News

Western Center for Agricultural Health and Safety

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FROM THE DIRECTOR

Tractor-related accidents continue to occur

By Marc Schenker, M.D., M.P.H.

Tractor-related accidents constitute the leading cause of agricultural deaths in the United States. Approximately 250 people die each year in overturns, run-overs, entanglements and highway collisions. Overturns consistently account for more than half of these fatalities—a disturbing statistic in light of the existence of a simple and effective means to prevent deaths from tractor rollovers.

Evidence from Europe and elsewhere shows that when tractor rollover protective structures (ROPS) are mandated, deaths and serious injuries from rollovers can be sharply reduced or even eliminated. An example of the dramatic impact of ROPS on tractor-related fatality rates is seen in Sweden, where annual fatality rates decreased from more than 15 to 0 per 100,000 tractors during the 30-year period in which ROPS were phased in (see Fig. 1 on page 2). Attainment of the zero-fatality target coincided with enactment of the requirement for all tractors to be equipped with ROPS.

The fatality rate from tractor-related events has not decreased in the United States, however, despite the existence of ROPS and unequivocal data showing that they are effective. Why aren't ROPS mandatory on all tractors

(*see* **ROPS** *on page 2*)

Tractors with no rollover protection structure (ROPS), such as the tractor shown above, continue to be used in the United States, despite numerous injuries and deaths resulting from rollovers.

Expert calls for vigilance in monitoring zoonotic diseases

Scientists are monitoring a potentially disturbing increase in incidences of zoonoses—infectious diseases transmissible between humans and other animals. Such zoonotic diseases can be linked to several plagues described in history books—for example, Bubonic Plague, which ravaged Europe between the 14th and 17th Centuries and killed up to one-third of the population. "Black Death," as it was also called because of the black spots it produced on the skin, was caused by the zoonotic bacterium *Yersinia pestis*, which is transmitted from rats to humans by fleas.

Bruno B. Chomel, D.V.M., Ph.D., professor of zoonoses in the Department of Population Health and Reproduction, School of Veterinary Medicine at UC Davis, presented an update on zoonotic diseases in agriculture during the Center's January noon seminar.

According to Chomel, several factors have led to the emergence or re-emergence of zoonotic infectious diseases, including human demographics, the industrialization of food production, globalization, international travel and commerce, land use, microbial adaptation, and changes and breakdown in public health measures.

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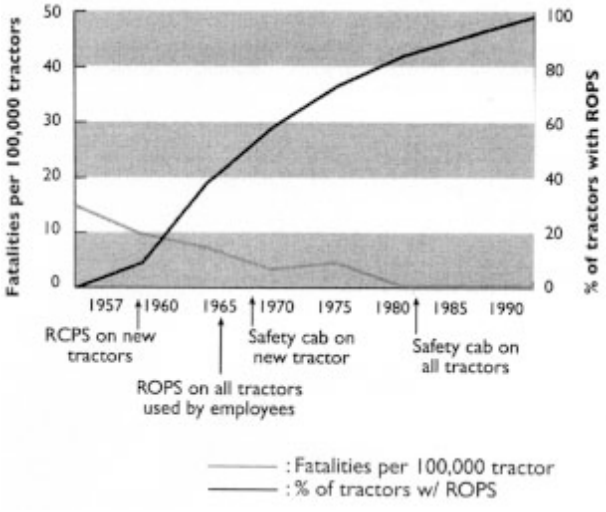
ROPS *continued from page 1*

in this country, and how can that goal be achieved? A historical perspective can be explanatory.

Development of ROPS began in the 1930s, and by the 1950s effective ROPS were available. However, during the first half of the 20th century little attention was given to agricultural health and safety in this country. While agriculture was recognized as being among the most hazardous occupations, most occupational health efforts concentrated on mining and heavy industry. Researchers did not begin exploring this serious discrepancy until the 1980s. In 1985, the American Society of Agricultural Engineers recommended a legislative mandate to equip all new tractors with ROPS. Unfortunately, more than 2 million tractors in the United States without ROPS were still in use.

A national conference in 1988 titled "Agricultural Occupational and Environmental Health: Policy Strategies for the Future" was a major catalyst for congressional legislation that created the Agricultural Health and Safety Program in 1991. By that time, the hazards of tractors were well recognized. At the landmark 1991 U.S. Surgeon General's Conference on Agricultural Health and Safety, the director of NIOSH and numerous other speakers affirmed the effectiveness of ROPS use. However, this effective safety intervention has not yet been endorsed by government sanction.

Fig. 1. ROPS Usage and Fatality Rate in Sweden, 1957–1990



Resistance to ROPS appears largely to be based in economics. Opponents claim that mandating ROPS on all tractors would subject farmers to an added expense that would drive many out of business. Similarly based arguments also were used by those opponents of automotive seatbelts, airbags and other safety interventions. Those devices now save thousands of lives each year.

A cost-benefit analysis has projected that mandatory installation of ROPS would save 1,000 lives during the next 10 years...

A cost-benefit analysis has projected that mandatory installation of ROPS would save 1,000 lives during the next 10 years, with cost-benefit ratios comparable to those utilized by the Federal Aviation Administration and the National Highway Traffic Safety Administration in their safety programs. Further, financial incentives and other programs can reduce the cost of this program to individual farmers.

Overcoming engineering and financial hurdles would nullify all reasonable objections to a regulation mandating ROPS on all U.S. tractors.

In short, I believe that the agriculture industry remains out of the mainstream of occupational health and safety in this country. One set of regulatory and public health standards has been established for white- and blue-collar workers, but another one exists for agricultural workers. Until agriculture is "normalized" and accorded status as a workplace deserving our best efforts to prevent disease, injury and death, effective health and safety interventions will continue to elude farmers and farm workers.

The nine NIOSH-funded agricultural health and safety centers have taken the initiative to achieve equitable protections for agricultural workers. This includes a national effort to increase ROPS on U.S. tractors. The means will involve not only epidemiological studies and risk-benefit analyses, but also a public health intervention program, including research, social marketing, economic analyses and drafting legislative bills. If successful, we will save hundreds of people from tractor-related deaths, while providing a foundation for improvements in health and safety in agriculture on a scale comparable to those achieved in other industries. ◆

Meet the new Center manager Dr. Ketty Mobed

An epidemiologist with extensive experience in public health and grant administration has become the new manager of the Western Center for Agricultural Health and Safety. Ketty Mobed, Ph.D., M.S.P.H., graduated from UC Davis in 1976 with a bachelor's degree in animal science. She went on to earn her master's degree in public health and infectious disease epidemiology from the University of Hawaii in 1980. After returning to UC Davis, she was awarded a Ph.D. in environmental and occupational epidemiology in 1997; for her doctoral dissertation she studied the reproductive health of female migrant farm workers who had been subject to occupational exposures.

She served as Epidemiology Program manager for Sacramento County until 1999, when she joined the UCD-Department of Health Services' California Cancer Research Program as a scientific grant administrator. She remained in that position until joining the Center this past December. She also has been active as a Volunteer Clinical Faculty member at UC Davis since 1998.

Ketty , whose parents were from Iran, was born in Germany and moved to Chicago during her teen years. While attending UC Davis, she met her husband, Jafar Yaghoobi, now a genetics researcher at the Dept. of Nematology at UC Davis. The couple has a daughter, Bahar, a junior at UC Davis, who is majoring in Community and Regional Development.

Ketty's goals for the Center are to advance its current programs and assist with the development of new initiatives. She is eager to meet investigators and staff members from NIOSH and its regional agricultural health and safety centers.

"I am very excited to take on this new and challenging position," says Ketty. "I am looking forward to working on the relevant and important health and safety issues confronting the agricultural community in this region."

If you would like to contact Ketty Mobed, please call her at (530) 752-5253, or send an e-mail message to kmobed@ucdavis.edu. ◆

Animal scientist studies air quality in and around livestock production facilities

Livestock production can generate numerous airborne contaminants, including gases, odor, dust and microbes. Proper indoor and outdoor air quality is imperative to maintain the health and productivity of farm workers and animals.

Frank Mitloehner (pronounced Mit-lerner), Ph.D., an animal scientist and air quality specialist in the UC Davis Department of Animal Science, is conducting research projects related to livestock production, especially quantification of ammonia, dust and volatile organic gas emissions in dairies, beef feedlots and poultry operations. He currently serves as principal investigator of a three-year project exploring air emission mitigation techniques and technologies for California dairies, which are of interest to the California Air Resources Board and the Environmental Protection Agency, along with other regulatory agencies and, of course, dairy producers.

Mitloehner says the main focus of his research is on mitigation—reducing emissions generated from dairies, feedlots and poultry operations in California.

Frank Mitloehner

Preliminary estimates by the California Air Resources Board for the San Joaquin Valley indicate that dairy operations contribute significantly to reactive organic gas concentrations, and scientists and regulators suspect that dairy operations emit substantial amounts of particulate matter and ammonia. Mitloehner's study focuses on air emission mitigation through animal feeding, management, and housing, as well as manure handling and treatment.

(*see* **Livestock** *on page 4*)

Livestock *continued from page 3*

His objective in the nutritional studies is to optimize the nutrient efficiency of animals by reducing unwanted excretions. Recommended animal management techniques include staggering feeding times, use of shade, sprinklers, bedding material (e.g., straw) and changes in cattle stocking density (cattle per area) to reduce dust and other emissions. Mitloehner compares the effectiveness of manure handling and treatment technologies that are intended to reduce air emissions, including manure storage covers, anaerobic digesters, aerators and solid separators, along with monitoring to control the pH of stored compost and manure.

He is now developing an air quality module for the California Dairy Quality Assurance Program (CDQAP), a voluntary certification program involving dairy producers, government agencies and academia. The program, administered through UC Davis Cooperative Extension, currently focuses on public health (food safety), animal health and welfare, and environmental stewardship.

"The CDQA's environmental stewardship curriculum included a module on waste and water issues, chaired by Deanne Meyer [a livestock waste specialist in the UC Davis Animal Science Department]," says Mitloehner. "The EPA liked this module and decided it should have something similar for air, so they contacted us to develop an air module. I'm now in the process of developing it together with my colleagues Deanne Meyer, Mike Payne and others."

Mitloehner's study focuses on air emission mitigation through animal feeding, management, and housing, as well as manure handling and treatment.

In addition, Mitloehner is involved in a preliminary study, funded by the National Pork Board, to assess ammonia exposure effects on pigs. The majority of pigs in the United States are raised in confined indoor swine facilities, which often have poor air quality and are associated with health problems in humans and animals. Swine facility workers commonly develop respiratory problems, including acute and chronic bronchitis, asthma-like syndrome, exacerbation of asthma, and mucus membrane irritation syndrome. These respiratory problems lead workers to seek medical treatment and in many cases to take legal action against their employer (Von Essen and Romberger, 2003).

"It is a widely accepted practice to investigate effects of respiratory agents on tissues of animals before monitoring human subjects in the production environment," says Mitloehner, who hopes to secure funding to further his studies of the effects of ammonia exposure on pigs. "Some of the assays I intend to conduct you just can't do with living humans. The swine is not only a good model for the human respiratory tissues, but also suffers from bad air."

Mitloehner, who grew up in Germany, received his master's degree in agricultural engineering at the College of Agriculture at the University of Leipzig, Germany. He went on to receive his Ph.D. degree in animal science from Texas Tech University in Lubbock.

His extensive overseas experience includes field research in beef cattle production in Queensland, Australia, and South Africa; field work in buffalo and pig production systems in the province of Guangxi, China; and field studies on heat stress in beef cattle for his master's thesis in the Chaco Boreal, Paraguay.

For more information, you may contact Mitloehner by e-mail at fmmitloehner@ucdavis.edu.

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Reporting key to pesticide illness tracking

Cholinesterase-inhibiting pesticides account for a large proportion of pesticide illnesses among California farm workers. Cholinesterase is one of many important enzymes needed for the proper functioning of the nervous systems of humans, other vertebrates and insects. Certain chemical classes of pesticides, such as organophosphates (OPs) and carbamates (CMs) work against undesirable bugs by interfering with, or inhibiting cholinesterase. In humans, an abnormal cholinesterase blood test suggests that exposure to pesticides may have occurred.


Rupali Das

During 2000–2002 three clinical California laboratories voluntarily reported their patients' cholinesterase test results to the Occupational Health Branch (OHB) of the California Department of Health Services for a research project funded by NIOSH's National Occupational Research Agenda (NORA).

Rupali Das, M.D., MPH, who is a public health medical officer with the California Department of Health Services as well as an assistant clinical professor of medicine at UC San Francisco, served as principal investigator of a cholinesterase surveillance project analyzing the labs' test results. Dr. Das was guest speaker at the Center's noon seminar on Dec. 5, and presented her findings in a talk titled "Using Laboratory-Reported Cholinesterase Results for Illness Tracking."

During the study, Dr. Das and her colleagues requested medical records from the laboratories and conducted telephone interviews with patients, physicians and lab technicians. They discovered that about 10 percent (317 individuals) of the 6,300 tests reported indicated depressed cholinesterase results, and 11 individuals experienced symptoms of pesticide poisoning.

At the conclusion of their study, investigators made four key recommendations:

- Laboratory reporting should be considered a surveillance tool;
- Worker interviews are critical;
- Reporting should be expanded to all laboratories;
- Laboratory reports should include more mandatory reportable fields.

For more information on Dr. Das's work, please call her at (510) 622-4300, or send an e-mail message to rdas@dhs.ca.gov. ◆

Zoonotic *continued from page 1*

More knowledge has brought about improved sanitation and development of antibiotics, vaccines and other drugs to battle them. Prevention, however, requires constant attention in order to protect ourselves, our families and our communities.

New types of farming, such as alligator farming in Idaho, have presented new challenges to that state after the West Nile Virus (WNV) was detected in alligators shipped from Florida to the natural warm springs of southern Idaho, as reported on Promed. Introduction of WNV poses a risk to alligator ranchers and their workers, as well as residents in the region.

Chomel presented some data on a newly emerged zoonotic disease: SARS (Severe Acute Respiratory Syndrome), an illness caused by a Coronavirus. After the initial SARS outbreak, which was traced back to the Guangdong Province in China, antibody (Ab) testing was performed in domestic and wild animals which are commonly caught and traded for food and fur. SARS Ab presence was apparent in a majority of tested civets, wild boars and Muntjac deer and 13% of tested animal traders were SARS antigen positive.


Bruno Chomel

Chomel also discussed Q fever, a zoonotic disease caused by a species of bacteria called *Coxiella burnetii* that is found globally. A review of case reports between 1948 and 1986, indicated about 1,400 human cases were diagnosed in the United States, but mainly from California (67%). However, because reporting of this disease is not required in many other countries, scientists can't reliably assess how many cases of Q fever have occurred worldwide. Cattle, sheep and goats are the primary source of *C. burnetii*; however, goats show a significantly higher average sero-prevalence (41.6%) than sheep (16.5%) or cattle (3.4%).

Zoonotic *continued on page 6*

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Zoonotic *continued from page 5*

Pigs play an important role in transmitting another zoonotic disease—swine streptococcal infection—to humans. In 1968, streptococcal meningoencephalitis caused a few human fatalities in Holland and Denmark.

"The disease in humans appears to be an occupational hazard, as most cases have occurred in pig breeders or abattoir workers," said Chomel. "Minor skin cuts, infected wounds and abrasions have been reported as the portal of entry of the organism to humans."

Chomel claims that prevention and control of emerging zoonotic diseases are dependent upon recognition, investigation and collaboration, the development of advanced diagnosis and surveillance tools, the use of applied epidemiology and molecular biology methods, as well as education, information, communication and technology transfer.

For more information about his work on zoonotic diseases, Chomel may be reached by e-mail at bbchomel@ucdavis.edu.

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CALENDAR

March 5, 12:10–1p.m.,
TB 137, UC Davis Campus
Pesticide Use Risk Reduction Project: Training on How to Avoid Off-Site Movement and Prevent Community Exposure
Tim W. Stock, Pesticide Educator, UC Statewide IPM Program

April 2, 12:10–1p.m.,
TB 137, UC Davis Campus
The California Endowment Initiative on Farmworker Health
Mario Gutierrez, Director of Strategic Programs, The California Endowment

May 7, 12:10–1p.m.,
TB 137, UC Davis Campus
Ergonomic Intervention in Labor-Intensive Crops
John Miles, Ph.D., Professor, Dept. of Biological and Agricultural Engineering at UC Davis

June 4, 12:10–1p.m.,
TB 137, UC Davis Campus
Effect of Farm Programs on Farm Health and Safety
Daniel A. Sumner, Ph.D., Director, Agricultural Issues Center, UC Davis

June 20–24, 2004
Keystone Resort and Conference Center, Colorado
2004 National Symposium on Agricultural Health and Safety
For more information, visit www.hicahs.colostate.edu or www.agromedicine.org on the Web; or send an e-mail message to Angi Buchanan at angi.buchanan@cahs.colostate.edu.

For a current schedule of IPM Training Workshops and Events visit: **www.ipm.ucdavis.edu**