

## **SURVEILLANCE - AGRICULTURE-RELATED DISEASES, INJURIES, AND HAZARDS**

*By Henry A. Anderson, M.D.*  
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Dr. Richard A. Lemen: Our first speaker will sum up the session on *Surveillance - Agriculture-Related Diseases, Injuries, and Hazards*. Our speaker, Dr. Henry Anderson, is the Chief of the Section of Environmental Epidemiology with the Division of Health in Madison, Wisconsin. Dr. Anderson has a medical degree from the University of Wisconsin and received his bachelor's degree from Stanford University. Dr. Anderson:

Over the past several days, we have experienced some stimulating discussions and presentations. What stands out are the vivid images that have been evoked.

We are all now familiar with the theme of the movie *Field of Dreams*; we have heard all about "belltollers." We can clearly say that this conference, among all conferences, has definitely overcome the "vision thing."

### **THE TIME HAS COME FOR ACTION**

Our session was to address surveillance of agriculture-related diseases, injuries, and hazards. I think we confirmed that the time has come for action; that there is a crisis of disease, injury, death, and disability on farms and in farm families.

We need to move away from the broad view to some specific, high-priority activities.

Our challenge is, "Why can't we prevent these events from happening in the first place? Why haven't we, and why can't we?" What is critical to accomplishing the

goals is that a coalition is forming, and it is forming around the common interest of concern and support for the prevention of agricultural injury and disease.

### **SURVEILLANCE IS ESSENTIAL TO PREVENTION**

As you might expect from our group, we feel surveillance is essential to prevention. We discussed that the role of surveillance and prevention has four main goals.

- ▶ The first is the ability to recognize and identify problems. We have certainly done that through existing programs. We have heard this week about the many problems that do exist.
- ▶ The second activity of surveillance and prevention is defining the scope of the problem. In many instances, we are in the process of trying to do that, but we also need the second step to continue that.
- ▶ The third is to target interventions. Right now we are in the process, for many diseases and injuries, of trying to target where we can get the most bang for our buck.

► The fourth role is in evaluating the efficacy of interventions.

For many conditions we are at different surveillance stages in this scheme. For one condition that we have heard much about, that of farm fatalities due to tractor roll-over, we have identified the problem, we largely know the scope of the problem, and we know what needs to be done to target interventions.

We also have heard this week that we have not been very successful. Surveillance information is continually telling us that our programs are not as effective as we would like and that we need to bring our coalition together to control these problems.

We discussed a number of issues: hearing loss, skin cancer, acute pesticide poisoning, and respiratory illness. All of these are problems that need to be addressed, and surveillance can assist us.

### **TASKS CAN BE ACCOMPLISHED BY A COALITION**

We also discussed defining the coalition. We all have a fuzzy, warm feeling about a coalition, but we really need to begin to define what it is and who it is. We need to involve government at all levels—that is, the Federal government, state governments, local governments, and county governments.

There is a critical need to have industry involved. They are key actors and players to help us intervene.

Communities also need to be involved. Both the academic community and the community of the voluntary organizations that represent individuals need to be involved.

We also heard of a need for grass roots effort. We need to have individuals involved. The individual farm family must be committed to this activity and participate.

The coalition needs to identify a set of conditions and hazards for surveillance. We need to move away from the broad view to some specific, high-priority activities.

### **THE NEED FOR PRIORITIES**

Our session participants determined that an initial task of the coalition must be to establish surveillance priorities and to provide support to build the infrastructure necessary to carry out the surveillance programs.

► Therefore, first we are proposing that within 60 days the Surgeon General make every effort to identify resources for a workshop of coalition members and that agricultural disease and injury experts come together to identify conditions for surveillance.

► Second, after that group has come together to identify candidate conditions, that within 180 days the Surgeon General make every effort to identify resources for a workshop, which will take up the candidate conditions involving all levels of the coalition. We have, over the past several days, identified and spoken of a number of candidate conditions in our group, including farm fatalities and the more serious injuries.

Of course, we talked about roll-overs, but also we have to be concerned about amputations and loss of eyes. Skin cancer, repetitive trauma, hearing loss, and especial-

ly respiratory conditions, also, must be considered as candidates.

### **CANDIDATE SURVEILLANCE PROGRAMS**

We also discussed various types of surveillance programs. Once these candidate conditions are identified, we must begin to move forward for the establishment of surveillance. A situation such as the need for continued coding of death certificates for industry and occupation, as well as that portion of the death certificate that indicates whether the fatality is work-related or not, is one candidate surveillance system that could be easily implemented.

We also need to begin additional surveillance at the local level by health and safety practitioners. Another example would be in-depth case investigations of individual fatalities or individual diseases by health and safety experts.

Lastly, and parallel with this activity, we recommend that the Surgeon General and the coalition, together, need to move forward to identify resources for the further development and support of the infrastructure that is necessary to carry out this mandate.

In conclusion, our group did feel that we have a vision, but we do not feel that it is visionary but rather that it is practical. Prevention can be accomplished, if we are all committed to achieving the goals. We feel that this conference is the first step in getting a coalition formed and allowing us to begin to make that commitment to move beyond all of the activity that is currently ongoing and to make additional strides for the prevention of disease and injury.□

## RESEARCH - CHEMICAL AND BIOLOGICAL HAZARDS

By Kelley J. Donham, D.V.M.

Professor, Department of Preventive Medicine and Environmental Health  
University of Iowa

Dr. Richard A. Lemen: Our next speaker this morning will be talking about the findings and the recommendations of the sessions on *Research - Chemical and Biological Hazards*. To do that is Dr. Kelley J. Donham, who is a veterinarian who received his degree from Iowa State University and his undergraduate and master's degree training from the University of Iowa. Dr. Donham:

Steve Olenchock, the rapporteur in our group, and I worked for several hours last night to summarize the kinds of messages that came through over the past two days in our group. We felt we could best summarize those ideas in about three different topics.

- ▶ Number one, there was a special spirit that transcended throughout the session that can best be described by a combination of urgency, enthusiasm, and commitment.
- ▶ What I want to talk about second is specific facts that were mentioned in regard to particular agents of disease and the gaps in the knowledge that were identified.
- ▶ The third topic I want to discuss is the need for a coalition to address the issues.

This was a group that was quite large. We usually had over a hundred people in the room, very interactive, and I think it was a very exciting group to be with.

### GROUP SPIRIT

Regarding the spirit of this group, I would like to try to demonstrate this through a model diagram of a nerve synapse. The spirit that we felt contained enthusiasm, commitment, and goal direction.

The spirit really was something that was sparked or initiated back in 1988 when there was a conference here in Iowa, entitled "Agricultural Occupational and Environmental Health: Policy Strategies for the Future." This conference resulted in *A Report to the Nation*, which indicated that there was an urgency, a feeling of urgency, about this whole issue.

I believe since 1988 that urgency has transcended into even a greater and broader enthusiasm and commitment demonstrated here at this conference. Clearly, the neurotransmitter substance here was Dr. Novello's enthusiastic communication to us of her commitment to this public health problem of agricultural safety and health.

However, in the background there is the question about the reality of this commitment in the years to come. The momentum, will it continue? The fact is that the changes, the actual reduction in injuries and illnesses that we hope to see, will take time and will take long-term commitment.

One of the items that came out of the group was a call for a sustainable human resource in agriculture. This was based on an analogy to the sustainable agriculture movement from a natural resources conservation perspective.

Perhaps one of the aspects that has not been thought of or put into the equation of sustainable agriculture is that we must have a sustainable human resource. We need a sustainable human resource that is as free as possible of illnesses and injuries from an economic standpoint as well as a humanistic standpoint.

## FACTS

### Dust-Related Diseases

Moving now from the spirit of this group to facts, Suzanna Von Essen reviewed some of the major respiratory diseases resulting from exposure to agricultural dust: bronchitis (both acute and chronic); occupational asthma; organic dust toxic syndrome; mucous membrane irritation; hypersensitivity pneumonitis; and classical allergies (rhinitis and asthma). These are placed subjectively in order of importance, as I interpreted from the discussion and from the presentation. I also noted some gaps in knowledge brought out in the discussions.

There were questions about the sequelae of repeated acute exposures or acute episodes of organic dust toxic syndrome, acute bronchitis, or hypersensitivity pneumonitis. What are the long-term and outcome sequelae? They are unknown. This is where additional research is needed.

There was considerable discussion in regards to agents of agricultural respiratory disease. The exact agents are unknown, as are the specific mediators that result in the biological conditions that are seen.

The difficulty of differential diagnosis was mentioned several times. It is not easy to differentiate between organic dust toxic syndrome and hypersensitivity pneumonitis

and a complex such as a combination of chronic bronchitis combined with hyper-reactive airways disease. To sort those out, the clinician at the community level needs help in regards to training and newer and more specific diagnostic tools.

**Treatment:** It is not entirely certain from the physician's standpoint as to what is the best treatment for these agricultural respiratory ailments. We know that protection, perhaps, is the best answer; but when a clinician is faced with these problems in his or her office, what is the best treatment?

Fifty percent of the pesticides that are in use show some potential for carcinogenicity.

**Children:** There are questions about children who are exposed to these environments at an early age. What are the issues and problems involved? Are they more prone to allergies? Are they susceptible to inflammatory agents and long-term sequelae? It is not known.

### Pesticides and Fumigants

Aaron Blair had the topic of pesticides and fumigants, and he outlined his presentations emphasizing chronic outcomes in four areas: cancer, immunologic, neurotoxic, and reproductive. He concentrated primarily on the potential relationships of pesticides to cancer, because that is where most of the research has been done.

Fifty percent of the pesticides that are in use show some potential for carcinogenicity, based on a variety of different kinds of bioassays, and they seem to span

the classes of pesticides that are used, including insecticides and herbicides. Even though farmers have lower overall risks for cancers, there are certain cancers that they have increased risk for, including reticuloendothelial cancers, multiple myeloma, lip, prostate, and soft tissue sarcoma among others. Perhaps, in terms of the evidence relating pesticides to cancers, non-Hodgkin's lymphoma seems to have the strongest relationship.

**Immunologic Concerns:** Perhaps one of the most interesting facts that was brought up was that non-farm populations of immunosuppressed individuals seem to have similar patterns of cancer as farmers. There are a host of neurotoxic problems that are at least, I guess, beginning to be associated with pesticide exposure, but they are not really well-known at this point. Then, certainly, there are certain pesticides that have some effects on both male and female reproductive outcomes.

Perhaps one of the major gaps that was noted was the need for a well-controlled, long-term prospective study; perhaps this is one of the major ways to try to find out some of these associations.

### **Infectious Diseases**

Dr. Russell Currier had the assignment of discussing infectious diseases. He discussed these in four different categories: interpersonal, food-borne, vector-borne, and other zoonoses.

In terms of interpersonal infections, he noted that there are certain diseases that have been rare in the past, but are very prevalent in certain farm populations. Tuberculosis, for example, is 300 times more prevalent in the migrant farm population than in the white population.

Polio and rubella have been noted in the Amish population. Enteric diseases, generally speaking, are more prevalent in the migrant and economically deprived groups. There is a problem with a combination of socioeconomic status and cultural situations that clearly influences the disease pattern within this population.

There are occasional outbreaks of a whole host of food-borne diseases within farm family populations, because of their particular food preparation methods and use of food from the farm. Examples include *Campylobacter*, *Listeria*, *Salmonella*, and *trichina*.

Perhaps one of the most interesting facts that was brought up was that non-farm populations of immunosuppressed individuals seem to have similar patterns of cancer as farmers.

Vector-borne diseases still crop up as occasional problems, ea plague, Rocky Mountain spotted fever, equine encephalitis, California encephalitis, and even malaria in certain areas.

Zoonoses, in particular tetanus, were noted. We still do have tetanus, and the fact is that the immunization status of our population is not as complete as we would hope it to be.

Bovine tuberculosis has shown up again from other species besides cattle. Llamas and buffalo are species that can harbor the infection and reintroduce it to the cattle population, which may in turn expose the farm population. Then, finally, rabies is still a problem and will be a problem for many years to come.

**Gaps in Knowledge of Infectious Disease:** Particularly a lack of information about infectious diseases in immunosuppressed populations and effects on women of certain infectious diseases was noted as a significant knowledge gap. Needlesticks, associated with the incidental use of injectable antibiotics and veterinary biologicals, have been noted as a problem.

### **Gases, Vapors, and Liquids**

William Pependorf had the topic of gases, vapors, and liquids. He approached it from a rather generic standpoint. He discussed a new paradigm for industrial hygiene in agriculture. He argued that we really have a special type of industrial hygiene, and that is agricultural hygiene.

What is agricultural hygiene? The old paradigm for industrial hygiene was recognition, evaluation and control. But in agriculture here we do not have the typical industrial setting. We cannot do monitoring on a daily basis. So we have to rely on anticipating the problems that may be occurring so that we can target the recognition and evaluation. The key part of this paradigm is anticipation.

The usual paradigm of control is source, pathway, and person. Here we have to concentrate on the source.

It is difficult, often impossible, to control the pathway. It is impossible to ventilate a strawberry field. It is difficult to put a respirator and a rubber suit on somebody who is working in 110°F heat in an orchard.

The third part of the paradigm is emphasizing practice standards rather than performance standards in agriculture. Practice standards emphasize good practice,

such as completely enclosed systems of pesticide handling, whereas performance standards, would stress methods such as daily monitoring of pesticides.

The lack of industrial hygiene services, the variation in the climates, the work practice, seasonality, are all not typical of industrial settings. Therefore, emphasizing practice standards only makes sense.

Gaps in knowledge here include the problem of additive and multiple exposures. We do have a situation in agriculture that is, again, different from industry—always a variety of different exposures in any one given case.

There are additive and synergistic health effects that are unknown. There is a need for more agricultural hygienists. There are precious few in this country that have the particular training and understanding of the agricultural processes and of the socioeconomic and cultural differences between the industry and agriculture approaches, which include cultural implications as well.

### **NEED FOR A COALITION**

Finally, I would like to try to put together the spirit I mentioned earlier and a paradigm of what a national coalition for local action might be. These thoughts came through in our group in various ways.

If you can, envision in Figure 1 at the center of the circle the farm family and farmworker who are the target. They are surrounded by a community, which includes a variety of different services and groups: local extensions, farm groups, the health care system, the public health departments, media, and schools.

Elements of a National Agenda

- Communication
- Community
- Surveillance Evaluation

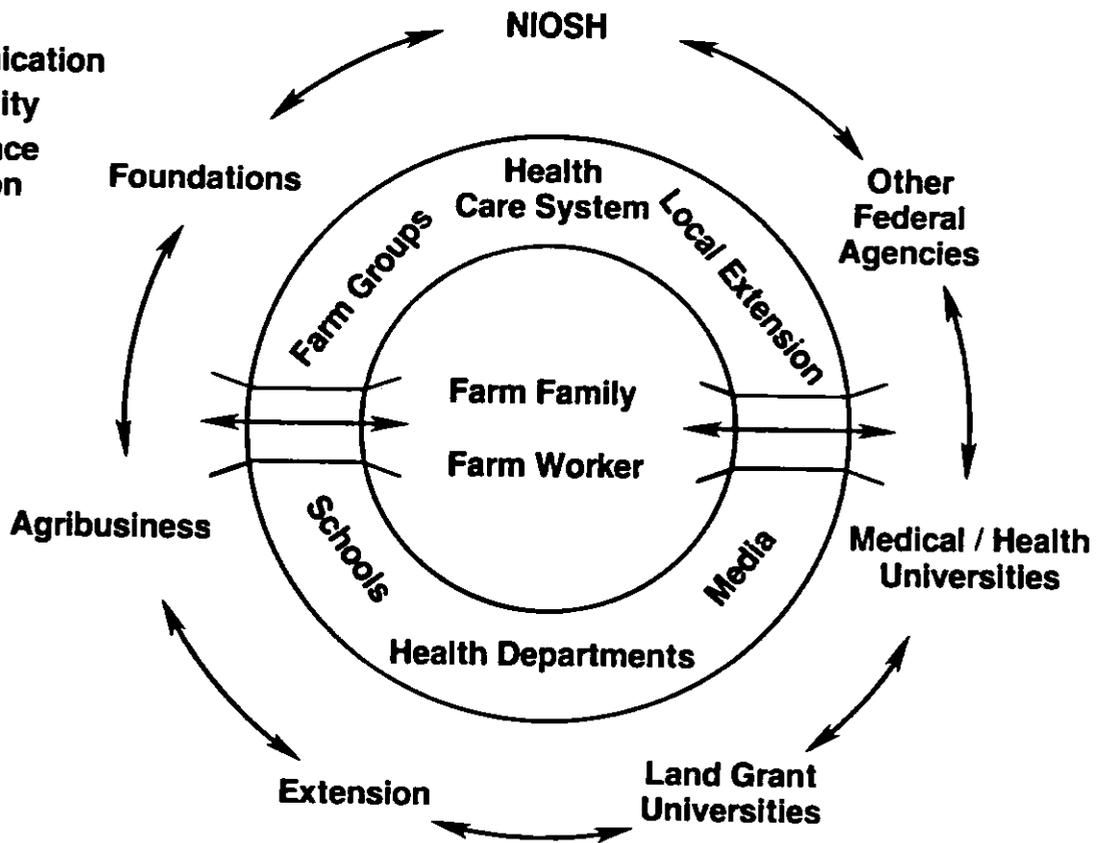


Figure 1. A National Coalition for Local Action.

Surrounding that, yet, are the national resources that we have, including NIOSH, other Federal agencies, medical and health universities, land-grant universities, national extension service, agribusiness, and foundations. There has to be communication within that outer circle and between that outer circle, to coordinate the services that are available.

Also communication is needed directly to that farm family and farmworker so that we are working on the problems that are of concern to them and are real for them and of importance for them. We must also utilize the community in which they live and work to help them solve their own

problems.

That whole communication system has to work. Included in that is the surveillance and evaluation of the programs that are in place to make sure that whatever programs that are in place are modified according to the results of that surveillance and evaluation system.

That is the paradigm that I think can result in a true "National Coalition for Local Action." Hopefully with the spirit of this conference, we can be striving for that. I think this conference has gone a long way in helping to realize that end. □

## RESEARCH - MECHANICAL AND PHYSICAL HAZARDS

By Lorann Stallones, M.P.H., Ph.D.  
Associate Professor, Department of Environmental Health  
Colorado State University

Dr. Richard A. Lemen: Our next speaker will summarize the sessions on *Research - Mechanical and Physical Hazards*. To do that is Dr. Lorann Stallones, who received her bachelor's degree from the University of California in Santa Barbara, and her MPH and her Ph.D. from the University of Texas, School of Public Health, in Houston. Dr. Stallones:

Well, that introduction does not give you a very good idea about why I am up here presenting physical and mechanical hazards when ordinarily these are in the realm of an engineer or an agriculture safety specialist. I would like to acknowledge those people who made a contribution to my being here. One of them is on the platform with me, Dr. David Pratt; one of them, I am sure, is in the audience, Dr. John May. After I finished my Ph.D. in Houston, I went up to Cooperstown, New York, where I worked at the Mary Imogene Bassett Hospital with the two of them.

There are two things that you have to know about David. One of the first things that anybody ever told me about him was that he could sell ice to Eskimos. I think in this case, I was the Eskimo. The ice was that we were in a farming community and really needed to look at what the problems were in that particular community. As public health professionals, I think that really is our obligation—one that we have been remiss in fulfilling the agricultural safety and health area.

The second thing you have to know about David is that someone—the same person, of course—told me that if you sat David down in the middle of a desert he would start to count sand. So, there he was in the center

of an agricultural community, and he started counting. What we wanted to do, because David is a pulmonary physician, is look at pulmonary disease among the farmers—of course a major problem.

So we put together a very detailed survey, and we asked a lot of questions about pulmonary disease. The last day before this questionnaire went into print David said, "I've heard that farmers have a lot of injuries. Don't you think, perhaps, we should ask that question?" So we did.

When the questionnaires came back, about 10 percent of the farmers had had a work-related injury in the past 12 months. We thought that was extremely high and that gave rise to ongoing surveillance where we called this same group of farmers every other month. Much of the data have been reported in national meetings, and I think it was an extremely important step in our development.

From there I went to the University of Kentucky where I met the other side of this whole business. He was Larry Piercy, who is an agricultural safety specialist who has his master's degree from the University of Iowa, and who trained at the Institute of Agricultural Medicine. He and a number of other people work with the Kentucky Farm and Home Safety Council.

My advice to anyone who goes to Kentucky is, if you do not want to become involved, stay away from that group, because they get you involved. You will automatically move through the ranks of going to the meetings and suddenly one day you will find yourself president of the organization. The Kentucky Farm Bureau is very active in that particular organization.

But the person I really want to acknowledge in all this is my uncle, who is a farmer in Idaho whose youngest son decided that after spending quite a number of years being a carpenter, he wanted to go back and work on the farm. Really, the reason we are here is to make sure that those people who want to go back and work on a farm will be able to work in a safe and healthful environment.

### **MACHINERY AND VEHICLE HAZARDS**

We have heard a lot about how important injuries are among children and the elderly, and I would like to introduce Tom Bean's (Ohio State University) general duty clause. The general duty clause that he proposed in our session was that old tractors and old equipment are usually used on the farm for general duty, and the people who are responsible for that general duty are the old and the young.

So that gives rise to a situation where they are at risk of injury because of the age of the equipment that they are dealing with. They also are the most vulnerable of the population in terms of injury risk.

His major recommendations were that we need to continue to aggressively evaluate the safety standards that are developed by the American Society of Agricultural Engineers.

The general duty clause that he proposed in our session was that old tractors and old equipment are usually used on the farm for general duty, and the people who are responsible for that general duty are the old and the young.

One of the problems that has not been looked at and that needs to be addressed is to develop model standards for the transport of farm equipment and self-propelled farm vehicles on the highways and public roads. We may not pick up fatalities related to road use of farm equipment, because the person who dies may be the person who is in the motor vehicle, not on the tractor.

This is a very important area because, for most equipment, there are no highway standards for the transport of farm equipment. In keeping with this, his proposal was also to improve the lighting and the marking of farm equipment. He also believed that it was very important to continue studies on educational techniques that are successful.

### **MUSCULOSKELETAL HAZARDS**

David Cochran is from the U.S. Occupational Safety and Health Administration, and he addressed musculoskeletal hazards. He focused primarily on cumulative trauma disorders, about which we know very little. If you look at the combined influences of stress and heat and the type of work that is done on a farm, there are some areas of research that are pressing.

His major proposal to reduce some of the hazards was to consider packaging of materials to reduce back injuries. Materials

can come to the farm in anywhere from 1-pound bags to 50-pound bags, which will be lifted.

The point of view of the people who are the moving materials around needs to be considered in order to package them in a safer manner. He also thought it was important to identify hazards and create solutions acceptable to the farmers.

### **ELECTRICAL HAZARDS**

Robert McLymore from North Carolina State University discussed electrical power. There were three basic recommendations.

- ▶ One is that inspections of electrical wiring are critical and need to be done on a periodic basis.
- ▶ The second is the need to adhere to the National Electric Codes on the farms, and that is frequently not done. Safety procedures need to be established, particularly when a farmer does the electrical wiring. Inspections should be done upon completion of the work and must be done by a trained electrician.
- ▶ Finally, of course, there is the issue of overhead wires about which we have no good solutions, but farm equipment frequently does come in contact with overhead wires on farms, and this is the agent in many deaths.

### **NOISE**

Matthew Marvel from Oneonta Health Center discussed noise and stress. His primary focus was on noise.

He said that in those few studies that have been done hearing loss is increased greatly among farmers, that the loss of hearing

begins in the early ages, and that one of the critical needs in this area is to improve hearing protection in order to make the equipment more acceptable for people who need to wear it.

### **TECHNOLOGY TRANSFER**

Murray Madsen from Deere Company discussed technology transfer, and he focused on the need for improved sensors, radar systems, systems to anticipate and avoid overturns of tractors and systems to alter collision courses. He believes that there is a great need to incorporate human factors into the engineering design community, and he posed some rather interesting questions, which I would like to read to you.

- ▶ How does safety become a cultural value that permeates all that each of us does?
- ▶ What are the skills needed to excel in hazard recognition in the earliest stages of design?
- ▶ What is the measure of safety improvement at the stage when only conceptual alternatives are being studied?

In order to have better technology transfer, researchers need to participate in safety research and intervention networks.

### **RESEARCH RESPONSIBILITY**

John Crowley from the Farm and Industrial Equipment Manufacturers discussed research and the responsibility of manufacturers for doing research and the public sector responsibility for areas of research. Many of the areas that he touched on were also addressed by surveillance and by the previous speaker, so I will skip over some of those; but I would like to discuss a few

of the things that have not been addressed in great detail.

One of them was improving the handling of agricultural chemicals, including closed systems, improved worker protection, and techniques that will minimize the loss of chemicals so that we can reduce the total amount of chemicals that are being used. He also discussed the need for improved air filtration systems—particularly in tractors and in work environments where you address not just dust levels but also chemical, gas, and vapor exposures.

Loggers are at even a higher risk of injury death than farmers, but many of the risks they encounter, farmers will encounter as well because farmers do logging activities.

He discussed the need for devices to detect hazardous materials, particularly gases and vapors in enclosed, confined spaces. We need to develop effective ways to gain support and cooperation to fund projects.

## FORESTRY

Penn Peters from the U.S. Forest Service discussed the forestry perspective. Deaths among loggers are about 30 times more common than among other occupational groups. Loggers are at even a higher risk of injury death than farmers, but many of the risks they encounter, farmers will encounter as well because farmers do logging activities.

There is a marked lack of awareness of the hazards of logging. Data systems need to be developed to increase the understanding of the circumstances in which the fatalities and injuries occur.

## REGULATION

Thomas Seymour from the Occupational Safety and Health Administration (OSHA) discussed the regulatory perspective and made his three main points.

- ▶ One point was that existing standards need to be fully evaluated.
- ▶ Second, we are in need of better injury data.
- ▶ Third, data-gathering needs to be improved so that we can further understand the problems.

Farmers and ranchers must be involved in the development of standards, because OSHA has had problems in the ways that they have attempted to address safety and health on farms. National policy guidance is needed in order to provide focus for targeting proper areas of research and to define the scope of research to be performed within priority areas. There is a need to address the role of behavior in prevention of injuries and illnesses among farmers.

Finally, some of the comments from the audience that should be addressed were the need for more coalitions, which do more than raise funds for research but also raise awareness, the need to identify the interventions that work, and the need to promulgate those interventions. Probably most important was understanding more about what incentives work so people do the things that we know and we believe are right.□

## INTERVENTION – AGRICULTURAL WORKERS' PROTECTION FROM HAZARDS

By David S. Pratt, M.D.

Director, New York Center for Agricultural Medicine and Health  
Cooperstown, NY

Dr. Richard A. Lemen: Our next subject is to deal with *Intervention – Agricultural Workers' Protection from Hazards*. You have heard a much better introduction of our next presenter by our previous presenter. Dr. Pratt is a physician who trained with his undergraduate degree at the University of New Hampshire, his medical degree from Tuft University, and was also in the U.S. Public Health Service for a period of time. Dr. Pratt:

I would like to also take a moment not only to thank Dr. Stallones, but also to make special note of Jack Parker's contribution to our group. Jack was on the phone with us on a continuing basis and did a wonderful job getting our group organized, and I appreciate his efforts very much.

About the members of my group: it was little bit like Dr. Stallones' experience—here I am a physician. You can see we have lots of engineers here.

I would like just to make a note that we were privileged to have an active farmer, Gary Erisman, in our group. We were also particularly happy to have Dr. Hoglund join us, from Stockholm. You will see some of his materials in just a moment. Let us look to the future. He really showed us what a bright and shining future could look like for American agriculture.

We also had the special expertise of Dr. Konz, who talked to us about application of ergonomics—the notion of how people interact with machines; and he gave some special insights into how ergonomics might help in the future of agriculture. You have already heard about Vector control from Kelley Donham today. We heard from

Robert Pinger about some of the Vector control problems. I will speak more about some of the pest problems that affect farmers and farmworkers. Then, finally, Richard Fenske gave us a very nice discussion approaching personal protective equipment; I will share some of his slides as well.

Then we had responders who brought us back to Earth, told us what it was like in the real world, and what goes on from the perspective of a consulting engineer, Ray Crammond, from the perspective of an extension safety specialist with a wealth of information, Rollin Schneider; and then also from the perspective of an agricultural engineer, L. Dale Baker, who is involved every day in design and in product development.

We entered the deliberations and discussions by recognizing that the American farmer and farm family face unique hazards in this environment. In order to make it safer for these people, we needed to understand the special risks to which they are exposed on an ongoing basis, often recalling that farming and the home environment are a single, contiguous, and shared continuum.

Thus, the children on the farm are at risk for injuries from equipment, from animals, and from chemicals on a frequent and ongoing basis. The farm workforce is older, as we have heard, and often includes family members, part-time help, and migrant workers, presenting a special and unique variety of problems that need to be dealt with.

The evolution of American agriculture as it is today has led to decreasing profit margins and increased levels of stress. Demands on farmers today are very great, indeed. As we have heard previously, they are expected to be meteorologists, economists, agronomists, crop specialists, repairmen, livestock breeders, and personnel experts.

The special health risks and hazards presented by farm equipment, including the ubiquitous tractor range from acute traumatic injuries to chronic musculoskeletal disorders. Farmers and farmworkers also face vector-borne diseases, as I mentioned earlier.

Dr. Donham pointed out that we are seeing cases of encephalitis in the northeast, and in Wisconsin we are seeing an increased amount of Lyme disease; also, interestingly and perplexingly, malaria and dengue fever. Agri-chemicals are also an important issue here, and there are other—in addition to agri-chemicals—toxic exposures that can occur in this work environment. Skin, the major organ systems, and also the lung are at risk from toxins and agri-chemicals.

Now, with that background, our group decided to look at the strategies from the experts that I told you about. What Dr. Parker and I did yesterday afternoon at the conclusion of the deliberations is try to

distill from those presentations the major guiding principles that we gathered.

We also had it emphasized to us that, all players, including the farmer and the farmworker, need to be at the table when we begin to redesign the strategies for intervention.

Those principles include the following: There are major interventions available to us as a community of interested engineers, scientists, physicians, and farmers. These would include three major options.

- ▶ One is the complete elimination of the hazard.
- ▶ Two would be what we call passive controls; that is, the operator would not necessarily have to do anything to be protected.
- ▶ Three is active controls, where volitional choices need to be made.

We also had it emphasized to us that, as Dr. Stallones said, all players, including the farmer and the farmworker, need to be at the table when we begin to redesign the strategies for intervention.

#### **ELIMINATION OF HAZARDS**

Many of the speakers emphasized that one must apply the earliest possible interventions to maximally reduce hazard exposures. The elimination of hazards could include machine redesign, job redesign, and product substitution, or all three.

Now the benefits of redesign include the fact that it would eliminate the problem at the beginning. It is a permanent solution

to what was the problem, and it has—in the nature of the design from the engineers—planned for the potential misuse of that equipment.

I would like to give an example of some extremely innovative product design in the agricultural realm: a Finnish tractor made by the Valmet Company.

It has some unusual and unique features that we were apprised of. First of all, the controls in the cab, including the steering apparatus, can rotate through 180°. A farmer can face backwards with all his controls facing the load that he is lifting.

This tractor also is articulated. The wheels turn independently, and also it has an automatic transmission. So the amount of pressure that would have been needed to depress a clutch is no longer an issue, thereby eliminating some of the left knee problems that had been identified by our Swedish colleagues.

In addition, job redesign was discussed in our group. A Swedish woman was shown working in a dairy barn. She was carrying numerous milking hoses.

It was calculated by the Swedish Farmworkers Health and Safety Association that she would have carried about 270 tons of equipment during the milking year in a 60-cow barn. This caused a lot of shoulder and neck problems.

The engineering job redesign group went out to look at this, and they came up with a solution: an overhead track on which you can hang the milking apparatus and slide it from cow to cow. This reduced, considerably, the workload and also reduced the rate of injury and problems with the shoulders in these workers.

The IPM, as many of you know, often will have a significant reduction in pesticide application and frequently prompts the choice of a less toxic compound in the work environment.

We were also told that the use of integrated pest management (IPM) is a solution that involves product substitution and administrative control. The IPM, as many of you know, often will have a significant reduction in pesticide application and frequently prompts the choice of a less toxic compound in the work environment. Please be mindful of the fact, as was emphasized in our group, that hazard elimination, at times, may need to be driven by legislation or regulation, especially when there are severe hazards and recognized effective interventions are available.

## **PASSIVE CONTROLS**

The next topic for discussion was passive controls. Our presenters and responders pointed out that in settings where complete hazard elimination is not possible, then passive controls may be applied.

Perhaps the best example of passive controls is roll-over protective structures (ROPS). Now, unfortunately, even if you have a ROPS you should not be opening the back window of an enclosed cab on a tractor and certainly should never have a child back there.

So, the passive systems are only as good as the operator, and in this instance some of the safety features of this cab have been subverted by removing the rear window. This breaks the sound reduction, as well as

the internal environmental controls and, indeed, puts a child at risk.

Other examples of passive controls include special kill-switches on chain saws such that when they buck or kick back they will automatically be turned off.

Finally, another example of passive controls includes what are called closed pesticide loading and mixing systems. Those particular systems allow a completely closed operation from the container into the mixing vats, thereby never exposing the worker.

### **ACTIVE CONTROLS**

The next group of strategies was termed active controls. Active controls are necessary when full hazard elimination or passive controls are not possible. Active controls require that the worker carry out a protective behavior such as donning personal protective equipment, applying an insect repellent, or reading and heeding warning labels.

The ultimate in personal protective equipment was shown. Astronauts were involved in working outside a space shuttle, which our colleagues at NASA call extravehicular activity. This is a situation where an active control system is absolutely mandatory, since one could not even live in that environment without that kind of gear and garb.

You immediately recognize that that equipment is wonderful, if you are going to be in the cargo bay of a shuttle, but it would be lousy to do your everyday activities, whether at work or at home, in that kind of a get-up. There are significant limitations in personal protective equipment, and they were enumerated in our group as

follows: it is uncomfortable, it may impose ventilatory stress, it certainly would reduce dexterity, and it may lead to heat loading and heat stress on the workers. This is especially true in people who work in warm climates and need to be fully covered.

Another point I should make about the limitations: a pesticide worker was shown wearing a non-woven garment that had a materials failure. The armpit was torn out. There was a gap in the underside of the garment, so that would allow a pesticide to escape onto the individual.

Finally, we heard that warnings, for all the emphasis we put on them, frequently do not work. They are temporary. They can be wiped off, erased, or removed. They have serious limitations. That is not to say that our group completely rejected training, education, and knowledge. In fact, one final thing that is shown here is an attempt to inform, to make sure that the agricultural population of Sweden is an informed population, about tractors that are designed with ergonomics in mind and with safety in mind.

We saw what you might think of as Swedish "Consumer Reports" of tractors that are ergonomically sound. The document was developed by the Swedish Farmers Health and Safety Association.

It was like a Michelin guide for restaurants. Four stars is excellent; three stars is good; and so on and so forth. Such scoring was resisted by the manufacturers in Sweden but has been very popular among the farmers and farmworkers.

Let me conclude by saying that our group decided that intervention strategies are most effective when they are applied early

in the process. Passive controls are less desirable but at times may be life-preserving and life-saving. Active controls are the least desirable interventions because they require forethought, modifications of behavior and, often, discomfort. Intervention strategies should always incorporate the knowledge of the users.

Intervention strategies are most effective when they are applied early in the process.

I am reminded of that little aphorism from Japanese management that says, "The worker has intimate knowledge of the process." In this instance it is the farmer and farmworker who have valuable, intimate knowledge.

Finally, in conclusion, we agreed that serious attention should be paid to using all the options to deal with what we all recognize as a clear and present danger to the American farmer and farmworker.□

## **INTERVENTION - SAFE BEHAVIORS AMONG ADULTS AND CHILDREN**

*By Walter J. Armbruster, Ph.D.*  
Associate Managing Director, Farm Foundation

Dr. Richard A. Lemen: Our next speaker will look at *Intervention - Safe Behaviors Among Adults and Children*. To do this, we have Dr. Walter J. Armbruster, who received a bachelor's degree and a master's degree in Agricultural Economics from Purdue University, and a doctorate in Agricultural Economics from Oregon State University. Dr. Armbruster:

We know that surveillance and research are, indeed, often precursors to intervention. Some of the discussion groups apparently did more than work on the necessary input to intervention, they even delivered some of our group's ideas for us. Be that as it may, I hope we will not be too repetitive.

The rapporteur for our discussion group, Dr. David Hard, deserves a great deal of credit for helping me put together an overview of what we discussed.

I was admonished by our group not to generalize our discussion to the point that we could have written the report before we arrived. I see some of them in the audience monitoring my reporting.

I hope they recognize our discussion. In some ways, Kelley Donham's diagram of a national coalition for local action could be viewed as the game plan for our whole discussion.

Achieving safe behaviors among adults and children, which we hope to foster through intervention, is an ongoing challenge. We grappled with ideas on how to better intervene to foster such behavior, so that it will avoid unintentional injuries in the agricultural occupations and create a safer and

healthier environment in which to live and work.

Our recommendations consist of a combination of short- and long-term implications or suggested actions that are aimed at immediate as well as future improvement in agricultural safety and health. While our discussion considered short- and long-term differences, the ideas did not lead to that framework very well.

We will introduce the ideas with the intent that some are short-term and some longer term in nature. We need to pay attention to this as we think about how to implement these ideas and recommendations.

### **BEHAVIORAL CHANGE**

There was rather widespread agreement in our discussion group that our overall goal is to achieve behavioral change that will result in a safer, healthier living and working environment for those engaged in agriculture. We have a good deal of evidence, e.g., from automobile seat belts, that providing education or information is not sufficient, though we feel it is a necessary precursor to achieve behavioral change. What is necessary to change attitudes regarding health and safety.

Mental health is an important aspect of overall health and a necessary ingredient of safe behavior. We had a bit of discussion about that, although we did not focus on it a great deal.

In trying to achieve behavioral change, youth may provide a more readily adaptable audience than some of the older clients that we try to reach. Hence, a focus on youth education and youth intervention may be very effective in changing their behaviors for their lifetime. We also believe that reaching adults through youth is a very effective channel for modifying adult behavior.

Similarly, we had some discussion about the possibility of working with spouses to help them understand the need for behavioral change, to reach the farmer whose behavior we are trying to change. We discussed it generally in terms of the spouses being the wives who would help the husbands change his behavior.

But we all know that there are many women farmers, so I assume that it works the other way also. We had a fair amount of agreement that the husbands listen to the wives; we did not have much discussion about whether it works the other way. So that is a hypothesis on my part. The point is, indirect access for delivery of messages as well as direct access, to our target audiences, may be a very effective strategy for achieving behavioral modification.

## **LOCAL EFFORTS**

We discussed local and state coalitions for working on agricultural health and safety issues, educational resources, and access to what is available in the various states. The federal role in coalitions is to help coordinate the state efforts, help avoid unneces-

sary duplication, and provide funding for the larger research base, intervention programs and mandated programs.

There was widespread recognition that while local coalitions may be very effective in delivery, they need a lot of help from federal and state levels in achieving or obtaining the resources with which to do their work at the local level. We need to think carefully about funding to make coalitions functional.

At the local level, it was pointed out that even a small amount of money is often quite significant and creates the opportunity for leveraging into significant activities that can have a realistic impact. I think some of the discussion was in the context that there is a lot of federal money and let us get it down to the local level where it will do some good.

As you think about it, the implication may also be that at the local level you may be able to raise the funds within the community to put on some of the educational or intervention activities that may be very effective. Someone suggested that we should not overlook the general businesses in our community as a funding source.

Knowing that more than half of the farmers in the U.S. receive more than half of their income from off-farm sources, there is a very direct stake in agricultural safety and health for those employers who do not necessarily have a direct connection with agriculture. These employees who count on having healthy employees who can be on the job and are not using the insurance benefits from that company's program to recover from injuries because of unsafe practices or unhealthy conditions in their farming operation.

Another point we discussed was the need to find ways to make it easy for individuals to achieve change in behavior. One suggestion was that when a farmer buys a significant amount of chemicals, protective clothing or protective gear needed to safely handle the chemicals could be packaged as part of the total product purchased.

You would not be given just a large can of pesticides, but rather a large can of pesticides with a safety suit attached directly to it. Obviously, there are some cost considerations that would need to be taken into account.

A related point was made about making it easy for farmers and agriculture workers to purchase safety equipment in general. In some cases it is very difficult to locate a local source. The individual may have to find catalogs or go to significant effort to locate the safety equipment needed.

So one of the opportunities or challenges for local or state coalitions might be to somehow assure that at least one source of supply for necessary safety equipment is available locally—a local cooperative or some private outlet. Making sure that those who need to purchase safety materials can find them easily, should they listen to our messages delivered through intervention, ought to be emphasized.

## RESEARCH

Then we turned our discussion to research. There was a strong feeling that we need better research on evaluating the effectiveness of the various intervention programs that are ongoing. I think somebody already made this point: if we are able to measure changes in behavior and sort out the links that they have to various interventions, then we can perhaps identify

which of those interventions are more effective than others. We know that budgets are tight. So that would imply withdrawing funds from programs that are not achieving, in order to obtain funding for those that are successful or for new programs.

The second issue regarding research that we talked about was the need for more basic research on the relationship between behavioral change and intervention alternatives, whether it be education, regulation or automatic protection from agents of injury. We do not know the linkages very well, so it makes it difficult to design new programs or better programs.

There was some feeling that legislation may be needed because education or other forms of intervention are not very successful, but there is also a feeling that legislation alone is unlikely to be effective. We have a lot of evidence, again going back to the seat belt example. Most or all states have seat belt laws now, but that does not mean that we have 100 percent of people buckling up.

We need to motivate individuals and communities, through education, to help modify behavior and accept or take advantage of safety equipment and healthy choices. We have a lot of anecdotal evidence, and I think more than that, of individuals overriding built-in safety features. So we need to use all of our approaches to achieve safe behavior in the agricultural occupations.

## COMMUNICATIONS

Finally, we had some discussion about the important role of communications in achieving behavioral change. We must pay attention to communications and carefully

consider how to deliver intervention in a manner that causes individuals to follow through to implement the desired changes.

We also know that reaching adults through youth is a very effective channel for modifying adult behavior.

We must carefully consider the background of targeted audiences, for example, age-appropriate programs for youth and education-level considerations, which dictate delivery approaches. If you have a farm or agricultural clientele or agricultural workers' group who are not highly educated, you may have to use cartoons, comic books, and posters requiring minimal amounts of reading.

Pictorial images may have to be used to get your point across. People with a low level of education are not going to read a six-page handout with many details related to safe behavior.

Similarly, if you are dealing with various cultures—Hispanic comes to mind—culture is quite important in how messages are normally delivered or more favorably received. Pictorial presentations and comic book kinds of educational materials apparently have a tradition of acceptance and use in Spanish cultures.

A point was made that we need to be careful that we draw on proper expertise—whether we are trying to create age-focused, education, or culturally appropriate materials. A partial understanding by somebody who is an expert in a particular aspect of health or safety, but who knows very little about child development stages,

educational strategies, or cultural differences, or who is not a proficient translator, may do more harm than good. That person may garble the message or weaken the impact of materials that could have much more effect by getting the proper expertise involved.

Another point regarding communications is the use of a range of media, organizations, and people to reach the target audience. Direct as well as indirect approaches, as I indicated earlier, repetitive messages, and varying approaches are needed. Use all the media, program opportunities, and the organizational efforts to repeat messages in various ways.

Finally, in communication, we need to be careful that proper communication takes place not only within coalitions at the local, federal and state levels, but also up and down the line.

We cannot have only top-down approaches. We know they will not work. We cannot have only bottom-up approaches, because we know we will have difficulty achieving access to good materials, etc. We need to make sure that the communications between the coalitions at different levels are fully utilized.

Finally, in closing, let me say that despite the admonition of the participants in our group, which was a large and actively involved group of probably 75 or so, I may have generalized too much in summarizing. A written report will contain some of the richness of discussion that I had to generalize away from this morning. □

## REPORT ON MIGRANT AND SEASONAL FARMWORKERS

By Valerie A. Wilk, M.S.  
Health Specialist, Farmworker Justice Fund, Inc.

Dr. Richard A. Lemen: The last speaker whom we have today will provide a *Report on Migrant and Seasonal Farmworkers*. Valerie A. Wilk received a bachelor's degree from Knox College in Illinois, and a master's degree in preventive medicine and environmental health from the University of Iowa. She is currently a health specialist with the Farmworker Justice Fund in Washington, D.C. I just want to read a couple of things that her organization does, and I am sure she is going to tell you more about this; but, as I see it, they try to make sense out of national and state-level occupational health policy issues facing farmworkers, and they develop strategies to address these issues. They attempt to educate the public, and they attempt to develop coalitions about these issues. Secondly, she also directs the Farmworker Women's Health Project, and she has just returned from a meeting on migrant and seasonal farmworkers. She will tell us about that meeting, and tell you about some of the problems that face these farmworkers. Ms. Wilk:

One of the advantages of speaking absolutely last on a panel is that a lot of the previous speakers said some of the things that I was planning to say, so it makes my job easier.

This is my first chance to attend this conference, because for the last four days I was in Buffalo, New York. During the days of your conference, there was another national agricultural conference—the 1991 National Conference on Migrant and Seasonal Farmworkers. It brought together over 1,300 migrant educators, farmworkers, Migrant Head Start educators and directors, employment training workers, attorneys and health care workers—both clinicians as well as non-clinicians—people like the physicians, nurses, and physician's assistants, as well as environmental specialists, health educators, and outreach workers.

The theme of the conference was "United for Progress." Over the four days, the conference participants had a chance to choose from over 160 workshops and plenary sessions. The sessions were heard in

English, some in Spanish only, and some were bilingual.

I am specifically focusing on the health workshops of the conference. Then what I'd like to do is go over some of the recurring themes and recommendations that came out of that conference and leave you with a couple of my observations from my 11 years of working with farmworker organizations.

### THE NATIONAL CONFERENCE ON MIGRANT AND SEASONAL FARMWORKERS

I know that at least one of the previous speakers on Monday spoke somewhat about farmworkers, but I just want to tell you, when we talk about migrant and seasonal or non-migrant farmworkers, we are talking about hired workers. In a 1990 demographic report, the Federal Office of Migrant Health estimated that there are four million farmworkers and their family members in the United States.

They are predominantly people of color. They are men and women; they are children. They are Hispanic, African-American, Haitian, West Indian, Southeast Asian, or Native American. They pick the fruits and vegetables; work in nurseries, greenhouses, and mushroom sheds. They hoe, weed, thin, and prune crops.

Almost one million farmworkers and their families migrate. Migrant workers travel throughout most of the United States.

The farmworker conference dealt with the issue of child labor; it dealt with farm injuries such as those related to falls from ladders. We focused on issues of disability and injuries from prolonged bending, stooping, heavy lifting, and carrying, and repetitive motion, including the musculoskeletal effects on children and results seen in the elderly.

One of the workshops dealt with workers' compensation and the fact that in about half of the states in the United States farmworkers are not covered at all by workers' compensation. We also dealt with the issue of pesticides, including farmworker poisonings from direct spray, from drift, and from residues on the plants.

We talked about effective methods of educating farmworkers and employers about pesticide use and hazards. We also talked about research projects being done, and about farmworker health status in general.

One of the points that came through, and one of the other speakers on the panel today has mentioned it, is that the workplace and home are one and the same—particularly in terms of migrant workers where migrant labor camps are right in the middle of fields. So when fields are

sprayed, so is the home, so are the children, even if they are not directly working in the fields at that time.

We also dealt with the issue of farm machinery-related injuries, heat disorders, and a major occupational hazard for hired farmworkers, which is transportation-related injuries. Farm labor contractors too often transport workers in unsafe vans and trucks. This unsafe transportation has resulted in deaths and serious injuries of a number of workers.

Most recently, in December 1990, in Florida, four farmworkers were killed and seven were seriously injured when a farm labor contractor's truck was broadsided by a van, and the truck carrying the farmworkers rolled over repeatedly. The farmworkers had been riding in the back of the truck on makeshift benches of planks and cement blocks, which is a violation of the Migrant and Seasonal Agricultural Worker Protection Act.

Farmworker advocates in the area had reported this particular farm labor contractor for violations six months previously, but nothing had been done. Because of this inaction, four workers died and seven were seriously injured.

We also discussed the issue of field sanitation. In 1987 OSHA promulgated regulations to require that drinking water, toilets and hand washing facilities be provided by employers for workers with 11 or more workers on any given day in the fields. The reality is that compliance is very low. There have been a couple of studies in the last year. In 1990, a study done with the North Carolina School of Public Health found that only 4 percent of farms were in complete compliance with the Federal Field Sanitation Standard. There was a

study done in New Jersey in 1990 that showed a figure of 16 percent compliance.

We discussed strategies to improve employer compliance and OSHA enforcement. One of the issues that came out in that workshop was the fact that the threat of employer retaliation is so great. If you have to rely on formal worker complaints, there are very few workers who are willing to risk their job if they know that OSHA may not be out to inspect for a week or two weeks or maybe 30 days. By that time, the labor crew has already left that farm and that work.

Another aspect of the field sanitation standard is drinking water. Common drinking cups are a major problem, as is clean and sanitary drinking water at the worksite.

We also talked about children's health and safety. Children drink and bath in contaminated water—water contaminated with pesticides and fertilizers. We also talked about injuries and about drownings in rivers and irrigation ditches.

Another workshop that attracted a lot of attention had to do with farmworker women and health. In March of this year, the Farmworker Justice Fund sponsored the First National Farmworker Women's Conference. It was the first event of our Farmworker Women's Health Project.

We brought 63 farmworker women and trainers to San Antonio for a three-day conference, and all of the farmworker women were women of color. They were Hispanic, African-American, Haitian, and Southeast Asian.

The meeting was held in three languages: Spanish, English, and Haitian-Creole. We will be publishing proceedings of that mee-

ting later this year. We brought two of the farmworker women, who had been elected by the group in San Antonio, to the Buffalo Conference to present to that conference about the health priorities and recommendations that the women made in San Antonio.

There are a number of health issues specific to women. For example, with regard to field sanitation, urinary tract infections. If there is no privacy or no clean facilities, farmworker women will wait an entire day before going to the bathroom. This is particularly troublesome for women during their menstrual period and for pregnant women.

With regard to farmworker women and their exposure to pesticides, there are consequences of long-term exposure to the reproductive system, such as infertility, as well as the risk of miscarriages and birth defects. In November of 1989, there was a mass poisoning near Ruskin, Florida, and there were about six pregnant women, most of them in their first trimester, who were among the workers who were poisoned.

Of those women, the medical director of the clinic who treated the workers knows of two women—one who miscarried and another who had a baby with birth defects of the face and hand. There was another case, which was unconfirmed, of a still-birth.

Another issue facing farmworker women is sexual harassment, rape, and even sexual slavery in labor camps.

Housing is a major concern and occupied various workshops at the conference—substandard housing, overcrowded housing, or no housing at all.

We have had reports of hundreds of workers in Arizona living in the citrus groves, sleeping under tarps with cardboard on the ground. Also, in southern California there are cases of workers who have been living in holes in the ground in the canyons. I just heard in Buffalo that in at least one case, workers were being charged for rent for the tree that they were sleeping under.

In a number of the workshops there were very concrete examples of groups who had worked in coalition, either within their community or statewide, on particular health and safety issues: workers' compensation or field sanitation.

What I have not shown you in these slides are other occupational hazards that farmworkers face: tuberculosis, involuntary servitude, and employer retaliation. I have heard through my office of a number of situations where farmworkers have gotten fired simply for asking a question about the safety of farm equipment or about the location of field sanitation facilities, or for refusing to return to a recently sprayed field, or for taking action and getting out of a field while it was being sprayed. There are no anti-retaliation protections under the Federal Pesticide Law, and OSHA's anti-retaliation protections are so time-consuming that with the seasonality of farmwork, they offer little protection for farmworkers.

## **THEMES AND RECOMMENDATIONS**

What are some of the recurring themes from the Buffalo conference? First of all, there was the recognition of the importance of service providers, particularly health care providers, being advocates for

farmworkers; and that advocacy to correct occupational and environmental health problems was, indeed, preventive medicine and extremely important. I have been gratified to see over the years that this has been a growing sentiment among migrant health and migrant service providers.

There was a commitment to continued and better coordination and communication among programs to most effectively use the resources available. Related to that was the importance of coalition building within one's community and beyond on farmworker health and safety issues. In a number of the workshops there were very concrete examples of groups who had worked in coalition, either within their community or statewide, on particular health and safety issues: workers' compensation or field sanitation, for example.

Another theme was the importance of the need for and the barriers to getting workplace information, most strikingly the right to know which pesticides are used and when they are applied in the fields. Another theme was the importance of the use of popular education methods to teach farmworkers, that is, getting farmworkers involved in a egalitarian way in training by doing skits and interacting with volunteers from the audience so you are not just doing straight lecturing about health and safety and pesticide safety.

The other thing, which I mentioned earlier, is the extent of farmworker intimidation by employers, and the lack of protection for workers who demand and who question and who actively try to make the workplace safer.

Finally, I would like to leave you with two observations. First of all, a *National Coalition for Local Action, FarmSafe 2000*,

must include migrant and seasonal farmworkers as equal partners.

Not only must farmworker family occupational safety and health issues be considered as seriously and as fully as farm family health and safety issues—because so many of these issues are similar and because farmworkers are important workers within the agriculture industry—but also farmworker leaders, community leaders, and union leaders need to be involved in the coalition as equal and active partners. Farmworker advocacy organizations such as the Farmworker Justice Fund can help identify those farmworker leaders to participate in this process.

Also, when we are talking about coalition building, what struck me earlier with the four components of a coalition, quite frankly, was that two of those partners in a coalition have been some of the biggest

barriers to farmworkers getting a safe and a health workplace. Both industry and government have opposed and have subverted some of the attempts to protect farmworkers, through legislation and regulation.

A safe workplace makes economic sense, and society picks up the tab when we have unsafe workplaces. Action is needed, but actions as have happened in the past cannot continue. We need to look at different ways of working together. We need to convince industry and government that changes need to be made, and we need to support farmworkers in their efforts.

Some of the most cutting edge protection for farmworkers have happened under union contracts. We need to look at all the different models to make sure that farmworkers are equally protected.□