WORKER HEALTH AND SAFETY IN A CHANGING AGRICULTURAL ENVIRONMENT

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Abstract

Changing demographics in the farming population and changes to the farm itself continue to represent new challenges and opportunities related to ensuring the health and safety of the farming community. While individual and partnership farms continue to decrease in number, the age of the remaining farm operators continues to increase. From 1982 to 1997, the number of farmers aged 65 years and older increased 24%, with the average age of 54.3 years for farm operators in 1997. Female farm operators continue to increase in numbers, as do Spanish, Hispanic or Latino operators. For the safety and health professional, these changes bring new concerns of slips and falls, reproductive hazards, and cultural acceptance of prevention messages and activities. This paper will update the current trends and discuss the potential effects on the health and safety of workers in agriculture.

Introduction

Agriculture remains a very dangerous occupation. The unintentional injury-death rate for agriculture was reported as 22.1 per 100,000 workers in 1998 (National Safety Council, 1999). There has been some improvement in this rate since 1992 when it was 23.2 per 100,000 workers, yet agriculture continues to rank second only to mining in unintentional injury deaths. By comparison, the unintentional injury-death rate for "all industries" was 3.9 per 100,000 workers in the United States in 1998.

In 1997, at the Twenty-First Cotton and Other Organic Dusts Conference in New Orleans, Louisiana, an attempt was made to understand then-current trends in production agriculture in Wisconsin and beyond (Olenchock and Young, 1997). It was suggested that an understanding of the trends in the changing practice of agriculture would provide an insight into the development of preventive interventions at the onset of change, rather than responding to the stimuli of resultant disease and injury related to new practices. At that time it was recognized that there was an aging population of farm and ranch operators. Numbers of women who participated significantly in the agricultural operation or who were farm operators was increasing. As the farms grew larger, there was an increased dependency on a hired workforce, including migratory and seasonal farmworkers. The number of farm operators who listed farming as their principal occupation in Wisconsin decreased during a five-year period while the numbers of farms that had 1000 or more acres increased over the same period. There was a renewed emphasis on food safety, environmental protection, and consumer-driven specialty products that pushed the older farming practices into new frontiers.

With the publication of the (most recent) 1997 Census of Agriculture (Census of Agriculture, 1997), it is appropriate to re-examine the trends noted previously in a more national scope. Is the agricultural environment continuing to pursue new frontiers? Is the agricultural workforce in the United States still changing or has stability returned to production agriculture? There are legitimate reasons to examine these issues. Most notably, one might argue that changes in agricultural practices, products, and/or workforce could be accompanied by new hazards with unforeseen consequences on health and safety for the human component. Recognizing change and anticipating health and safety outcomes should benefit the farm and ranch operator, their families and their paid and unpaid workers. It is the purpose of this paper to re-examine the changing environment of the agricultural workplace and report on the potential health and safety consequences of that change.

Health and Safety Concerns from Production Farming Changes

The number of farms in production agriculture in the United States continues to decline, from 3.96 million farms in 1960 to 1.9 million in 1997, as reported in the most recent agricultural census (Kiplinger, 1994; Census of Agriculture, 1997). While that 52% decrease in the numbers of farms is dramatic, more contemporary time comparisons show that there was an 11 % decline in farm numbers since only 1990. Farms decreased in number by 8% from 2.07 million to 1.9 million since 1993.

Concomitant with the decrease in the number of farms in the United States is the increase in the average size of the farms that remain in 1997. In 1960 the average size of the farm was 297 acres (Kiplinger, 1994). This number has increased approximately 64% to an average of 487 acres per farm in 1997 (Census of Agriculture, 1997). Since 1990, the average size of farms increased approximately 6%; since 1993, 3%.

Increased acreage and increased operations are joined with increases in the number of production animals that are on farms. Figure 1 demonstrates the historic increase in the average number of milk cows per farm in the United States from 1959 to 1997. During that time frame, there was an almost 9-fold increase from and average of 9 milk cows per

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farm in 1959 to an average of 78 milk cows per farm in 1997 (Census of Agriculture, 1992, 1997). There was a 27% increase in the average number of milk cows per farm from 1992 to 1997 alone. In similar fashion, Figure 2 shows the increase in average number of hogs and pigs per farm in the United States from 1959 to 1997. A greater than 15-fold increase, from an average of 37 animals per farm in 1959 to an average of 558 hogs and pigs per farm in 1997, is observed. Between 1992 and1997, the average number of hogs and pigs per farm increased over 85%.

As farms become fewer in number, yet larger in size, inevitable change must occur to the farming operations, and new stressors may surface for the farm operator, the farm family, hired farmworkers, and the environment. New management demands of increased size, business and personnel management, and worker training would be expected to increase the stress in an operation that already suffers from stressful financial demands. The evolution from small family farms to larger farms, partnerships, corporations, or limited liability companies leads to an increased dependency on contracted and hired labor, migratory and seasonal workers as well as permanent hired farmworkers. With that change, these non-asset owning workers often experience increased and perhaps more intense exposures on the farm. Issues of health care access, housing and sanitation, health and safety training become prominent in the farming operation. Cultural and language differences add significantly to the difficulties of meaningful communication of health and safety practices. Hazards to adolescent workers and children at the worksite must be addressed in ways that are different than they would be for adult workers.

Increased animal production results in excess nutrients in the form of manure and waste products. Safe holding and disposition of these materials in an economical and environmentally sound manner requires management resources and attention. Odor and surface/ground water pollution are issues beyond the boundaries of the farm operation. Larger operations can also bring potentially extended exposures, over-use injuries and ergonomic problems, and fatigue.

Health and Safety Concerns from Changes in Farm Operator Demographics

In a trend that was reported previously (Olenchock and Young, 1997), the average age of the farm operator continues to increase. Older farmers continue to farm, while younger people are not entering the profession in sufficient replacement numbers. In 1997, the average age of farm operators in the United States was 54.3 years, a two percent increase from the 1992 average age of 53.3, but an 8% increase from 1978 (50.3 years) (Census of Agriculture, 1997). Seventeen percent of farm operators were 70 years of age or older in 1997, compared to 15% in 1992. At the other end of the age scale, only 27% of farm operators were 44 years old and younger, compared to 31% in 1992.

There is also a continued decline in the numbers of male farm operators from 2.12 million in 1982 to 1.75 million in 1997, a decrease of 17.5%. Over the same period, female farm operators increased 35.2% in numbers from 122,000 in 1982 to 165,000 in 1997. Although the numbers are small, there was an increase of 72% in the numbers of farm operators of Spanish, Hispanic, or Latino origin (1982: 16,200; 1997: 27,700).

Individuals 65 years of age and older experience substantially higher (farm) machine-related traumatic injuries (Layde et al. 1995) and a higher rate of fall-related farm injuries (Nordstrom et al., 1996) when compared to other age groups on an hours-worked basis. Recently, Myers et al. (1999) reported that older workers (55 years of age and older) are at the highest risk for fatal occupational injuries in agricultural production. In that study, farm tractors were the leading cause of those fatalities. Work-related fatality rates for female agricultural workers over the age of 55 were approximately 2-times the rate for younger female agricultural workers. Those investigators recommend that education programs be tailored for the older agricultural worker, and that engineering interventions be designed and implemented to address the aging workforce. Safety and health professionals must also design education and interventions to address cultural sensitivities and language differences not only for migratory farmworkers, but also for the growing numbers of farm operators of Spanish, Hispanic, or Latino origin.

Expectations in health-related changes in older farm workers include reductions in hearing, vision, and reflex acuities. Over-use injuries and ergonomic-related problems would be anticipated with age as would chronic illnesses such as skin cancers. Adverse reproductive outcomes from physical, chemical, or environmental insults are potential unintentional results for women working on or operating farms. Current research interest surrounds plant-protection products that may disrupt the endocrine system and result in adverse reproductive outcomes.

Consumer-Driven Health and Safety Concerns

Consumers, rather than the agricultural owner/operator or worker, drive many health and safety issues in agriculture. Food safety is an issue that demands attention. There is increased concern over agricultural products contaminated with E. coli O157-H7, Salmonella spp., or even Mad Cow Disease. Transmission of diseases from animals to humans, zoonoses, are of concern with such organisms as Campylobacter, Cryptosporidium, Helicobacter, and

Salmonella. In a related issue, the presence of antibiotic residues in food products is of historic interest to consumers and public policy makers. There is increased consumer/public sensitivity about preserving good quality in our environment in light of increasing animal herd size, larger animal waste lagoons, large crop operations, and intensive application of plant nutrients. Farm, rural, and municipal families share ground and surface waters which must be protected from polluting chemicals and infectious agents.

"*The emotional debate over whether genetically engineered food is safe to eat escalated yesterday….*" (Weiss, 1999). It is clear that genetically modified foods generate controversy, yet biotechnology holds the potential to drive the next wave of technological change (Hillyer, 1999). A recent survey shows that consumers expect to benefit from biotechnology over the next five years and that they would be willing to purchase genetically modified produce if there was a benefit to that product (Miller, 2000). Some crops have been genetically modified successfully such as glyphosate-tolerant corn that is not affected by over-spraying with the herbicide. Likewise, tomatoes have been altered to contain less water and stay firmer on the vine for longer growth periods, allowing the potential to mechanically pick them with less bruising. Yet, not so clear is the future hazard, if any, that genetically modified plants might bring to the agricultural worker. Will there be a reduction in the dependency on hired, often migratory, farmworkers who weed or harvest by hand today? Or will there be an increase in machine-related injuries and fatalities in the move from hand to mechanical picking? Will there be a shift in the antigenicity of the agricultural product that could trigger allergy or asthma in the dust from harvesting or food allergy in the consumer? These are but a few of the biotechnology-related and as yet unanswered questions that are of interest to scientists and public health professionals.

Discussion

Changing trends in the agricultural environment that were reported in 1997 continue today. In fact, some changes in production agriculture such as intense animal production are accelerating at a rapid pace. Demographic shifts to an older workforce, increased dependency on hired labor, greater participation in work and ownership by females are observed. Agricultural safety and health professionals must develop new paradigms to address issues related to unintentional injuries, fatalities, and diseases associated with this changing environment. Opportunities abound to be proactive in anticipating hazards or dispelling myths related to the emergence of biotechnology and genetically altered products. *"Success belongs to the most adaptive, flexible and creative individuals -- those who can feel the winds of change shifting in a different direction, enabling them to adjust their sails and change their course."* (Kiplinger, 1998).

References

Census of Agriculture. 1992. *Volume 1: Geographic Area Series. United States Summary and State Data*. U.S. Government Printing Office, Washington, DC.

Census of Agriculture. 1997. *Volume 1: Geographic Area Series. National, State, and County Tables*. http://www.nass.usda.gov/census/

Hillyer, G. 1999. A new age of agriculture. Prog. Farmer. 114:28-29.

Kiplinger, A. 1994. *Farm & Food Facts*. The Kiplinger Washington Editors, Inc., Washington, DC. pp. 1-44.

Kiplinger, K. 1998. *World Boom Ahead*. Kiplinger Books, Washington, DC. p. 391.

Layde, P.M., D.L. Nordstrom, D. Stueland, L. Brand, and K.A. Olson. 1995. Machine-related occupational injuries in farm residents. Ann. Epidemiol. 5:419-426.

Miller, D. 2000. Despite critics, consumers still support biotech. Prog. Farmer. 115:(1).

Myers, J.R., D.L. Hard, K.A. Snyder, V.J. Casini, R. Cianfrocco, J. Fields, and L. Morton. 1999. Fisks of fatal injuries to farm workers 55-years of age and older. Am. J. Indust. Med. Suppl. 1:29-30.

National Safety Council. 1999. *Injury Facts, 1999 Edition*. National Safety Council, Itasca, IL. p. 50.

Nordstrom, K.L., P.M. Layde, K.A. Olson, D. Stueland, M.A. Follen, and L. Brand. 1996. Fall-related occupational injuries on farms. Am. J. Indust. Med. 29:509-515.

Olenchock, S.A., and N. Young. 1997. Changing agricultural trends in Wisconsin and beyond. In: Wakelyn, P.J., R.R. Jacobs, and R. Rylander (eds.), *Proceedings of the Twenty-First Cotton and Other Organic Dusts Research Conference*. National Cotton Council of America, Memphis. pp. 173-175.

Weiss, R. 1999. Gene-altered food study fuels a fire. The Washington Post. p. A3.

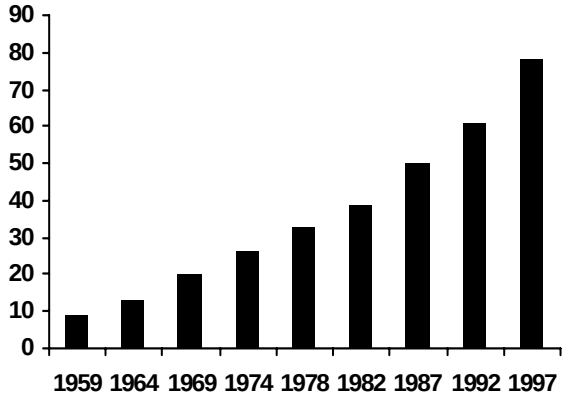

Figure 1. Average number of milk cows per farm, United States: 1959 - 1997. (From Census of Agriculture, 1992, 1997)

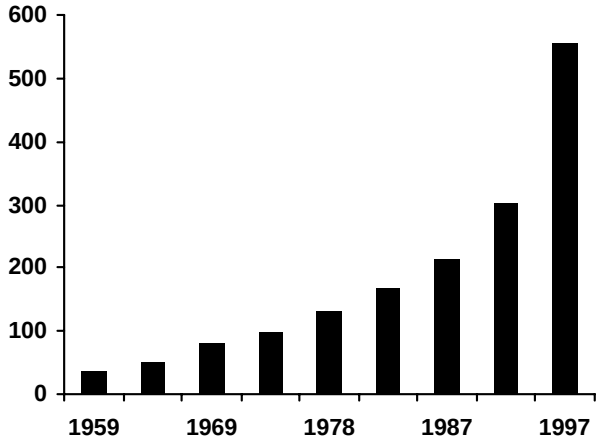

Figure 2. Average number of hogs and pigs per farm, United States: 1959 – 1997. (From Census of Agriculture, 1992, 1997)