of cooking and terms defined, 76
- Test, beef cutting, 179
- Testing flour, 97
- Thawing frozen meats and fish, 196
 - thawing tables, frozen meats and fish, 197
- Thousand Island dressing, recipe, 348
- Timetable and temperatures for frying, 43
- Timetable for braising, 206
- Timetable for roasting meats, 209
- Tin cans, disposal of, 360
- Toast
 - chipped beef on toast, recipe, 307
 - dried beef on toast, recipe, 307
 - French toast, recipe, 301
 - milk toast, recipe, 301
 - sliced beef on toast, recipe, 307
- Tomato french dressing, recipe, 348
- Tomato omelet recipe, 314
- Tomato sauce
 - inspection and storage, 253
 - recipe, 319
- Tomato soup, recipe, 305
- Tomato-and-Barley soup, recipe, 301
- Tomato-and-pea puree, recipe, 304
- Tomato-and-rice soup, recipe, 305
- Tomatoes, 165
 - fresh, inspection and storage, 230
 - sliced, recipe, 347
 - stewed, recipe, 330
- Tongue, 196
 - cooking, 203
 - inspection, 269
- Tools
 - see also Utensils
- Trains, troop
 - installation and use of field range M1937, 65
 - messaging, 68
 - serving, 68
- Transfer station, garbage, 360
- Transportation of beef, 262
- Travel ration, 15, 19
 - accounting, 30
- Trench, open, baking in, 142
- Triangle, lamb, cutting, 183
- Troop trains
 - installation and use of field range M1937, 65
 - messaging, 68
 - serving, 68
- Trucks, kitchen, installation of, 68

- Turkeys
 - inspection, 290
 - kinds and uses, 213
 - roast turkey, recipe, 317
- Turkish beef, recipe, 309
- Turnips, 165
 - boiled, recipe, 330
 - inspection and storage, 230
 - left over turnips, recipe, 330
 - mashed, recipe, 330
- Underground icebox, 364
- Utensils
 - assembling, 41
 - bread making equipment, 107
 - care and cleaning, 4, 44
 - meat cutting knives, 167
 - meat cutting cleaver, 169
 - meat cutting tools, 166
 - meat saw, 169
 - metal mesh glove, 169
 - rebluing, 44
 - steeling knives, 167
- Vanilla extract
 - inspection and storage, 255
 - recipe for, 319
- Veal
 - chart showing location and names of bones, 194
 - chart showing location and names of wholesale cuts, 193
 - cooking, 204
 - cutlets, recipe, 317
 - cutting, 192
 - forequarters, 194
 - general, 192
 - hindquarters, 194
 - inspection, 264
 - roast veal, recipe, 317
- Vegetable bin, 365
- Vegetable salad, recipe, 347
- Vegetable soup, recipe, 305
- Vegetables
 - braised beef with vegetables, recipe, 306
 - canned, 148
 - grades of, 217
 - inspection of, 217
 - storage, 219
 - cookery, 85
 - definitions, 233
 - dehydrated, 161
 - fresh, 161
 - grades of, 221
 - inspection, 221
 - inspection and storage, 233
 - inspection factor table, 231
 - leafy vegetables, 161
 - liquor from vegetables, 148
 - preservation of color in cooking, 85
 - preservation of flavor in cooking, 85
 - preservation of nutrients in cooking, 86
 - starchy vegetables, 161
 - table of weights and measures, 389
- Vinegar, 165
 - inspection and storage, 254
- Vitamins, 31
 - definition, 93
- Wastes, kitchen, disposal of, 353
- Water
 - adjustment of temperatures in baking, 107
 - boiling point under various pressures, 391
 - cooking in water, 80
 - in diet, 32
 - Lyster bag sterilization, 380
 - table of weights, 395
 - timetable for cooking meats in water, 210
 - use of water in baking, 102
- Weights and measures, 295
 - weight of beef carcass, 170
 - conversion table, avoirdupois to metric system, 394
 - table of weights and measures, 296
 - table of conversion of pounds and ounces, 394
 - table of water weights, 395
 - fruits and vegetables, table of weights, 389
 - table foods, weights and equivalents, 390
 - table of weights and measures, 388
- Wheat, 94
- Wheat cakes, recipe, 300
- Wheat farina, inspection and storage, 241
- Wheat flour, 95
- Wheat mush, rolled, recipe, 300
- White cake, recipe, 333
- Whole wheat bread, formula and procedure, 117
- Wholesale market cuts of beef for small messes, 182
- Window washing, 395
- Worcestershire sauce, inspection and storage, 253
- Yeast, 165
 - action in dough, 101
 - compressed, inspection and storage, 236
 - description, 98
 - dried, inspection and storage, 236
 - factors affecting bread making, 102
 - importance of, 98
 - kinds, 98
- Yorkshire pudding, recipe, 317

UC 703 A741 1942

14110400R



NLM 05098685 1

NATIONAL LIBRARY OF MEDICINE