is a subset of a larger testing issue faced by the National Toxicology Program.

• At a National Institute of Environmental Health Sciences Conference on Agricultural Chemical Utilization and Human Health, the need for further chemical testing to address organ function, perinatal toxicity, immunotoxicity, and chronic and delayed effects including cancer and delayed nervous system manifestations (and testing of combinations of chemicals) was strongly recommended.

▸ A second area where basic research needs to play an important role is in the emerging area of agricultural biotechnology. Genetically engineered microorganisms promise substantial benefits for food production throughout the world.

Potential benefits include new crop varieties that will benefit the grower through lower input costs and increased productivity, the food processor through production of higher-quality and consistent products, and ultimately the consumer through production of more appealing and nutritious foods. Use of biotechnology in agriculture has potentially significant implications for agricultural safety and health.

Two potentially lowered risks that may accrue through use of agricultural biotechnology include:

1. Reduced use or replacement of agricultural chemicals now known to be harmful to human health.

2. Reduced field exposures to crop production, especially to farm machinery, which is known to be the single greatest risk in farming.

Biotechnology is currently being regulated by EPA through the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA; 7 U.S.C. 136-136y) and regulation adopted in 1984 (49 Federal Register 40659), the Toxic Substances Control Act (TSCA; 5 U.S.C. 2601-2929), and by the USDA through provisions of the Plant Pest Act (7 U.S.C. 15Oaa-jj) and regulations adopted in June of 1987 (CFR Part 330).

• While regulation of this emerging technology provides some assurance that appropriate testing will be done, from a public health perspective it is essential that necessary testing for adverse effects on plants and animals be conducted in the laboratory and in small field experiments.

Experience to date suggests that the use of biotechnology in agriculture will not be associated with unpredictable exposures that cannot be addressed using appropriate work practices.[5]

Disease and Injury Surveillance

The development of disease and injury surveillance or information systems is a very high priority for the advancement of agricultural safety and health research. As surveillance is covered by another speaker, I will confine my comments to those information systems especially important to epidemiological research. These information systems fall in two categories—those dealing with health effects (injuries and diseases) and those dealing with exposures (cohorts with specific exposures or systems defining exposures to which human or animal populations may be linked).

• Information systems that are especially useful in epidemiology are specific disease and injury registries. Often existing cancer registration data is available from state or

hospital data. Use of these information systems is an inexpensive and powerful epidemiologic tool.

Through the State Health Registry of Iowa at the University of Iowa, we are now able to register birth defect and cancer incidence. An Alzheimer's Disease Registry has also been developed for some counties, and a Rural Injury Surveillance System is now under development.

These health effect registries are especially useful as they allow systematic collection of large numbers of specific types of birth defects, cancers, or injuries that can then be studied quantitatively through the use of case control studies. This approach has been used effectively in the assessment of risk factors for a variety of specific types of cancer.

The same approach is now being applied to birth defects, which have an added advantage of having a much shorter latency (hence more accessible and valid data). In the case of injuries, there is no latency and the circumstances of injury are usually clear. This will allow the injury registry to collect more data at the time of the event and thus reduce the time and cost of case control studies.

Epidemiological Studies

• A significant problem in assessment of surveillance and epidemiological data is the lack of adequate exposure data. The development of exposure registries is, therefore, especially attractive.

For instance, large cohorts of pesticide applicators who must be licensed to do their work now provide an especially important opportunity for epidemiological research through record linkage to cancer and birth defect registries. Data on the sale of certain farm chemicals provide another type of exposure registry. Another type may be derived from widespread testing of drinking water for nitrates and pesticides.

While these exposure registries usually provide evidence of exposure to certain agricultural chemicals, epidemiological research requires much more detail in terms of the types and amounts of specific chemical use, the time-frames of use, the type of application, and the use (and non-use) of protective equipment. These types of data must almost always be collected retrospectively, but could be collected prospectively in a small cohort or in a sample of a larger cohort.

Collection of representative exposure data is also essential in cross-sectional studies of injuries and health effects. These data are necessary in order to derive exposure response relationships, which are essential to the development of guidelines for reduction of exposures and the prevention of diseases and injuries.

• There are very few trained industrial hygienists specializing in agriculture. The need for these skills in the collection and interpretation of environmental data is critical to advance agricultural health and safety research.

Demonstration and Education Research

Closely related to epidemiological research is the area of demonstration and education research that utilizes intervention studies. While epidemiological research may clearly show an excess in a certain type of cancer, birth defect, respiratory disease or specific type of injury, a valid model for

intervention may not be available or may be difficult to implement.

The traditional intervention model in occupational safety and health is that of regulation, which has seen some significant successes, such as the reduction of respiratory disease through the regulation of coal mine dust and cotton dust. Occupational safety and health regulation has, however, been greatly diminished over the past decade, and agriculture has traditionally not been a regulated industry.

If we cannot develop a U.S. model for a proven intervention on the single most important cause of agricultural mortality, how can we succeed in addressing less dramatic yet still important causes of agricultural diseases and injuries?

As a result, more innovative intervention methods for disease and injury prevention are needed in agricultural safety and health. A good example of the need for such a model is the prevention of tractor roll-over deaths through the application of roll-over protective structures (ROPS) on both new and older tractors.

The epidemiological evidence for the very significant risk posed by tractors without ROPS is clear. The data available from Sweden, which mandated such a program, makes it equally clear that ROPS can prevent almost all tractor roll-over deaths.

• An important question for this conference is whether an American intervention model can be developed that can produce a significant reduction of tractor roll-over deaths and injuries. A second question, with much broader ramifications, is, "If we cannot develop a U.S. model for a proven intervention on the single most important cause of agricultural mortality, how can we succeed in addressing less dramatic yet still important causes of agricultural diseases and injuries?"

Health Services Research

An observation made by Dr. James A. Dosman in his summary of the research workshops prior to the conference, "Agricultural Occupational and Environmental Health: Policy Strategies for the Future," was the following:

> *It is striking that the organized scientific documentation of specific health risks is occurring at a time when changing rural economic resources and family and rural community infrastructures are leaving few community resources to alter specific risk patterns. Thus, the assessment and presentation of health and family-life deficiencies must be viewed in a climate of economic adjustment, rural population decline, and loss of personal, financial, and social control by individuals and families. However, one must realize that whereas all these changes are occurring simultaneously, unacceptable injury, death, and dysfunction are occurring on the farms and in rural areas. This conundrum describes a widening gap in diagnostic and preventive health services, and in family support services, between rural dwellers and city dwellers.*[6]

While this paper is not intended to address the very broad field of health services research, this quotation points out that there are significant differences between rural populations and their urban counterparts, which must be taken into account in conducting epidemiological research. In nearly every parameter of health—disease

and injury incidence, availability of health care, and related social services —people living in rural areas have less favorable statistics than their urban counterparts.[7] Especially vulnerable are migrant agricultural workers who are at triple jeopardy—poor, rural and uninsured.

• These social service and health-care delivery factors clearly influence the incidence of rural injuries and diseases and point up the importance of interaction and collaboration between those engaged in agricultural health and safety research with rural sociologists and those engaged in rural health care delivery research.

AGRICULTURAL DISEASE AND INJURY RESEARCH PRIORITIES

Injury Morbidity and Mortality

Available data on the risk of injury and traumatic death consistently reflect a higher injury risk to those living in rural compared to urban areas, with a mortality rate for unintentional injuries twice that of urban areas.[8] This excess is attributable to several factors, including increased mortality from motor and non-motor vehicle deaths arising from higher speeds on poorer roads, less seat belt use, more use of high-risk utility vehicles, and poorer access to trauma care. At particular risk to rural injury are farmers, their family members, and hired and migrant laborers.

In addition to the several factors that place rural residents at increased risk are added the occupational risks of farming. The National Safety Council estimated deaths among farm residents to be 56.2 per 100,000, 30.1 of which were motor-vehicle-related, 20.1 work-related (18.1 in farm work), 8.0 home-related, and 4.0 public non-motor vehicle deaths.[4] The trend in agricultural mortality over the past ten years has shown relatively little improvement and remains higher than that of mining and construction.

NIOSH, through its National Traumatic Occupational Fatalities (NTOF) database, reports 20.7 deaths per 100,000 agricultural workers, versus 7.9 deaths per 100,000 for the general private - sector workforce.[9] Results of epidemiological studies and newly developed surveillance systems suggest these national estimates may significantly underestimate both deaths and farm-related injuries.

The Iowa Department of Public Health farm injury surveillance program (SPRAINS) reported 83 deaths for 1990 based on voluntary reports from health-care providers.[10] As this was the initial year of reporting, it is thought that this number is incomplete; yet this number of deaths is over 60 percent higher than previous estimates of farm deaths in Iowa. Epidemiological studies draw our attention to the importance of farm machinery in fatalities and severe injuries, to higher rates of injury among children and the aged, and to the substantial numbers of intentional deaths (suicides and homicides).[11]

While it is clear that traumatic injuries and deaths are epidemic on American farms, we still lack national and state-based information systems (surveillance), a reasonable understanding of risk factors, and an adequate characterization of hazards of farming associated with injury morbidity and mortality. Therefore, three research priorities in the area of traumatic injuries are:

1. Development of national and state-based information systems, which will

provide essential injury and injury mortality incidence data by type of injury (ICD-9 codes), cause of injury (E-codes), place of injury and demographic information on the injured party.

2. From surveillance data or large epidemiological studies, case control studies of specific farm injuries, which will allow much better understanding of risk factors associated with the injury.

3. A much better environmental assessment of farm machinery, farm buildings, livestock operations, on and off-road vehicles, agricultural chemical use and storage, and available prevention measures. This assessment is essential to epidemiological surveys and case-control studies

Respiratory Health Effects

Farmers and other agricultural workers are exposed to a number of respiratory hazards, the most common of which is organic dust. Additional exposures, which are known to be important include several agricultural chemicals, toxic gases from livestock confinement facilities, toxic and immunogenic constituents of microorganisms, feed additives such as antibiotics, and infestations of insects, which may produce lung disease.[12,13]

A common denominator in these exposures is a significant exposure to organic dust, which has been shown by many epidemiological studies to result in acute symptoms of airway inflammation, heightened airway reactivity and asthma, and acute changes in lung function. Pulmonary edema followed by bronchiolitis obliterans and hypersensitivity pneumonitis are relatively uncommon but well-known pulmonary conditions arising from certain agricultural exposures.

In some agricultural populations with long exposure to organic dust, fixed airway obstruction has been observed. Despite recent interest in this area, there are significant research gaps including the following:

1. There is little surveillance data and incomplete epidemiological data on respiratory diseases in several agricultural populations. Disease patterns and risk factors are still incompletely understood in the animal confinement and grain handling and processing industries, and from exposures to agricultural chemicals such as anhydrous ammonia.

2. There is a very great need for the development of dose-response data for agricultural exposures in order to allow fuller development of prevention strategies.

3. There is a need to more fully explore certain environmental factors, such as exposure to storage mites and the toxic products of certain microorganisms, in both the laboratory and through field studies.

Cancer

Epidemiological studies reported a decade ago initially raised questions about an association between soft-tissue sarcoma and lymphoma and exposure to acetic acid herbicides and chlorophenols. Since then, over 20 additional cohort and case-control studies have addressed this issue. The results of these studies are not consistent, but excess deaths from non-Hodgkin's lymphoma, multiple myeloma and leukemia have shown more consistent positive associations.

In addition, excesses of lung, stomach and prostate cancer have been observed in cohort studies of manufactures and applicators.[14] Other potential risk factors for cancer incidence include viruses, and dietary and other factors as possible contributors to cancer incidence among agricultural workers.[15] A number of methodological issues pose difficulties in interpreting these findings and indicate priorities for research in this area:

1. There is a uniform need for better environmental characterization of agricultural chemical exposures through the development of valid and inexpensive environmental exposure protocols.

2. Use of exposure registries linked with cancer registries promises to provide important additional data on cancer risk among agricultural workers.

3. Improved epidemiological methods to assess and validate previous agricultural and other exposures are needed for adequate analysis and evaluation of cancer data.

Reproductive Health Effects

Concern about possible adverse reproductive health effects arises from toxicological testing showing some agricultural chemicals to be teratogenic, from widespread use of some of these chemicals, and from some case reports suggesting associations between certain adverse reproductive effects and agricultural exposures.[16,17] The reports on dibromochloropropane (DBCP) on male reproductive function have provided an important example of the toxic effects of this pesticide, an exposure, which now continues in some developing countries.[18]

Assessment of adverse reproductive effects has a significant methodological advantage over assessment of cancer incidence in that the latency from the time of exposure to the time of the reproductive effect is much shorter than that for cancer, which is generally 20 or more years. The lack of birth defect information systems has greatly hampered evaluation of birth defects in association with environmental exposures. Priorities for research in this area fall in two areas:

1. Additional systematic toxicological testing of agricultural chemicals and commonly used combinations of chemicals for adverse reproductive effects.

2. Further development of birth defect registries and linkage of these information systems with exposure registries, and through the development of case-control studies with adequate exposure data.

Neurological Health Effects

Recent reviews of the neurotoxic effects of pesticide exposure have focused on chronic neuropsychological sequelae from exposures to organophosphate pesticides.[19,20] While the early (immediate and delayed) neurotoxic effects are well-described for organophosphate intoxication, until recently little attention had been given to evaluation of possible chronic effects.

However, as the result of several case studies and clusters of adverse behavioral and neurological findings, the World Health Organization (WHO) and the United Nations Development Programme (UNDP) are coordinating a ten-country European, prospective epidemiological study on the neurotoxic effects of low-level exposure to organophosphorus pesticides.

This study includes both pesticide formulators and agricultural workers. Additional studies of three types are needed:

1. A replicate of the European study through the use of recently developed and standardized tests of neuropsychological function and extensive characterization of exposures to organophosphate pesticides;

2. Well-controlled follow-up studies of workers who have documented cases of acute organophosphate intoxication for possible chronic neuropsychological effects; and

3. Greater attention to neurotoxic effects of agricultural chemicals through toxicological testing.

Repetitive Trauma

Trauma research in agricultural populations has focused almost entirely on acute traumatic injury and death. Yet repetitive trauma is known to be a much more significant problem than acute trauma in most industries.

There is reason to suspect that significant repetitive trauma may occur as the result of vibration and repetitive tasks in the use of farm machinery and other farming operations. A recent case-control study of hip joint arthrosis among Swedish farmers found a relative risk for this condition between 2.1 and 3.2, varying by length of time in farming.[21]

There is also reason to believe that long hours of work on agricultural machinery may induce significant muscle fatigue, which may, in turn, contribute to the risk to acute injury. Repetitive trauma has not been systematically studied among farming populations, but should be a research priority:

1. Surveys of farming populations to assess acute injuries or other health effects should also include assessment of repetitive trauma conditions, especially those involving the back, hip and knee.

2. Collaboration between agricultural engineers and biomechanical engineers should focus on ergonomic factors that may contribute to repetitive injuries and how these factors may be mitigated.

Dermatitis

Dermatitis is a condition endemic in farming. Data from the Bureau of Labor Statistics (BLS) indicate a five-fold greater incidence of dermatitis among farm workers compared to workers in general industry. Because of the limitations in BLS data for agricultural workers, these findings may represent a significant underestimation of dermatitis in this working population. A recent survey of California grape and tomato workers found a high cumulative incidence of dermatitis, suggesting that dermatitis is a frequent and recurrent problem among these farm workers.[22]

1. There is a need for systematic dermatological surveys of farm workers with attention given to criteria for classification of dermatological conditions, to the sensitivity and specificity of questionnaires, and to the correlation between questionnaire and exam results.

2. There is a great need for environmental evaluation and measurement of dermatological irritants and sensitizers.

3. Development and evaluation of intervention programs to prevent dermatitis among farm workers are further research needs.

Noise-Induced Hearing Loss

Several studies have now reported bilateral high-frequency hearing loss to be quite prevalent among farmers.[23] Of particular concern is the frequency with which this abnormality is observed among farmers under the age of 30. This strongly suggests that noise is the cause of this injury. Indeed, farm machinery and chain saws are known to generate noise levels above recommended limits. A further finding has been that relatively few farmers use hearing protection. Therefore, research priorities here include:

1. Systematic industrial hygiene surveys to characterize farming operations where noise levels exceed recommended levels.

2. Development and evaluation of intervention programs to provide adequate hearing protection to those engaged in these farming operations.

THE NATIONAL AGRICULTURAL AND ENVIRONMENTAL HEALTH INITIATIVE

Since the publication of *Agriculture At Risk: A Report to the Nation*, which summarized the recommendations arising from the national public policy conference, "Agricultural Occupational and Environmental Health: Policy Strategies for the Future," and the dissemination activities of the NCASH, there is a new level of awareness of the magnitude and severity of disease and injury among American agricultural workers. Significant credit for initiation of and support for this effort is due to several agricultural industries and foundations, to the interest and support of several state and federal agencies, to the efforts of the National Rural Health Association, to the work of many university faculty who participated in the conferences and briefings, and to the commitment of many members of the U.S. Congress and several state legislatures.

As a result, and for the first time, a healthy dialogue has involved all parties to these important issues. Significant resources are now available through federal appropriations and some state appropriations to mount this national research and intervention initiative. This research effort is just beginning. The challenge ahead is to maintain this momentum and build upon these gains.

CONCLUSIONS

1. The high risk of disease and injury arising from agricultural exposures has now been recognized and has now been placed on the national public health agenda.

2. Adequate resources and incentives have been provided to address the multiple research priorities. These resources must be maintained and cultivated.

3. A healthy dialogue has promoted the involvement of most parties. Greater efforts are needed to involve full representation of children, women, migrants, and the rural poor.

4. The challenge ahead is to prioritize, implement, and publish research findings and translate this research into meaningful prevention and health delivery programs.□

REFERENCES

1. Coughenour CM and Swanson L. Work Statuses and Occupations of Men and Women in Farm Families and the Structure of Farms, *Rural Sociology*. 48(1):23-43, 1983.

2. Fassinger PAD and Schwarzseller HK. The Work of Farm Women: A Midwestern Study, *Research in Rural Sociology and Development*. (1):37-60, 1984.

3. Ungar RL. *Farm Women at Risk: Work Roles and Agricultural Exposures*. Thesis, Department of Preventive Medicine and Environmental Health, The University of Iowa, 1990.

4. National Safety Council. *Accident Facts, 1988 Edition*. National Safety Council, Chicago, Ill, 1988.

5. Glass DJ. Agricultural Biotechnology: Occupational Health and Regulatory Issues in *Occupational Medicine: State of the Art Reviews*. 6(2):301-309, 1991.

6. Dosman JA. Technical Workshop Report: Working Group I: Occupational Health and Safety Strategies for Agriculture, *American Journal of Industrial Medicine*. 18:353-356, 1990.

7. Summer L. *Limited Access: Health Care for the Rural Poor*. Center on Budget and Policy Priorities, Washington D.C., 1991.

8. Baker SP, O'Neill B. and Karpf R. *The Injury Fact Book*. Lexington, Mass.: Lexington Books, 1984.

9. Myers JR. National Surveillance of Occupational Fatalities in Agriculture, *American Journal of Industrial Medicine*. 18(2):163-168, 1990.

10. Currier R. Iowa Department of Public Health, Personal Communication, 1991.

11. Stallones L. Surveillance of Fatal and Non-Fatal Farm Injuries in Kentucky, *American Journal of Industrial Medicine*. 18(2):223-234, 1990.

12. Merchant JA. Agricultural Respiratory Diseases, *Seminars in Respiratory Medicine*. Thieme, Inc., No.3, 7:211-224, New York, 1986.

13. Merchant JA. Agricultural Exposures of Organic Dusts. *Occupational Medicine: State of the Art Reviews*. 2(23) April-June:409-425, 1987.

14. Blair A and Zahm SH. Herbicides and Cancer: A Review and Discussion of Methodologic Issues, *Recent Results in Cancer Research*. 120:132-145, 1991.

15. Pearce N and Reif JS. Epidemiologic Studies of Cancer in Agricultural Workers, *American Journal of Industrial Medicine*. 18(2):133-148, 1990.

16. Schwartz DA and LoGerfo JP. Limb Reduction Defects in the Agricultural Setting, *American Journal of Public Health*. 78:654-659, 1988.

17. Gordon JE and Shy CM. Agricultural Chemical Use and Congenital Cleft Lip and/or Palate, *Archives Environmental Health*. 36(5):213-221, 1981.

18. Whorton D. Dibromochloropropane Health Effects, Chapter 48 in *Environmental and Occupational Medicine*. WN Rom (Ed). Little, Brown and Company, Boston, 1983.

19. Rosenstock L, Daniell W, Barnhart S., Schwartz D, and Demers PA. Chronic Neuropsychological Sequelae of Occupational Exposure to Organophosphate Insecticides, *American Journal of Industrial Medicine*. 18(2): 321-326, 1990.

20. Davies JE. Neurotoxic Concerns of Human Pesticide Exposures, *American Journal of Industrial Medicine*. 18(2):327-332, 1990.

21. Thelin A. Hip Joint Arthrosis: An Occupational Disorder Among Farmers, *American Journal of Industrial Medicine*. 18(2):339-344, 1990.

22. Schenker MB and McCurdy SA. Occupational Health Among Migrant and Seasonal Farmworkers: The Specific Case of Dermatitis, *American Journal of Industrial Medicine*. 18(2):345-352, 1990.

23. May JJ, Marvel M, Regan M, Marvel LH, and Pratt DS. Noise-Induced Hearing Loss in Randomly Selected New York Dairy Farmers, *American Journal of Industrial Medicine*. 18(2):333-338, 1990.

Surgeon General's Conference on Agricultural Safety and Health
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INTERVENTION FOR AGRICULTURAL SAFETY AND HEALTH

Myron D. Johnsrud, Ph.D.
Administrator, Extension Service
United States Department of Agriculture

Mr. Mark Timm: From Washington, D.C., our next speaker is Dr. Myron Johnsrud, Administrator of the USDA Extension Service. Dr. Johnsrud holds a master's and doctor's degree in administration from the University of Wisconsin and farmed for a number of years in North Dakota. He directed the North Dakota State University Cooperative Extension Service for 12 years. He served as chairman of the Great Plains Agricultural Council, and served on the Board of Directors of the Prairie Public Television Corporation and on the Board of Trustees of the National 4-H Council. Since 1986, Dr. Johnsrud has directed the U.S. Department of Agriculture's Extension Service. In this position, he is responsible for a $15 million program and $370 million of federal allocations to the land grant universities for cooperative extension service programs. He is responsible for a major program for redirecting the Extension Service, in partnership with the Cooperative Extension Service, a national network in the 50 states and territories, and more than 3,100 countries. The redirection focuses on current and critical issues of the nation. Dr. Myron Johnsrud will speak to us this morning on the critical issue of *Intervention for Agricultural Safety and Health.* Dr. Johnsrud:

INTRODUCTION

"The health of the people is really the foundation upon which all their happiness and all their powers as a state depend."

Benjamin Disraeli, prime minister of Britain, made that statement in a speech over 100 years ago, and it is still right to the point today. Safety, too, which we link closely with health, has long been essential to civilization. *Salus populi suprema lex* ("The people's safety is the highest law") was a legal and political maxim of ancient Rome.

The need for surveillance and research to guide injury control efforts in agricultural safety and health presents many challenges that have been identified by the previous speakers. However, we must ask ourselves how society will judge our success in solving the problems of agricultural injuries. I believe that society will judge our success by how effective our intervention methods are in protecting agricultural workers and helping create the change in their behavior necessary for their success. Intervention countermeasures will rely upon the knowledge gained from research and surveillance programs to implement effective solutions to agricultural health and safety problems.

What makes agricultural production one of the most hazardous occupations in the United States? As we attempt to prevent and reduce the incidence of fatal and serious accidents and chronic illness on our farms and ranches, do we know what areas to focus on for the most success?

How do we keep agricultural safety and health from being overlooked when addressing other issues that confront agriculture, such as the environment, animal welfare, or energy? How wide is our scope—does it stop at the farm gate or timber mill? Or, does it include many segments of food, feed, and fiber processing?

These are just a few of the questions confronting us today in the important issue of agricultural safety and health. This morning I want first to present a brief history and the current status of intervention efforts. Second, I will pose questions to guide the concurrent session on developing intervention strategies for various targeted audiences, approaches to intervention, and the need for collaboration. Third, I will suggest some areas that I see as the pressure points, injuries, and fatalities of highest priority and the places where we have the best chance to intervene successfully.

CURRENT STATUS OF INTERVENTION

Voluntary safety efforts have had much success. Agriculture has the most extensive community of voluntary safety professionals of any industry in the United States. What was probably the first farm safety effort began in 1933, when the Sixth Annual Rock River Valley Safety Conference meeting at Fort Atkinson, Wisconsin organized a farm safety section.

In 1937 the National Safety Council held a meeting of an agricultural section. Its first farm conference took place in 1947. An organized professional effort to prevent farm accidents began in the Cooperative Extension system early in the 1940's with appointment of a full-time Extension farm safety specialist by the University of Wisconsin.

A coalition of farm safety professionals representing agricultural equipment manufacturers, the Farm Bureau, insurance companies, and the Cooperative Extension System chartered the National Institute for Farm Safety in 1961 to provide a forum for the exchange of research results, surveillance data, and effective intervention methods. Much of the success in reducing the occupational injuries experienced by agriculture over the past 50 years is due to the accomplishments of these professionals working cooperatively through organizations such as the National Institute for Farm Safety and the safety committees and standards committees of the American Society of Agricultural Engineers (ASAE).

We cannot ignore the fact, however, that the rate of decline in agricultural fatalities and injuries is much slower than that experienced by mining and construction, the other two most hazardous industries in this nation. Except for this fact, we would not be here today. Because of it and the efforts of such organizations as NCASH, the Congress has recognized the need to commit additional resources to research, surveillance, education, and intervention programs.

Most of the new programs are being administered by NIOSH. In administering these programs, NIOSH has recognized the value of supporting existing programs. An example of this is NIOSH's intervention program Agricultural Safety and Health Promotion Systems, which is providing funding to enhance educational safety programs through the Cooperative Extension System in 15 states.

Two new NIOSH programs crucial to developing intervention include establishing two new centers in Iowa and California for agricultural research and education and supporting occupational health and safety nurses in agricultural communities. These programs exemplify, too, the key questions we must ask ourselves in developing strategies for intervention programs.

1. How do we implement promising and innovative new programs such as nursing services in agricultural communities

so that they complement existing intervention programs?

2. How do we foster programs that utilize the existing infrastructure of organizations, such as the Cooperative Extension System and the National Safety Council, to enhance our ability to make the most effective use of resources available for intervention programs?

What is the current status of safety features on farm equipment? New farm equipment being sold today has the latest state-of-the-art safety technology. When machines are used and maintained properly, injuries and deaths from machinery-related accidents can drop dramatically. ROPS for tractors and tractor seat-belt use could prevent the majority of tractor-related deaths. Virtually all new tractors sold in the United States have ROPS.

Because of the relatively long life of tractors, most agricultural tractors in use do not have ROPS in place. Nearly half of the approximately 400 tractor-related deaths that occur each year in this nation involve rollovers. How do we ensure that the older tractors and machines without these modern safety features get retrofitted with modern safety features when feasible or get taken out of use? The issue of how such updating and retrofitting is practical presents a significant challenge.

I encourage us not to focus solely on tractor fatalities, though they have become a focus of considerable media attention. They account for only a small percentage of nonfatal injuries on farms, compared with traumatic injuries from other causes and chronic occupational illnesses. Engineering and safety standards have long been the primary method of injury control.

Many manufacturers of agricultural equipment rely heavily upon the voluntary standards of ASAE in equipment design when no mandated standards exist. The development and issuance of technical standards by ASAE has contributed strongly to intervention for many years.

New standards and updates related to safety are constantly needed. What intervention programs do we need to ensure that the vast array of small manufacturers of farm equipment are aware of and comply with both mandatory and voluntary standards?

Unlike the situation in many other industries, the autonomy of the agricultural workplace can render many safety standards useless as safety features are discarded or overridden. How will this problem be overcome?

DEVELOPING INTERVENTION STRATEGIES

Characteristics of Target Audiences

How wide a net do we cast for our targets? Do we include forestry and logging? Food, feed, and fiber processing? Textile mills? Workers at fast-food chains? Food safety in general, which means all of us who eat?

As a first level of how wide we cast our net, let us focus on the 3.32 million persons who work on the nation's farms and ranches. Nearly half of these people are self-employed farm operators. The balance are unpaid workers (family), agricultural service employees, and workers hired directly by farm operators.

What methods would work best for reaching farmers? A recent study in New York State found that farmers and farm-

workers, while acknowledging the need for health and safety, did not have time to attend meetings.

Radio, general farm magazines, and conversations with others are prime information sources. The Cooperative Extension Service received a very high rating as a source of health and safety information.

A sizable share of the farm population is children. Accidents are the primary cause of death among children less than 15 years old in the United States as a whole and in farming. About 23,000 farm children are injured on farms each year. Why are these injuries occurring?

Partly, it is the generally risky nature of the farm environment and the fact that it is both home and office for farmers and for their spouses and children. Often, the economic realities of farming create a dependence on children for labor. Frequently, either there is no adequate child care for them off the farm or it is too costly for farm families. These problems exist for both the farm-operator family and the migrant-labor family.

In a recent national survey, farmers reported that they allowed their young children (aged 6-9 years) to ride on a tractor, and as many as 29 percent of 7-9 year-olds were driving the tractor. Between ages 7 and 15, farm children were performing a wide range of farm operations with tractors.

When asked about risks of such behavior, farm parents surveyed saw a low accident-risk level for their children when they were riding on a tractor the parent was operating or when the children were operating the tractor. As great as a 40 percent reduction in the farm fatalities to children may be possible if children do not ride on tractors.

Studies of the cognitive physical limitations of children at various stages up through 15 years of age indicate that they are being put at risk through farm activities that they are asked to perform.

I have yet to see a farm safety awareness or education program that did not stress the danger of extra riders on tractors. This poses some important questions that need to be applied to all agricultural safety and health problems.

Why are our safety warnings going unheeded? Are we reaching and involving our targeted audiences sufficiently to develop effective education and awareness programs that change behavior? What will be the most effective combination of engineering controls, awareness, education, regulation, and enforcement to find solutions to each problem?

Studies of the cognitive physical limitations of children at various stages up through 15 years of age indicate that they are being put at risk through farm activities that they are asked to perform. Their parents do not understand that risk potential. How do we direct our educational efforts at these target populations? Helping farmers understand the developmental limitations of their children could significantly reduce child accidents and deaths on farms.

Another target population is the estimated 3 million migrant and seasonal farmworkers from many different ethnic groups. Children are about one-third of this population.

No comprehensive baseline health data exist for them. Some of their health problems and hazards are well documented. Others require much more investigation and research. Their need for a wide variety of education and social services is enormous. What are the unique demographic, cultural, and language problems that must be overcome to provide effective intervention programs for this targeted audience?

The average age of U.S. farm operators is 52, with 21 percent of farm operators 65 or older. Farm workers aged 65 and over have two to three times the injury rate of other age groups. Older workers are more vulnerable to injury due to decreases in sensory capabilities (hearing, vision, smell).

They also may be suffering from several chronic occupational illnesses that have high incidence rates among farmers. This target audience offers unique challenges for effective intervention programs that reduce their risk of traumatic injury and prevent increasing the severity of existing health problems.

What intervention programs are needed by audiences who have experienced an injury? Approximately 600,000 farmers have a disability that impedes their ability to perform essential farming tasks. This group is also at high risk to further injury.

Expanding upon several pilot programs, USDA's Extension Service, in cooperation with the National Easter Seal Society and other nonprofit disability organizations, recently launched an innovative program to help farmers with disabilities continue farming.

Extension agents, disability experts, rural professionals, and volunteers will offer such services as identification and referral of farmers with disabilities, on-the-farm technical assistance for modification of the workplace, and, agriculture-based education to prevent further injury and disability. Accident victims can be a powerful influence in creating behavioral change. How can we more effectively involve these individuals and the grassroots organizations they have created, such as Farm Safety for Just Kids?

Should we target groups that are not employed in agriculture or live on farms but may become victims of farm injuries? What are the risks to individuals that visit or provide services to farms?

Approximately 40 percent of the fatalities that occur in confined-space agricultural accidents are attempted rescuers of farm accident victims. The Cooperative Extension System has trained more than 17,000 professionals in farm accident extrication procedure and nonprofessionals in first-on-the-scene emergency response procedures. These programs are crucial to reducing the risk of injury to the rescuer, reducing the severity of the injury to the victim, and emphasizing the value of injury prevention.

Approaches to Intervention

Various approaches to intervention have been applied to agriculture. What do we know about the effectiveness of injury control strategies in the agricultural workplace? What new method emanating from the public health approach and human factors engineering will be required to solve these problems? How do we educate to achieve behavioral changes toward better agricultural safety and health? Many educational programs are in place.

We have our own, ranging from training of persons who will be using restricted-use pesticides to courses that instruct youth (14-15 years old) in operating tractors safely. Of the more than 23,000 Nebraska youth that have completed the tractor certification training program conducted by the University of Nebraska Cooperative Extension Service, only two have died in tractor-related accidents.

A national strategy could rest on the belief that the most effective preventive efforts will emerge from a process that emphasizes identifying and characterizing problem areas and populations at risk.

How do we educate people to change accident-causing or otherwise risky behavior? Simple identification of a public problem such as agricultural safety and health is not enough to allow the design and development of successful remedial programs.

Building meaningful people-involvement into problem identification, program development, and program delivery is essential. Failure to involve the real stakeholders (the farmers and farmworkers) dooms even the most outstanding programs to failure. The era of unshared decisionmaking is generally behind us.

Need for Collaboration

What is required? The attention, effort, and cooperation of individuals and organizations at every level of society, from this conference to our offices at home. Should there be a national coalition to plan and to coordinate intervention programs? A national strategy could rest on the belief that the most effective preventive efforts will emerge from a process that emphasizes identifying and characterizing problem areas and populations at risk.

The collaborative efforts of engineers, ergonomists, safety professionals, industrial hygienists, and experts in biomechanics and the behavioral sciences are needed to address the most compelling problem areas by studying what makes up workplace systems and the process, tasks, and tools involved. They must identify potential causal mechanisms, opportunities for intervention, and possible prevention strategies.

How will automatic ("passive") protection be used more in agriculture? Passive protection is generally more effective than "active" measures requiring effort by each worker.

Engineering controls are available for many known hazards but have not been systematically applied and evaluated. "Passive" measures of prevention could involve worker protective-system ventures into the realm of intelligent microenvironments that feature sensors, microprocessors, adaptive protective mechanisms, and display and imaging technology to protect, inform, and warn workers for hazardous conditions at their onset.

How do we ensure that the safety and health of the agricultural worker is not sacrificed for the sake of other issues? In considering common issues, such as selective harvesting versus clearcutting in the forests, we need to be aware that selective harvesting may be better for the environment but that it places the logger at a greater risk of injury than occurs in clearcutting using modern equipment. Can we engineer machines that allow selective

harvesting and that protect the workers using them?

We must apply a systems approach that identifies the multiple benefits and feasibility of intervention methods. For example, closed-container mixing systems for pesticides not only protect the applicator from exposure to pesticides, but can also prevent ground water contamination and reduce the possibility of mixing errors. Communication of multiple benefits can be an effective means of creating a change in behavior.

FUTURE FOCUS

Let us look at success stories in agricultural safety and health. What data do we have on them? We know they exist. Probably one of the greatest shortcomings of existing educational farm-safety programs is the lack of scientific evaluations of their effectiveness. We must conduct more comprehensive evaluations. We need more than simple, generalized descriptors—beyond age and sex of the victim, the time of year of accident, and its severity—for us to develop innovative engineering or educational countermeasures.

Although more research and more data are needed to direct intervention, we know certain health and safety precautions work; ROPS work. Educational programs by the Extension System and others in health, hygiene, and pesticide use all have their successes in reaching our target audiences.

Where do we need to go? We need to focus on injuries that often result in death or severe disability because of their impact on the family and the economic and social costs to society. We need to find workable solutions to tractor fatalities and to reduce and eliminate them, if possible.

Tractor-related injuries are about one-third to one-half of all fatal farm injuries. This figure has changed little in 20 years. We also know that the youth and the aged were involved in a significant portion of total tractor injuries. We need to reach these target groups more effectively.

Injuries that occur with high frequency and may be easily prevented should receive high priority, even if less severe in nature. For occupational illnesses, we can increase educational efforts in the use of common methods of worker protection from hazards and in the use of protective equipment and clothing. Some types of clothing and equipment, for example, can reduce exposure to many harmful agents. We need feasible engineering controls to reduce vibrations, noise exposure, air contaminants, and other harmful agents. We need to stop the decay of basic health services available in rural areas and to reverse this trend.

I have raised many questions for your consideration both now and after you return home. Your presence here today is testimony to the momentum building to address this issue.

I think that we can find the answers to solving these problems through the collaborative efforts of all of you. We can act on measures that we know work now and search for more effective intervention countermeasures. Safety and health are the right of every person involved in agriculture. I wish us success in solving our agricultural health and safety problems.□

Surgeon General's Conference on Agricultural Safety and Health
FARMSAFE 2000 • A National Coalition for Local Action
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RURAL HEALTH POLICY

By Jeffrey Human, M.A.
Director, Office of Rural Health Policy
U.S. Public Health Service

Has this not been a terrific conference so far? We have outstanding attendance. We have had one excellent speaker after another. The commitment to improve agricultural safety and health has also been striking in these presentations.

Groups like the National Coalition for Agricultural Safety and Health and the Farm Foundation have been working extra hours to form consensus on the national agenda we need to develop. This is a time of hope.

One of the most interesting things about several of the presentations so far was the emphasis on the movie *Field of Dreams*, and its use as a metaphor of hope. I asked a city dweller last evening what movies urbanites relate to these days. "Well," he said, "I'd include *Deathwish, Taxi, Mean Streets*, and *Escape from New York*." I think there is more hope in the country.

This morning's *Des Moines Register* ran a nice story on Dr. Novello's speech, which I thought was a high point of the meeting. What an anachronism to call her the "Surgeon General."

Her message makes it clear that she is both the "Pediatrician General" and the "Family Medicine General." And that is what we need in rural health. Yesterday, everybody had a different ranking for agriculture as a dangerous occupation. It was first, second, third, and fourth within an hour.

Chris Atchison, and this morning, Dr. Bill Halperin seemed to me to have the best idea. Let us set up and run farm health and safety surveillance systems in all states as they do in Iowa. Let us keep track of injuries and deaths and let us export this record-keeping to the other states, so we can keep track on a national basis and so that we can intervene for prevention. We also need to educate the nation's public on the nature and extent of the dangers of farm work to get the assistance we need.

It is very fitting that this meeting should be in Des Moines. It was in this city, in 1984, that the *Des Moines Register* won the Pulitzer Prize for a series of articles entitled "A Harvest of Harm." Those articles argued, persuasively, that agriculture has become our most dangerous occupation.

It was in Des Moines and Iowa City, in 1988, that Jim Merchant and Kelley Donham held a conference on agricultural health and safety; the conference led to the publication of *Agriculture at Risk: A Report to the Nation*, a report that has brought the issues we are talking about today to the nation and to the Congress.

The 1988 conference also led to the formation of the National Coalition for Agricultural Safety and Health—a coalition that is continuing to keep these issues in the forefront of national efforts to improve rural health; a coalition that has now integrated its work with the National Rural Health Association; a coalition whose work at

raising consciousness made this meeting possible.

Iowa's leaders have been very influential in other rural health endeavors. In the mid-1980's, the administrators of small rural hospitals detailed the problems they were experiencing to the Congress. Don Dunn and Art Spies (who is with us today) of the Iowa Hospital Association, were among the chief spokespersons of the movement.

The Iowa Congressional Delegation has been as united as any in the country in rural health advocacy. Senators Harkin and Grassley helped build a Senate Rural Health Caucus of 65 of the 100 members of the Senate, and they have delivered better-funded programs and new programs through the Senate Appropriations Committee, on which they serve. Former Iowa Congressman Tom Tauka was the first co-chairman of the House Rural Health Care Coalition, which now has 165 of the 435 members of the House, including all of Iowa's Congressmen.

There is one other Iowa leader we should speak of, but he is our next speaker. I will get to him soon.

I am supposed to say something about the Office of Rural Health Policy, which I direct. We act as a voice of the rural constituency in the Department of Health and Human Services and coordinate its rural activities. So I come to meetings like this as much to listen as to speak.

Our primary responsibility is policy, but we also run some programs. For example, this year we will be making around 38 grants to states to help them establish or enlarge state Offices of Rural Health. These offices work like our federal offices but at the state level.

I think they can be very effective in representing rural constituencies in the state capitals, in working with communities and their health providers to solve local problems, and in working with the farm community on health and safety issues.

This year, we will be making anywhere from 60 to 200 grants for local innovative health services programs or programs that support health professionals through education, telecommunications, or similar means. We expect several agricultural health and safety proposals.

We fund seven rural health research centers nationwide. All of them have some involvement in agricultural health and safety and one center—the Marshfield Medical Foundation—has agricultural health and safety as its principal emphasis.

We heard about one of their projects yesterday from Secretary Sullivan. It illustrates the practical applied research I ask for from each center.

When we looked at the tractor-rollover problem with Marshfield, we decided that there was no need for further research on the problem. What we decided we needed was a way to help farmers who wanted to retrofit older tractors with roll bars or other rollover protective devices to find those "ROPS," as they are called.

So we asked Marshfield to develop and publish a catalog of all American manufacturers of "ROPS," all products they produce and what make of tractor, model of tractor, and year of tractor they will build. Then Marshfield sent the catalog to all extension agents in the country, so it is available where it is needed.

Producing that catalog is not the best step we could take as a society. As we have seen in the slide on the Swedish experience, the best step we could take would be to require "ROPS." But as an Office, it was the best we could do.

We fund a national information center on rural health. It is a part of the U.S. Department of Agriculture and is within their National Agriculture Library. So if you want some rural health information, call 1-800-633-7701.

The nice thing is that you can also get agricultural information or rural economic development at this same number. Add $24.95 and postage, and we will include all the hits of *Boxcar Willie*. That is 1-800-633-7701. Offer is not valid in Mexico or Canada.

My own office is also a sort of information clearinghouse. In my presentations, I try to share ideas on the things that are happening in the states and communities and in Washington that affect rural health.

Thus, I talk around the country about the problems of rural health and about the potential solutions. For example, I tell state officials that they should train more nurses because we have a national rural nurse shortage. If they ask where to get the money, I suggest they cut back on training so many lawyers at taxpayer expense.

If we are short of nurses, we are short of essential health services for our people. If we grow short of lawyers, however, what are we short of? Essential lawsuits?

Certainly with a few less lawyers we might have fewer malpractice suits. Seriously, let us confront conventional approaches and make new choices with limited funds, choices that help solve rural health problems.

I tell people in other states about the package of programs offered to local subscribers by the University of Iowa's Institute of Agricultural Medicine and Agricultural Health. I do not have time to tell you the specifics today, but I will mention three features of the program, which is based on a Swedish model.

1. It is hospital based and contributes to the viability of rural hospitals. That is important because 10 percent of all of America's rural hospitals closed their doors during the 1980's.

2. The program includes continuing medical education for physicians. A 1979 survey showed that 70 percent of all medical schools offered no instruction in agricultural medicine. The other 30 percent offered an average of four hours of instruction during four years of medical school. The young physician new to an agricultural community may be baffled by pulmonary and cardiac conditions caused by agricultural dusts or chemicals. Ellen Widess' stories yesterday play out over and over again, and many times with worse endings when we do not prepare our physicians properly.

3. The program trains farm families to be responsible for their own health and safety. For example, they are shown how to make animal confinement houses safe for themselves and the animals. For more information, see Jim Merchant or Kelley Donham or David Pratt, who know more about these and other similar programs than I do.

I want to tell you about one last program. It is called "Stress Country Style," and it is in Illinois. A network of health workers throughout the state are available to help farm families. Farmers call an 800 number, and help comes to them. There is no stigma because the encounter is private at the farm. Counseling is offered. Referral to mental health or debt consolidation or one of 100 other programs is offered. Oklahoma and Iowa have similar programs.

> Seriously, let us confront conventional approaches and make new choices with limited funds, choices that help solve rural health problems.

We need more innovative stress reduction programs like these. In Ontario between 1979 and 1982, 95 of the 273 farm deaths were suicides, and the farm suicide rate has been documented to be high in this country as well. Mental health must be an important part of our national strategy.

Incidentally, we need to place a special emphasis on teenagers when we look at mental health in the farm community. A survey by the University of Minnesota's Extension Service and the Medical School indicated that 5 of every 100 rural adolescents surveyed has attempted suicide within the past month.

Nationally, the figure was 2 of 1,000. This was in the early 1980's during the height of the farm crisis, but other studies have shown pervasive high levels of depression among rural adolescents.

I should also mention that our office provides staffing for the National Advisory Committee on Rural Health. I have left some brochures about our office at the registration desk. If there are none left, call 1-800-633-7701, and they will have us send you one.□

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MEDICAL INTERVENTION PROBLEMS AND OPPORTUNITIES IN RURAL AREAS

By Governor Robert D. Ray
Chairman, National Advisory Committee on Rural Health Policy

Mr. Jeffrey Human: My last assigned task is to introduce our next speaker. My honest impression is that Bob Ray is a real enigma. This is a guy who was elected to five terms as Governor of Iowa, and then found a life after politics on his own. He did not lose an election—he quit. There was no scandal. He just left the political life. He wanted to try something new. This is almost unprecedented in American politics. Then Bob went out and got jobs on his own and made a mark. He ran a successful insurance company, and now he is president of Blue Cross and Blue Shield of Iowa, with a million subscribers. He is not some absentee figurehead president either. A top official of Blue Cross nationwide tells me he has personally turned the program around in this state. Secretary Sullivan told us yesterday that Bob Ray is one of his advisors. Well, he should be, because Bob is chairman of the National Advisory Committee on Rural Health. That committee has provided Secretary Sullivan and the Congress with a series of challenging recommendations on rural health that have led to changes. For example, the Outreach program I told you about is partially a result of a recommendation of the committee. There is a great revival of interest in national health reform. There are many competing proposals. One of the best and most influential, based on universal insurance coverage, is from the National Leadership Commission on Health Care. The Commission's members read like a *Who's Who* in American health policy. The chairman is, of course, Bob Ray. Bob Ray also was a U.S. Delegate to the United Nations and former chairman of the Indochinese Refugee Panel, providing leadership in efforts to resettle Vietnamese and Cambodian refugees. Bob is a graduate of Drake University's Law School, and he has a lot of honorary degrees and distinctions. Those of us who work with him and for him with the National Advisory Committee on Rural Health have discovered more important things about Bob. We have found him to be intelligent, funny, caring, realistic, charming, articulate, and an excellent leader. He is one of the best listeners I have ever met. He knows more about health care than most of us. It is a pleasure to introduce one of America's great leaders, Robert D. Ray:

Jeff, thank you. Thank you very much. I just learned a great deal about Jeff Human. I have always admired him and his talent and his ability and I have watched him in Washington, knowing that he is not just a bureaucrat. He is a person with tremendous compassion and understanding of people, their needs, and their problems.

Jeff, what I did not know about you is how flexible you can be. You have talked to us about education; you have talked to us about tractors; you have talked to us about Federal programs; you have talked to us about *Boxcar Willie*; and you have talked to us about me. I am here to tell you that I am sure thankful I do not practice law anymore.

I am not sure I should have been invited to speak to you today at all because I am not sure of my own commitments. There is probably no one who is working harder or who believes more that we should hold down health care costs than I.

Earlier this year, I was in an automobile accident and was taken to the emergency room. I was laying there flat on the slab and looking up, and two white spotlights were shining down on me. It was very, very warm and very comfortable.

I felt pretty good about that, but then I looked kind of from one side to the other, and I saw these green things running around. There were doctors standing here and there. Once in awhile one would lean over and look at me, and I would look at him. The funny thing about it is that never one time did I look up and say, "How much is it going to cost, Doctor?"

And so there are conflicts within all of us. We want the best health care system possible. We do not always want to pay for it. We believe that there are ways in which we can cut and save—but not on the service that we get.

So, it is very difficult when we talk about what is needed and what is doable. If at first blush you think it is just overwhelming and impossible, you would quit.

Then when you realize that things do happen—maybe slowly, but they do happen. There is always change going around. Maybe the change will inure to a system that we want to change. That is the reason it has been exciting to me to work with Jeff Human and the people in Washington and DHHS.

Some of the business people and the major leaders of this country are trying to do something about health care. We have long learned that you can not do something about cost alone because if you control cost, you reduce access.

You cannot do something about quality of care alone, even though that, by itself, might reduce health care costs 30 or 40 percent, because it costs money to do certain things.

You cannot just provide more access for everybody without affecting costs and quality. So we have to deal with all of those aspects of health care and the health care delivery system together.

I think that it is awfully easy for us in the rural areas to be neglected because we do not have the votes they have in the big states: California, how many congressmen do they now have? New York?

It has been very impressive, what has happened in Congress over the last several years. Jeff already mentioned how many members belong to the House Coalition on Rural Health. So, a lot of good things have happened, and our advisory committee, I think, has had some influence, some impact, and I am pleased to be associated with them.

I am pleased that the Surgeon General decided that we should have this conference and that our senators endorsed it, and Tom Harkin helped to get it here in the State of Iowa. There is no better place we could have a conference on rural health than right here in the State of Iowa. I think we ought to have one of these every 50 years.

An awful lot has happened to change the landscape of American health care during this past 50 years. Advances in technology and the proliferation of medical specialties allow us to live longer and healthier lives. That is good. But unfortunately, farm families, farm workers, and rural farming communities do not share equally in all of this achievement with our neighbors in urban areas.

This conference is very timely, and I am pleased that it is here in the State of Iowa. And I want to thank the Surgeon General for being here.

There are so many people that I would like to acknowledge on the federal level, on the state level, and on the regional level—our Senators, Congressmen, Dr. Donham and Dr. Merchant, and the list goes on and on. I am going to save you—spare you—the time that it will take to do that.

Let it suffice to say, I truly appreciate what you are doing because this is important—not just to those people who live on farms, but even those who live in small towns; it is important to every one of us. I will get back to that.

The diverse groups of people like yourself who focus specifically on rural health at this conference give us a unique chance to build and strengthen active, vital, rural health networks. It offers the opportunity to develop links between the researchers and the health professionals, between health professionals and extension agents, between extension agents and surveillance experts, and between surveillance experts and researchers. The list goes on and on; you get the picture.

We just finished a rather tasty meal. You have probably had better; you have undoubtedly had worse, but by most standards, let me tell you, there are people in this world who have never, ever had a meal that good. Let me give you some food for thought.

Just stop and pause and reflect for a moment with me about who produced that food. I am not talking about the culinary part, the chef's part, but about the people who provided the labor and the risk and the sacrifice that we enjoyed at noon: we are spoiled. We in this country try to decrease the calories that we eat, while the rest of the world measures growth and progress by the increase in calories their people eat.

Our farmers only get a very small fraction of what we spend for food. They get 4 cents for the wheat that goes into a loaf of bread, which costs roughly a dollar and a quarter. They get 5 cents for the corn that goes into a 7-ounce box of corn flakes, which sells for a dollar and a quarter.

We in this country spend a smaller percent of personal income on food than any other civilized country. You people pay, on the average, 11.9 percent of your personal income for food. It was 18 percent in 1959. It has been reduced.

Yet, in other countries, like the European countries, they are paying around 17 percent; Japan, 19 percent; the Soviet Union, 28 percent; India, 54 percent; China, 48 percent. We have a bargain.

Look at what is happening in the Soviet Union. During our lifetime we have grown up knowing about two superpowers—one the United States of America and the other the Soviet Union.

Today the Soviet people stand in lines for hours. You see them on television. You can watch them—waiting for a little piece of bread that they cannot even afford.

> Add to that the fact that the suicide rate for farmers is now 30 to 40 percent above the national non-farm rate.

We are fortunate, yet we take it all for granted. Our farmers produced the food that the chef prepared for us today, but they did it accepting some risk: the possi-

bility of an untimely death or serious injury or acute or chronic illness—all of that—while they were growing the food and raising it.

RURAL STATISTICS

Earlier at this conference, if I understand correctly, you heard some alarming statistics. Let me briefly reiterate what I think some of them were.

Although farmers and farmworkers comprise only 3 percent of the work force, they suffered 14 percent of work-related deaths, according to National Safety Council figures. Agriculture, as you heard just a moment ago, precedes mining now as the most hazardous occupation.

Unlike mining, where the death rates have been decreasing, agriculture mortality rates have remained consistently high during this past decade. The fatality rate in farm work is five times the average for all U.S. industry—five times.

Researchers have discovered that midwestern farmers have a higher-than-normal chance of dying of leukemia. The cause is uncertain. Some experts fear an unusual incidence of leukemia is linked to the use of modern pesticides in raising corn.

A serious new hazard known as "hog lung" is also one of the by-products of the modern system of raising hogs in confinement. In a half-dozen or more of our cities, water supplies contain greater than acceptable amounts of pesticides and other synthetic organic chemicals.

Millions of rural poor people are risking health problems because of substantially substandard diets. That problem is attributed to the pride of rural poor who are unwilling to accept food stamps and other assistance. These numbers do not even take into account all the children who die each year in farm-related activities.

In addition to deaths, there are 130,000 to 170,000 disabling farm injuries every year. These injuries entail an enormous hospital rehabilitation cost, and nearly half of all survivors of serious farm trauma are permanently impaired. Add to that the fact that the suicide rate for farmers is now 30 to 40 percent above the national non-farm rate.

Jeff just gave you some other information about that fact. He mentioned that I had served as a representative to the United Nations. When I was there, I found myself frequently talking to those of other countries, and especially Africans, who no longer could produce enough food for their own people.

They had joined a crowd of socialized countries, and soon learned that they just could not produce food like they used to. They liked talking to me because they knew that I came from the State of Iowa, one of the best farm states in the country, in the world.

We spent hours talking about how our farmers could produce food better than anybody in the world. I believe that we could help them. We used to talk about how we might do that.

One day I was telling them about how wonderful our farmers were and how well they could produce food. Then, the very next day, I picked up the *New York Times* and there on the front page was a dateline story from Spencer, Iowa; and this is a quote, "More suicides on Iowa farms." I just hoped that my friends I talked to the