

What You Should Know About:

► *Agriculture Injury*

National Statistics

According to National Agriculture Statistics Service reports, there are more than 2 million farms in the United States. Farms vary greatly in their size and characteristics, from small, family-run farms, part-time retirement farms, to large production facilities with million dollar sales. The family farm unit remains the dominant entity in agricultural production, especially in the southern United States.¹ This diversity of farm types, as well as the unique work/residential environment, make understanding and preventing agricultural injuries a challenge.



Agriculture is consistently one of the most hazardous industries, with farmers at increased risk for both fatal and nonfatal injuries.^{2,3} In 2002 alone, 730 deaths and 150,000 disabling injuries occurred on U.S. farms.³ Each day, about 500 agricultural workers suffer lost-time injuries, 25 of which result in permanent impairment. In a 1995 survey of the agricultural production industry, nearly 200,000 nonfatal lost-time work injuries were reported to have occurred on U.S. farms. Farm operators and their family members accounted for most of the injuries reported.⁴

Leading causes of farm-related deaths include machinery, motor vehicles, electrocution, environmental hazards and falling objects.² Tractors are the leading cause of death in agriculture.⁵ In an average year, 110 American farm workers are crushed to death by tractor rollovers.⁶

Farming is one of the few industries in which families are also at increased risk. In particular, farm surveys indicate that the injury rate is highest among children age 15 and under and adults more than 65 year of age.⁷ Unlike other occupations, farmers routinely work beyond the average retirement age.⁸ Data from the National Institute for Occupational Safety and Health (NIOSH) reveals that farmers aged 75 and older are more than twice as likely to die on the job than their younger counterparts. Age-related conditions, such as arthritis, vision or hearing problems make farming potentially more dangerous for senior farmers. The Kentucky Farm Family Health and Hazard Survey found that 1 in 9 farmers older

than 55 years had been involved in a tractor rollover, and accounted for about half of all farming deaths.⁹

An estimated 1.26 million children and young adults less than 20 years of age reside on farms, with an estimated 725,000 working on the farms.⁶ On average, 104 children die each year as a result of farm-related injury¹⁰ and more than 22,000 additional injuries occur among children younger than 20 years of age on farms.¹¹

Oklahoma Statistics

From January 1998 through December 2001, farming-related deaths were found to be the leading cause of occupational deaths in Oklahoma, accounting for nearly one-quarter of all work-related deaths. Eighty-eight fatal injuries were identified in the agriculture, forestry, and fishing industry during this period. The average annual farming death rate was 35.9



deaths per 100,000 workers. While farmers and farm workers accounted for 4% of the work force, they accounted for 20% of all work-related deaths in Oklahoma. Males accounted for 92% of deaths; only seven females died in agriculture-related incidents. Forty-seven percent of deaths occurred among males over 64 years of age.

Over half (52%) of agriculture-related deaths were related to crop production, including planting and harvesting, whereas 39% were associated with livestock farming or ranching, and 9% were others, such as landscape/horticultural services and farm labor services. The leading causes of fatal agriculture-related events were machinery, followed by traffic crashes, animal-related incidents, electrocution, and being struck and/or crushed by an object. Of the fatal farming machinery cases, tractors were the most frequently used piece of farming machinery, accounting for 87% of the machinery-related deaths. Almost half of the tractor-related fatalities (44%) occurred when the victim fell or was thrown from a moving tractor and run over either by an attached implement or the tractor.

► What Works

Data Collection

It is likely that agriculture-related injury deaths are underreported. National data sources, such as death certificates, do not sufficiently identify the number of farm injury incidents or describe their sources, causes, severity,

and effects. Further, there is no single, continuous source of national non-fatal agricultural injury data. The unique setting of business and residence also make data collection a challenge. Farms with less than 11 employees are exempt from Occupational Safety and Health Administration (OSHA) guidelines that require reporting of agricultural injuries and deaths. Additionally, migrant farm workers and children injured while working on farms may never be reported as agricultural-related deaths. Also, tractor-related injuries and deaths may occur while these vehicles are on public roadways and be reported as a motor vehicle crash, not farm or occupational related.

A major barrier to progress in the prevention of agricultural injuries has been not only a lack of knowledge about the magnitude of the problem but also a deficiency in knowledge about the specific causes or risk factors due to the lack of analytical studies.¹²

To adequately address the problem, the population at risk must be accurately identified. Injury surveillance needs to provide "time of event, place of occurrence, demographic characteristics of the injured person, characteristics of the injury, agent causing the event, source of the event, mechanism of the event, circumstances surrounding the injury event, medical health care provided to the injured person, and health outcome of the event".¹² Additionally, information on the characteristics of the farm, including the size, type, and location of the farm and the number of people who work there should be collected.

Since July 1997, the Injury Prevention Service through the Oklahoma Fatality Assessment and Control Evaluation (OKFACE) project has conducted surveillance through multiple reporting sources including the Office of the Chief Medical Examiner, OSDH Division of Vital Records, OSHA, the Oklahoma Department of Labor, Workers' Compensation Court, statewide hospital injury surveillance, and a newspaper clipping service. Supplemental information has also been obtained from the Department of Public Safety, the Oklahoma Department of Mines, the Oklahoma Lake Patrol, fire departments, police and sheriff departments, and emergency medical services. Information about the OKFACE project is available at www.health.state.ok.us/program/injury/okface/index.html.



Rollover Protective Structure (ROPS)

Tractors are common to all farm operations. In 1976, OSHA standards required rollover protective structures on all tractors used by farm employees. However, self-employed farmers and their family members, as well

as farms with 10 or fewer workers are exempt. Nearly 50% of farm tractors currently in use don't have a certified ROPS with a seatbelt.¹³ A ROPS is a cab or frame that is designed to prevent death or injury by providing a protective zone for the tractor operator if the tractor overturns or rolls over. The operators of tractors equipped with ROPS must wear seat belts. Without the seat belt, the operator would not be confined to the protective zone. The National Safety Council estimates that ROPS and seat belt equipped tractors will save approximately 350 lives each year on U.S. farms.¹⁴

Power Take-Off (PTO)

The Master Shield power take-off (PTO) shaft is an efficient means of transferring mechanical power between farm tractors and implements. However, PTO entanglements are a serious danger, which may result in disabling injuries or even death to farmers. The spinning shaft can grab and entangle farmers if proper guards or shields for the PTO-driven machinery are not in place.^{15,16} Power take-off entanglements most often occur when people try to make repairs while equipment is operating. Others have been caught while stepping over or onto rotating shafts.¹⁷ Power take-off master shields prevent accidental contact with the machine driveline. All PTO shielding must be correctly installed and properly maintained to prevent injury in the event of accidental contact.

Sensor Systems

Sensor systems have been designed to reduce injuries or deaths from machinery. This technological advancement can be adapted to agricultural equipment. Multiple sensing technologies, such as radar, microwave, and infra-red, have been designed to detect persons entering the defined danger areas. These sensors have been evaluated to protect operators or bystanders approaching the rotating components found on farm equipment, such as PTO and other shafts, gears, and belts.¹⁸

Slow Moving Vehicle (SMV) proper lighting/reflectors

Many agricultural equipment/vehicles driven on public roads are not equipped with a Slow Moving Vehicle (SMV) emblem, proper lighting, and/or reflectors. A slow-moving vehicle, or SMV, emblem is a fluorescent orange triangle (for daytime viewing) bordered by red photo-reflective material (for nighttime viewing). The triangle points up. The SMV emblem is placed at the rear of tractors or other farm machine near the centerline and two to ten feet from the ground. The purpose of the SMV emblem is to identify that the tractor or machine cannot travel any faster



than 25 m.p.h. These features will alert other drivers and subsequently may reduce risks for motor vehicle crashes.¹⁹

Cattle Handling Safety in Working Facilities

According to the Bureau of Labor Statistics, from 1992-1997, more than 75,000 workers received injuries and 375 workers were killed from animal-related injuries. Cattle are responsible for most injuries caused by farm animals. A 1997 study conducted by Oklahoma State University (OSU), Biosystems and Agricultural Engineering Department, found 150 cases of cattle handling-related injuries among 100 Oklahoma cow-calf operations. The study also showed that more than half of the injury cases resulted from human error.²⁰



Health and Safety for Kids on the Farm

The National Institute for Occupational Safety and Health has funded the National Children's Center for Agricultural Injury Prevention through a cooperative agreement with the National Farm Medicine Center in Marshfield, Wisconsin. The Center has developed "North American Guidelines for Children's Agricultural Tasks" which is used to assist adults in assigning farm tasks to children between 7 and 16 years who live or work on farms. Various organizations committed to safety, children, and agricultural workers have been working together with the National Children's Center to implement education and training in childhood agricultural health and safety. The organizations include Farm Safety 4 Just Kids, National Future Farmers of America, National SAFE KIDS Campaign, Progressive Farmer Foundation, and others. These organizations collaborate with schools, farm families, agricultural businesses, producer groups, university extension, emergency medical personnel, health professionals, civic groups, and persons who are interested in the safety of children on the farm to do local children's farm safety activities using their resources and guidance.

Farm safety day camp programs are a way to teach children how to stay safe and healthy. The purpose of the program is to teach children 8 to 13 years of age the basics of farm safety and health. Farm safety day camps are designed based on specific contents/formats and are usually determined by a planning group or committee in the designated community. Topics covered may include general farm safety, farm chemical safety, PTO devices, tractor rollovers, electrical hazards, first aid, fire safety, grain entrapment/suffocation, safety around equipment on the farm, and animal safety. Although farm safety day camp programs

focus on children, adults are encouraged to participate. Classes such as first aid, cardiopulmonary resuscitation (CPR), stages of development for children, characteristics of each stage of development, causes of most farm injuries for children, and suggestions for preventing farm injuries among children can be offered.^{21,22}

► What You Can Do

Implement Farm Safety Campaigns

Work with your local county extension office, Farm Bureau officers and committees, state Cooperative Extension farm safety specialist, farm supply stores and dealerships, farm organizations, rural health care providers and others to develop an ongoing effective farm safety promotion program.

Organize a safety field day for farmers and farm families that can be used to educate the whole family on farm safety and health issues.

Make sure any local farm event or gathering has someone on the program speaking about a farm safety topic.

Sponsor and promote a first aid and a CPR course for farm families in your community.

Create partnerships with Hispanic organizations to disseminate Spanish farm safety material among Hispanic farmers.

Participate with Farm Safety Day Camp organizations to promote farm safety among children living in farming communities.

Identify and develop working relationships with rural farm cooperatives and insurance companies.

Online Programs

The University of Minnesota offers an online farm-safety course, "*A Nurse's Guide to Children's Agricultural Safety*", (<http://safety.coafes.umn.edu/nagcatcourse.html>) to prepare nurses and others working with families to give better advice to adults on the proper match of children and farm chores. The course is based on the North American Guidelines for Children's Agricultural Tasks and is designed for nurses working with rural residents.

► Where You Can Go

The following organizations can provide information about reducing agriculture deaths and injuries as well as links to other organizations and web sites.

State

- Injury Prevention Service
Oklahoma State Department of Health
405/271-3430
www.health.state.ok.us/PROGRAM/injury

National

- Children's Safety Network
www.childrenssafetynetwork.org
- National Institute for Occupational Safety and Health
www.cdc.gov/niosh/homepage.html
- National Safety Council
www.nsc.org/necas/
- National Children's Center for Rural and Agricultural Health and Safety
www.marshfieldclinic.org/research/children/
888/924-7233 or 715/389-4999
- Farm Safety 4 Just Kids
www.fs4jk.org
800/423-5437 or 515/758-2827
- University of Minnesota Online Farm Safety Course
612/624-7444
- National Institute for Occupational Safety and Health
www.cdc.gov/niosh/homepage.html
1-800-35NIOOSH
- National Education Center for Agricultural Safety
1-888-844-6322.
- Farm Family Emergency Response Program
Pennsylvania State University
Agricultural Emergency Management Program
814/865-2808

Local

4-H Clubs

Future Farmers of America chapters

References

1. US Department of Agriculture, National Agricultural Statistics Service. *1997 Census of Agriculture*. Washington, D.C.: U.S. Dept. of Agriculture, National Agricultural Statistics Service; 1999.
2. National Farm Medicine Center. *Agricultural Injury Fact Sheet*. 1996. Available from: <http://www.cdc.gov/nasd/docs/d000901-d001000/d000984/d000984.pdf>. Accessed November 12, 2004.
3. National Safety Council. *Report on Injuries in America, 2002*. Itasca, IL: National Safety Council; 2003.
4. Myers JR, National Institute for Occupational Safety and Health. *Injuries among farm workers in the United States, 1995*. no. (NIOSH) 01-153 ed. Washington, D.C.: Dept. of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health; 2001.
5. New York Center for Agricultural Medicine & Health. *Tractors, the #1 Cause of Fatalities on the Farm*. October 2004. Available from: <http://www.cdc.gov/nasd/docs/d000701-d000800/d000729/d000729.pdf>. Accessed November 12, 2004.
6. National Institute for Occupational Safety and Health. *Traumatic Occupational Injuries: Agricultural Safety*. 2004. Available from: <http://www.cdc.gov/niosh/injury/traumaagric.html>. Accessed November 12, 2004.
7. Occupational Safety and Health Administration. *Farm Safety*. 2002. Available from: http://www.osha.gov/OshDoc/data_General_Facts/FarmFactS2.pdf. Accessed November 10, 2004.
8. Hernandez-Peck M. *Older Farmers: Factors Affecting their Health and Safety*. 2001. Available from: <http://www.cdc.gov/nasd/docs/d001701-d001800/d001760/d001760.html>. Accessed November 12, 2004.
9. Browning SR, et al. *The Kentucky Farm Family Health and Hazard Surveillance Study*. Southeast Center for Agricultural Health and Injury Prevention, Department of Preventive Medicine and Environmental Health, University of Kentucky; January 1999.
10. Rivara FP. Fatal and non-fatal farm injuries to children and adolescents in the United States, 1990-3. *Inj Prev*. 1997;3(3):190-194.

11. National Agricultural Statistics Service, U.S. Department of Agriculture. *2001 Childhood Agricultural-Related Injuries*. Accessed November 12, 2004. Washington, D.C.: U.S. Department of Agriculture; January 2004.
12. Runyan JL. *A Review of Farm Accident Data Sources and Research: Review of Recently Published and Current Research*. October 1993. Available from: <http://www.cdc.gov/nasd/docs/d001001-d001100/d001045/d001045.pdf>. Accessed November 12, 2004.
13. National Safety Council. *Fact Sheet & Resources and Current Agricultural and Farming Issues*. Itasca, IL: National Safety Council; September 2003.
14. National Safety Council. *The Plain Facts about Tractor Safety*. April 2002. Available from: <http://www.nsc.org/issues/agri/tractor.htm>. Accessed November 12, 2004.
15. Murphy DJ. *Power Take-Off (PTO) Safety*. 1991. Available from: <http://www.cdc.gov/nasd/docs/d000701-d000800/d000745/d000745.pdf>. Accessed November 12, 2004.
16. Doss HJ. *Shield Yourself from PTO Dangers*. May 1993. Available from: <http://www.cdc.gov/nasd/docs/d001001-d001100/d001094/d001094.pdf>. Accessed November 8, 2004.
17. Farm Safety Association. *Power-Take-Off Safety*. March 2000. Available from: <http://www.cdc.gov/nasd/docs/d001601-d001700/d001636/d001636.pdf>. Accessed November 12, 2004.
18. Venem M, Shutske J, Gilbert W. *Research: Human Presence Sensors and Control Systems to Prevent Machinery Entanglement Injuries*. January 2004. Available from: <http://www.bae.umn.edu/annrpt/2002/research/safety2.html>. Accessed November 12, 2004.
19. Schwab CV, Miller L. *Safe Farm: Use SMV Emblems for your Safety*. September 2004. Available from: <http://www.extension.iastate.edu/Publications/PM1265J.pdf>. Accessed November 12, 2004.
20. Hubert DJ, Huhnke RL, Harp SL. *Cattle Handling Safety in Working Facilities*. February 2003. Available from: <http://osueextra.okstate.edu/pdfs/F-1738web.pdf>. Accessed November 12, 2004.

21. National Children's Center for Rural and Agricultural Health and Safety. *Childhood Agricultural Safety Network*. July 2002. Available from: <http://www.marshfieldclinic.org/research/children/childsafetynetwork/default.htm>. Accessed November 12, 2004.
22. *Farm Safety 4 Just Kids*. 2004. Available from: <http://www.fs4jk.org/chapters.html>. Accessed November 12, 2004.