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Protecting Cattle Feedyard Workers in the Central States Region: Exploring State, Regional, and National Data on Fatal and Nonfatal Injuries in Agriculture and the Beef Production Sector

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Abstract. Working in agriculture can be dangerous. Despite ongoing efforts of Extension, animal production worker safety has not been adequately addressed. We present state, regional, and national counts and rates on fatal and nonfatal injuries in agriculture and animal production using publicly available data from the Bureau of Labor Statistics. We found that animal production had a high number of fatal injuries and a higher rate of nonfatal injuries than the average within agriculture. More needs to be done to protect livestock workers from injury. Extension professionals can play a key role in increasing safety knowledge and changing behaviors.

INTRODUCTION

Cattle feedyards are intensive animal feeding operations and a critical component of integrated beef cattle production systems. In 2018, cattle production accounted for $67.1 billion in cash receipts (United States Department of Agriculture [USDA], 2019). Feedyard operations are often divided into two phases: backgrounding (i.e., feeding cattle a ration to maximize growth and minimize fat deposits) and finishing (i.e., feeding cattle to up to a specific fat cover; Endres & Schwartzkopf-Genswein, 2018). Although cattle feedyards are found throughout the United States, Texas, Nebraska, Kansas, California, and Oklahoma were ranked as the top five states for cattle on feed (USDA, 2020).

Significant labor inputs are necessary for the efficient operation of a cattle feedyard. It has been estimated that there is approximately one worker for every 1,095 head of cattle on a feedyard operation (Birch & Brooks, 2015). Typically, feedyard work is divided into different departments (Wagner et al., 2014). For example, the cowboy crew checks the health and well-being of the cattle, a feeding crew delivers feed to the bunks, mill workers grind and mix feed and nutrients, a hospital team examines and cares for sick animals, and, of course, there are also administrative and maintenance personnel.

Feedyard work can be risky due to several factors including the high density of cattle, use of horses, operation of heavy equipment, exposure to extreme weather, and limited employee safety training (Ramos et al., 2021; Ramos et al., 2018; Ramos et al., 2019). Unfortunately, few Extension resources and little programming focuses on cattle feedyard worker safety. In 2015 the Central States Center for Agricultural Safety and Health (CS-CASH) hosted a feedyard safety roundtable jointly with the Texas Cattle Feeders Association, and participants noted that unsafe working practices were routine and that many feedyards were understaffed. Furthermore, they noted that there was an increasing number of immigrant workers who had cultural and language barriers. Roundtable participants believed that these barriers limited immigrant workers' access to fully engaging in safety training and increased their risk for injury (Central States Center for Agricultural Safety and Health, 2015).

In this article, we seek to identify the burden of work-related injuries in agriculture, the animal production sector, and the cattle feeding subsector at a national, regional, and state level for the states within the "central states" region, consisting of Iowa, Kansas, Missouri, Minnesota, Nebraska, North Dakota, and South Dakota.

METHODS

We used publicly available sources to quantify both fatal and nonfatal injuries in the agricultural industry as a whole, but also specifically examined animal production and cattle feedlots in the central states region. The Quarterly Census of Employment and Wages, Census of Fatal Occupational Injuries (CFOI) and Survey of Occupational Injuries and Illness

(SOII) databases from the U.S. Bureau of Labor Statistics (BLS) were used for gathering the information (U.S. Department of Labor, Bureau of Labor Statistics 2019, 2020a, 2020b). Specific data were collected for the central states region (i.e., Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota), analyzed, and compared with national data. The BLS database for the year 2018 was used for the analyses except for Iowa's fatal incident counts and rates in animal production due to missing data. To resolve the issue, an average count of available 5-year data (2012–2016) were used for Iowa. Additionally, the total annual establishments and employment numbers were obtained from the Quarterly Census of Employment and Wages for animal production (North American Industrial Classification System [NAICS] code 112), beef cattle ranching, farming and feedlots (NAICS code 11211), and cattle feedlots (NAICS code 112112) for each of the central states and the United States in total.

Similarly, the CFOI and SOII databases were used to obtain fatal and nonfatal incidence counts and rates for the overall agriculture sector and specifically for animal production. The animal production sector was not further subcategorized since BLS data were not available. The number of injuries and illnesses for each of the states was obtained, whereas the fatal incidence rate for each state was averaged and compared with the United States total. Nonfatal incident counts and rates were not publicly available for North Dakota or South Dakota. Missouri also lacked nonfatal incidence counts and rates for animal production. Since data were not available for these states, they were excluded from the analysis.

RESULTS

Table 1 provides the number of agriculture sector establishments, employment, and injuries by state, region, and within the United States. There were 12,992 agriculture sector establishments and 92,747 employees in 2018 in the central states region. The central states had 12.3% of these establishments and 7.3% of employment compared to the U.S. total. Out of the seven central states, Iowa, Minnesota, and Nebraska had the highest numbers of animal production establishments and employment. Nebraska led the region in the number of cattle feedlot establishments followed by Kansas and Iowa. However, Kansas had the most people employed on cattle feedlots, followed by Nebraska and Iowa. Although the central states' share of total agriculture establishments and employment was relatively low, this region contributes significantly to the cattle production, particularly cattle feedlots, with 53.1% of feedlot establishments and 49.1% of all feedlot employment in the United States.

There were 574 agricultural fatalities in the United States in 2018, and 119 of these were in the central states region, representing 20.7% of all agricultural fatalities in the country that year. The state of Missouri had the highest number of fatalities (31) and Kansas had the lowest (9). The fatality rate for the central states region was 1.4 times greater than the national average fatality rate in the agriculture sector. The animal production subsector had 45 fatalities in the central states region, representing 28% of the total animal production fatalities in the United States. Minnesota had the highest number of fatal injuries in animal production (12) and Kansas had the lowest (1). The fatality rate for animal production in the central states was not publicly available and hence was excluded from the analysis.

There were approximately 3,300 nonfatal injuries related to agriculture in the central states region whereas the total number in the United States was 54,400 in 2018. The nonfatal incidence rate for the central states region, calculated as an average of the seven states, was 5.9, which was 1.1 times higher than the national nonfatal incidence rate. Nonfatal injury incidence data for North Dakota and South Dakota were not available in SOII and thus were excluded from the analysis. In the animal production subsector, the central states region recorded 16.3% of the total incidence counts in animal production in the United States. Among the central states, Kansas and Iowa had the highest nonfatal incidence counts and rates in animal production.

DISCUSSION

Agricultural injury surveillance is critical for developing appropriate and relevant injury prevention education resources and strategies. We sought to identify the number and rate of fatal and nonfatal injuries within agriculture, the animal production sector, and the cattle feeding subsector at a national, regional, and state level for the states within the central states region. Our results indicated that the central states region had approximately 50% of the total number of cattle feedlots and employees in the United States. We also found that animal production in the central states region resulted in 28% of the total animal production fatalities in the country. Furthermore, the region had a higher rate of nonfatal injuries than that found overall within agriculture generally, which is important to note because the agricultural industry already has the highest rate of nonfatal injury among all industries (5.3 cases per 100 full-time equivalents compared to 2.8 cases per 100 full-time equivalents; U.S. Department of Labor, Bureau of Labor Statistics, 2020b).

The *National Land-Grant Research and Extension Agenda for Agricultural Safety and Health: National Agenda for Action* identified livestock handling and housing systems as priorities for research and education (NCR-197 Committee, 2003). Despite the ongoing efforts of Extension professionals, more attention needs to be directed toward protecting livestock workers from injury. Extension produces limited resources related to worker safety practices for the animal production sector, and those resources that have been produced have

Table 1. Agricultural Establishments, Employment, and Injuries by State, Within the Central States Region, and in the United States in 2018

Characteristics	Iowa	Kansas	Minnesota	Missouri	Nebraska	North Dakota	South Dakota	Central states total or average	United States total or average	% within the central states
Number of establishments										
Agriculture, forestry, fishing, and hunting	2,639	1,652	2,855	1,638	2,242	985	981	12,992	105,981	12.3%
Animal production	1,058	583	893	421	878	119	396	4,348	26,181	16.6%
Beef cattle ranching, farming, and feedlots	212	459	86	141	611	55	238	1,802	9,990	18.0%
Cattle feedlots	94	144	27	10	254	14	48	591	1,112	53.1%
Total number of people employed										
Agriculture, forestry, fishing, and hunting	20,646	12,527	21,762	12,503	14,742	4,618	5,949	92,747	1,263,676	7.3%
Animal production	11,807	7,329	10,895	4,736	7,720	692	3,602	46,781	264,446	17.7%
Beef cattle ranching, farming, and feedlots	1,022	4,592	368	544	4,648	212	1,072	12,458	52,788	23.6%
Cattle feedlots	562	3,018	144	54	2,972	82	277	7,109	14,479	49.1%
Fatal injuries										
Agriculture, forestry, fishing, and hunting										
Number	20	9	22	31	13	12	12	119	574	20.7%
Rate*	27.5	19.8	23.2	40.9	29.9	51.6	33	32.3	23.4	1.4
Animal production										
Number	9	1	12	4	4	7	8	45	161	28.0%
Rate*	–	–	–	–	–	–	–	–	18.6	–
Nonfatal injuries										
Agriculture, forestry, fishing, and hunting										
Number	900	800	800	300	500	–	–	3,300	54,400	6.1%
Rate**	5.8	8.7	4.9	4.7	5.2	–	–	5.9	5.3	1.1
Animal production										
Number	700	700	500	–	400	–	–	2,300	14,100	16.3%
Rate**	7.2	9.4	5	–	7.1	–	–	7.2	6.5	1.1

Notes. *The fatal injury rate represents the number of fatal occupational injuries per 100,000 full-time equivalent workers. **The nonfatal injury rate represents the number of nonfatal injuries and illnesses per 100 full-till equivalent workers. –Data are not publicly available.

not been disseminated broadly. Few materials on this subject appear in the two best known sources of agricultural safety and health materials at the national level, including the Farm and Ranch eXtension in Safety and Health (FReSH) Community of Practice and the National Ag Safety Database.

Extension professionals can play a key role in increasing safety knowledge and changing producer and worker behaviors. To that end, we offer several suggestions for Extension professionals:

- Develop partnerships with agricultural safety specialists from agribusiness, nonprofit, and educational institutions to provide safety training opportunities to livestock producers and workers. Training should address common risk factors for injury including animal handling and equipment safety. Training should not just be classroom-based but also incorporate hands-on training components (Adams Progar et al., 2019; Boyles, 2007; Ramos et al., 2019).
- Collaborate with one of the 11 agricultural health and safety centers across the county that have been funded by the National Institute for Occupational Safety and Health to conduct research, evaluation, and outreach to improve the health and safety of people working in agriculture (Centers for Disease Control and Prevention, 2014). Extension professionals could use, promote, and disseminate many of the resources that these centers have created to educate producers and workers. For example, CS-CASH, in collaboration with insurance providers and producers, has developed the Feedyard 15 training program, which consists of modules on the most common risk factors for injury on cattle feedyards as indicated by workers' compensation insurance data and industry stakeholders. Modules cover topics such as stockmanship, horsemanship, silage, manure handling, feedmill safety, tractors, and ATVs/UTVs (Ramos et al., 2019).
- Promote the use of research-based tools, such as the Feedyard 15 program and the Stockman's Scorecard, to improve occupational safety and health on the feedyard and enhance lives of individuals working in animal production agriculture (Ramos et al., 2019; Yost et al., 2020).
- Consider joining the FReSH Community of Practice at eXtension.org and engaging with professional organizations such as the International Society for Agricultural Safety and Health and the Agricultural Safety and Health Council of America.

As with any study, we have some limitations to note. First, we used publicly available data from the BLS and various state-based data sources. Second, agricultural injury surveillance has been problematic for several reasons including underreporting of injuries, issues with coding and accuracy of reporting, delayed reporting, missing data, and few comprehensive data sources (Patel et al., 2017). These same concerns also exist in the animal production and cattle feeding subsectors, but there are also additional concerns with accurate reporting of animal-related injuries. Although we used BLS data, there are inherent issues with reporting methods and definitions used within this data source. For example, the number of establishments is lower in BLS data than other sources such as the USDA or the Census of Agriculture. Additionally, the BLS changed its reporting guidelines in 2018 and added a phased-in reporting requirement, which may create some variability in the numbers and rates of reported injuries and illness cases from 2018 to 2020.

CONCLUSION

Cattle feeding comprises a significant part of animal production in the central states region. The data presented in this article are a first step toward identifying the issues and developing strategies to prevent injuries and worker fatalities in animal production and the cattle feeding industry specifically. Supplemental data and information like workers' compensation claims, Extension case studies, and ethnographic fieldwork that include both feedyard workers and managers can improve our knowledge of safety attitudes, beliefs, behaviors, and outcomes in the industry. Our study validates the need for improved surveillance and emphasizes the need to explore multiple injury and illness data collection mechanisms. Furthermore, we highlight the importance of a renewed focus on Extension education and outreach efforts related to livestock worker safety at the national, regional, and state level. Safety should be integrated into all Extension agriculture programming. Because of the high rates of injury in animal production, collaborative efforts between Extension professionals and other stakeholders are vital to educating livestock producers and workers and improving safety outcomes.

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