



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

1
A984Ab

United States
Department of
Agriculture



Agriculture
Information
Bulletin
Number 739

An Economic Research Service Report

Injuries and Fatalities on U.S. Farms

Jack L. Runyan



It's Easy To Order Another Copy!

Just dial 1-800-999-6779. Toll free in the United States and Canada.

Ask for Injuries and Fatalities on U.S. Farms (AIB-739).

For additional information about ERS publications, databases, and other products, both paper and electronic, visit the **ERS Home Page** on the Internet at <http://www.econ.ag.gov>

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint, write the Secretary of Agriculture, U.S. Department of Agriculture, Washington, DC 20250, or call 1-800-245-6340. USDA is an equal employment opportunity employer.

Injuries and Fatalities on U.S. Farms. By Jack L. Runyan. U.S. Department of Agriculture, Economic Research Service, Food and Rural Economics Division. Agriculture Information Bulletin No. 739.

Abstract

U.S. farmworkers suffered 673 fatal and 64,813 nonfatal accidents in 1992. Fatal injuries occurred at a rate of 0.3 per 1,000 U.S. farms and per 1,000 farms with hired labor expenditures. Farm operators and family members accounted for about 32 percent of nonfatal injuries, while 44,383 hired laborers were injured while engaged in farmwork. This study, using 1992 Census of Agriculture data, analyzes fatal injuries by State, and nonfatal injuries by the operators' primary occupation, age, and tenure group, and by farm type, acreage, sales, commodity, and location.

Keywords: Farm injuries, hired farmworker injuries, farm operator injuries.

Acknowledgment

The statistical procedures used for the data analysis were developed by Charlie Hallahan, ERS.

Contents

Summary .....	.iii
Introduction .....	.1
Fatal Farm Injuries .....	.1
Nonfatal Farm Injuries .....	.3
Operators and Family Members .....	.3
Hired Workers .....	.5
Farm Safety Policy .....	.8
References .....	.11
Glossary .....	.12
Appendix table 1. Nonfatal injuries to operators and family members on U.S. farms by State, 1992 .....	.14
Appendix table 2. Nonfatal injuries to hired workers on U.S. farms by State, 1992 .....	.15

Summary

Farm operators and their families suffered 72 percent of the 673 work-related farm fatalities in 1992 and a third of the 64,813 nonfatal farming injuries. Hired farmworkers endured 44,383 nonfatal and less than a third of fatal farmwork-related injuries, according to the 1992 Census of Agriculture.

Farming has one of the highest fatality rates of all occupations, according to the U.S. Department of Labor. Farmers and farmworkers receive little formal safety training and often work alone and far from assistance should an injury occur.

The total of 673 farmwork-related fatalities was 1 for every 2,861 farms--the United States had more than 1.9 million farms in 1992. Total injuries averaged 1 for every 29 farms.

Farm operator and family member fatality rates in Delaware, Indiana, Iowa, Minnesota, and Wisconsin were higher than the U.S. average per 1,000 farms. Arizona, California, Florida, Idaho, Louisiana, and Maryland reported higher-than-average fatality rates among hired laborers per 1,000 farms that reported labor costs.

Of the 64,813 nonfatal injuries, about 32 percent were to farm operators and family members, a rate of about 10.6 injuries per 1,000 farms.

Hired workers suffered about 64 injuries per 1,000 farms with labor costs.

Hired workers were injured at a higher rate on the following types of farms:

- Farms where operators characterized farming as their principal instead of secondary occupation;
- Farms where the operator was 45 to 64 years old;
- Farms with tenant operators rather than operators who were partial or full farm owner;
- Farms of 1,000 acres or more;
- Farms with sales at or over \$500,000;
- Farms producing mainly horticultural-specialty products;
- Farms owned by corporations other than the primary farm operator; and
- Farms located in California, Connecticut, Florida, and, especially, Hawaii.

Connecticut, Nevada, and Hawaii had the greatest injury rates per 1,000 hired workers, while the lowest rates were in Kentucky, North Dakota, and Tennessee.

Farm operators and family members were nonfatally injured at higher rates when the operators' occupation was farming, the operators were 44 years old or younger and part owners, and the farms were family-held corporations, over 1,000 acres, sold at least \$500,000 in agricultural products, primarily produced dairy products, and were in the Lake States region. Wyoming, Wisconsin, Vermont, and New York had the highest injury rates per 1,000 farms for operators and their family members; Texas, Tennessee, Alabama, Mississippi, Georgia, and Louisiana had the lowest rates.

The greater number of injuries in both the Lake States region and on farms pro-

ducing dairy products may be related. Dairy farms' slippery surfaces, combined with colder temperatures, may produce more hazardous working conditions.

The risk of injury varies with characteristics of farmers and farms. This study is a limited analysis of the fatal farm injuries and a broader analysis of nonfatal farm injuries in 1992, the first year such data are available in the Census of Agriculture.

It may be possible to reduce the risk of occupational injuries through regulation, engineering, education, or a combination of these methods. However, each method has limitations. Most farming operations are exempt from Federal regulations. Farm machinery's longevity outlasts many safety devices, which are not replaced, and safety innovations take years to become widely used. Developing effective farm safety education programs requires the cooperation of all parties involved in farming (operators, family members, farmworkers, manufacturers, researchers, and farm safety specialists).

Injuries and Fatalities on U.S. Farms

Jack Runyan

Introduction

Farming, by its very nature, creates an environment conducive to injuries and illnesses and presents unique safety problems not found in most industries. Home and worksite are the same location for most farm operations, and children play on and around machinery and animals, exposing farmers and their family members to hazards associated with animals, machinery, tools, and chemicals. Farming is usually not performed in packages of 40-hour weeks but in an erratic tempo dictated by weather, season, and climate. During planting and harvesting periods, farmers, their family members, and hired workers may work long, fatiguing hours, and may be less cautious while operating equipment and handling livestock. Farmers and farmworkers receive little formal safety training, and they often work alone and far from assistance should an injury occur. Emergency services in many rural areas are distant from the farm and often not equipped to handle more severe farm injuries (Murphy, Runyan).

Congress, in the Food, Agriculture, Conservation, and Trade Act of 1990, directed the Secretary of Commerce to include questions relating to agricultural accidents and farm safety in the 1992 Census of Agriculture. Therefore, the 1992 Census of Agriculture is the first farm census to include a count of work-related injuries and deaths on the farm (see Glossary). The Bureau of the Census asked, "Were there any injuries or deaths connected with farm or ranch work on or for this place in 1992?" If the respondent answered "yes," he or she was asked how many operator and family members and/or hired workers experienced injuries or work-related deaths.

There were 64,813 nonfatal injuries and 673 fatal injuries on U.S. farms in 1992, according to the 1992 Census of Agriculture. Hired workers were involved in 68 percent of the nonfatal injuries and 27 percent of the fatal ones.

A recent study of farm injuries in a five-State area (Minnesota, Nebraska, North Dakota, South Dakota,

and Wisconsin) showed that about 72 percent of farm injuries were sprains/strains, contusions, lacerations, and fractures (Gerberich et al.). More than half of the injuries were to the back, fingers, arms, eyes, hands, and legs. The most frequent periods of restricted activity resulting from a farm injury were from 1 to less than 7 days.

Farming has one of the higher rates of fatal injuries of all occupations (along with timber cutting, fishing, and airplane pilots), according to a study of fatal work-related injuries by the U.S. Department of Labor. In 1993, farm operators and managers accounted for 30 percent of the fatal injuries to self-employed individuals while accounting for only 10 percent of the self-employed population (Personick and Windau). Most of these fatalities resulted from tractor accidents. The same study also reported that wage and salary workers in agriculture also face fatality risks much higher than their 2-percent share of wage and salary employment suggests (Personick and Windau, p. 28).

This report has two parts. The first part is a limited analysis of farm fatalities. The second is an analysis of the nonfatal farm injuries to operators and family members and to hired workers reported in 1992 by operator characteristics (primary occupation, age, and tenure group) and farm characteristics (type of organization, acreage, sales, commodity, and location). The rates of injury in each category and in States are compared with the U.S. averages to determine levels of significance at the 95-percent confidence level (Kanji). Unfortunately, the data do not allow for an analysis of cause, type, or severity of the nonfatal injuries. Demographic data (such as age, gender, or relationship to the operator) on the injured parties are also not available. Data were not readily accessible for individual farms, so analysis was performed on categories.

Fatal Farm Injuries

There were 490 operators and family members fatally injured on 482 U.S. farms in 1992 (table 1), a rate of

Table 1—Fatalities on farms by State, 1992

State	Operators and family members			Hired workers		Fatalities per 1,000 farms with hired labor expenditures
	Number of farms	Number of fatalities	Fatalities per 1,000 farms	Number of farms with hired labor expenditures	Number of fatalities	
Total U.S.	1,925,300	490	0.25	693,011	183	0.26
Alabama	37,905	4	0.10	12,754	4	0.31
Alaska	512	0	0	188	0	0
Arizona	6,773	3	0.44	2,946	3	1.02*
Arkansas	43,937	12	0.27	15,422	5	0.32
California	77,669	15	0.19	38,347	23	0.60*
Colorado	27,152	8	0.29	9,137	d	—
Connecticut	3,427	0	0	1,001	0	0
Delaware	2,633	4	1.52*	946	0	0
Florida	35,204	4	0.11	13,151	20	1.52*
Georgia	40,759	5	0.12	13,720	4	0.29
Hawaii	5,336	0	0	1,447	0	0
Idaho	22,124	6	0.27	10,005	6	0.60*
Illinois	77,610	22	0.28	25,398	5	0.20
Indiana	62,788	25	0.40*	19,252	d	—
Iowa	96,543	35	0.36*	36,520	4	0.11
Kansas	63,278	19	0.30	21,093	d	—
Kentucky	90,281	26	0.28	39,979	5	0.12
Louisiana	26,652	d	—	10,361	10	0.96*
Maine	5,776	0	0	2,485	0	0
Maryland	13,037	d	—	4,875	4	0.82*
Massachusetts	5,258	d	—	1,847	0	0
Michigan	46,502	16	0.34	15,908	d	—
Minnesota	75,079	35	0.46*	28,275	5	0.18
Mississippi	31,998	3	0.09	11,373	d	—
Missouri	98,082	28	0.28	26,290	d	—
Montana	22,821	7	0.30	8,191	3	0.36
Nebraska	52,923	9	0.17	19,889	4	0.20
Nevada	2,890	0	0	1,143	d	—
New Hampshire	2,445	0	0	885	0	0
New Jersey	9,079	d	—	2,659	d	—
New Mexico	14,279	0	0	5,597	3	0.54
New York	32,306	d	—	12,903	d	—
North Carolina	51,854	12	0.23	21,919	5	0.22
North Dakota	31,123	4	0.12	11,895	d	—
Ohio	70,711	18	0.25	20,559	4	0.19
Oklahoma	66,937	22	0.32	20,070	d	—
Oregon	31,892	6	0.18	11,480	4	0.34
Pennsylvania	44,870	10	0.22	14,447	5	0.34
Rhode Island	649	0	0	237	0	0
South Carolina	20,242	3	0.14	6,958	d	—
South Dakota	34,057	10	0.29	12,699	d	—
Tennessee	75,076	20	0.26	25,662	5	0.19
Texas	180,644	18	0.10*	57,952	15	0.26
Utah	13,520	4	0.30	5,860	d	—
Vermont	5,436	d	—	2,508	d	—
Virginia	42,222	14	0.33	16,358	d	—
Washington	30,264	7	0.23	14,145	4	0.28
West Virginia	17,020	7	0.41	5,179	d	—
Wisconsin	67,959	31	0.46*	27,681	4	0.14
Wyoming	8,716	3	0.34	3,416	d	—

* Significantly different from the U.S. average at the 95-percent confidence level.

d = data withheld to avoid disclosing data from individual farms.

— = data not available.

Source: Calculated by ERS using data from the 1992 *Census of Agriculture*.

1,016 per 1,000 farms with fatal injuries and 0.25 per 1,000 U.S. farms. Five States--Delaware, Indiana, Iowa, Minnesota, and Wisconsin--had higher operator and family member fatality rates per 1,000 farms than the U.S. average.¹ Texas' fatal injury rates to operators and family members were lower than the U.S. average.

There were 183 hired laborers fatally injured on 160 U.S. farms in 1992. This amounts to a rate of 1,144 per 1,000 farms with fatal injuries and 0.26 per 1,000 U.S. farms with labor expenditures. Six States--Arizona, California, Florida, Idaho, Louisiana, and Maryland--had hired labor fatality rates higher than the U.S. average (rates calculated per 1,000 farms with hired labor expenditures).² No State had fatal injury rates to hired laborers that were significantly lower (at the 95-percent confidence level) than the U.S. average.

Nonfatal Farm Injuries

The general analysis of nonfatal farm injuries is less limited than that of fatal injuries. Data are available for comparing rates of injury for several categories of farms, and for all States for both operators and their family members, and hired laborers.

Operators and Family Members

In 1992, there were 20,430 injuries to operators and their family members on 17,725 (less than 1 percent) of the 1,925,300 farms in the United States (table 2). This resulted in about 1,152.6 injuries per 1,000 farms where injuries occurred, and about 10.6 injuries per 1,000 U.S. farms (table 2). Since data were not collected on the number of family members working on farms, the analysis of injuries to operators and family members will be based on rates of injuries per 1,000 farms where injuries occurred, and rates of injuries per 1,000 U.S. farms. A comparison with the U.S. average determined levels of significance (at the 95-

percent confidence level) for rates of injury in each category, and rates for States.

Injuries per 1,000 Farms Where Injuries Occurred

Based on an analysis of the data shown in table 2, only one type of farm (value of agricultural products sold amounting to \$500,000 and over) had a rate per 1,000 farms where injuries occurred that was significantly different (greater) from the U.S. average. No State rates were significantly different from the U.S. average (appendix table 1).

Injuries per 1,000 U.S. Farms

All of the groupings of operators and farms had rates of injuries to operators and family members per 1,000 farms significantly different from the U.S. average, except vegetable and melon farms, poultry and egg farms, livestock specialty farms, other livestock farms, and farms located in the Corn Belt. The highest injury rates occurred on farms with \$500,000 or more in sales of agricultural products (table 2). Dairy farms had the next highest rate of injuries. Other notable rates per 1,000 farms within each grouping of farms (statistically different at the 95-percent level) are as follows:

- Occupation: Higher injury rates for farming as principal rather than secondary occupation.
- Age: Lower injury rates for operators 65 years and older and higher for those less than 44 years of age.
- Tenure: Lower rates for full owners and higher for part owners.
- Organization: Lower rates for individual or family organization types and higher for family-held corporations.
- Size of farm: Injury rates rise with size of farm: lower for farms with less than 100 acres and higher for farms with 1,000 acres and over.
- Sales: Injury rates rise with value of sales: lower for farms with sales amounting to less than \$20,000 and higher for farms with value of sales amounting to \$500,000 and over.
- Type of farm: Lower rates for fruit and tree nuts farms and higher for dairy farms.
- Region: Higher rates for farms located in the Lake States region.

While many of the regions' rates may be related to farm type, a clear relationship seems to emerge

¹ Data were not published for six States--Louisiana, Maryland, Massachusetts, New Jersey, New York, and Vermont. Each of these States contained two farms that had fatal injuries, except New Jersey, which contained one such farm.

² Data were not published for 18 States--Colorado, Indiana, Kansas, Michigan, Mississippi, Missouri, Nevada, New Jersey, New York, North Dakota, Oklahoma, South Carolina, South Dakota, Utah, Vermont, Virginia, West Virginia, and Wyoming. Nine of these States contained two farms and seven contained one farm where fatal injuries occurred to hired workers.

Table 2—Nonfatal injuries to operators and family members on U.S. farms, 1992

Item	Number of farms		Number of injuries			Percent		
	Total	With injuries	Total	Per 1,000 farms with injuries	Per 1,000 farms	Total farms	Farms with injuries	Injuries
Total U.S.	1,925,300	17,725	20,430	1,152.6	10.6	100.0	100.0	100.0
Principal occupation of operator								
Farming	1,053,150	13,383	15,519	1,159.6	14.7*	54.7	75.5	76.0
Other occupations	872,150	4,342	4,911	1,131.0	5.6*	45.3	24.5	24.0
Age of operator								
Less than 25 years	27,906	355	419	1,180.2	15.0*	1.5	2.0	2.1
25 to 44 years	560,572	6,910	7,907	1,144.2	14.1*	29.1	39.0	38.7
45 to 64 years	859,172	7,370	8,424	1,143.0	9.8*	44.6	41.6	41.2
65 years and older	477,650	3,090	3,680	1,190.9	7.7*	24.8	17.4	18.0
Tenure group								
Full owners	1,111,738	6,994	8,050	1,151.0	7.2*	57.7	39.4	39.4
Part owners	596,657	8,359	9,653	1,154.8	16.2*	31.0	47.2	47.3
Tenants	216,905	2,372	2,727	1,149.6	12.6*	11.3	13.4	11.3
Type of organization								
Individual or family	1,653,491	13,941	15,747	1,130.0	9.5*	85.9	78.6	77.0
Partnership	186,806	2,356	2,771	1,176.1	14.8*	9.7	13.3	13.6
Corporation:								
Family held	64,528	1,208	1,606	1,329.4	24.8*	3.4	6.8	7.9
Other held	8,039	98	141	1,438.8	17.5*	0.4	0.6	0.7
Other	12,436	122	165	1,352.4	13.2*	0.6	0.7	0.8
Size of farm								
Less than 100 acres	837,562	4,603	5,253	1,143.2	6.2*	43.5	26.0	25.6
100 to 219 acres	395,328	3,320	3,767	1,134.6	9.5*	20.5	18.7	18.4
220 to 499 acres	333,111	4,181	4,779	1,143.0	14.3*	17.3	23.6	23.4
500 to 999 acres	186,387	2,689	3,103	1,154.0	16.6*	9.7	15.2	15.2
1,000 acres and over	172,912	2,932	3,528	1,203.2	20.4*	9.0	16.5	17.2
Value of agricultural products sold								
Less than \$20,000	1,138,584	6,183	6,938	1,122.1	6.0*	59.2	34.8	34.0
\$20,000 to \$39,999	204,319	1,835	2,070	1,128.0	10.1*	10.6	10.4	10.1
\$40,000 to \$99,999	248,532	3,316	3,691	1,113.0	14.8*	12.9	18.7	18.1
\$100,000 to \$249,999	208,405	3,769	4,317	1,145.4	20.7*	10.8	21.3	21.1
\$250,000 to \$499,999	78,546	1,493	1,753	1,174.1	22.3*	4.1	8.4	8.6
\$500,000 and over	46,914	1,129	1,661	1,471.2*	35.4*	2.4	6.4	8.1
Type of farm								
Cash grains	405,008	3,475	3,883	1,117.4	9.6*	21.0	19.6	19.0
Cotton	20,447	154	178	1,155.8	8.7*	1.1	0.9	0.9
Tobacco	90,826	538	644	1,197.0	7.0*	4.7	3.0	3.2
Vegetables and melons	29,605	233	329	1,412.0	11.1	1.5	1.3	1.6
Fruit and tree nuts	89,514	453	563	1,242.8	6.2*	4.7	2.6	2.8
Horticultural specialty	39,712	347	471	1,357.3	11.8*	2.1	2.0	2.3
Other crop	187,912	1,329	1,567	1,179.0	8.3*	9.8	7.5	7.6
Beef, hog, and sheep	808,283	6,785	7,660	1,129.0	9.4*	42.0	38.3	37.5
Dairy	113,412	3,072	3,592	1,169.2	31.6*	5.9	17.3	17.6
Poultry and eggs	35,066	335	398	1,188.0	11.4	1.8	1.9	1.9
Livestock specialty	80,504	775	868	1,120.0	10.8	4.2	4.4	4.2
Other livestock	25,011	229	277	1,209.6	11.1	1.3	1.3	1.3
Farm production region								
Northeast	124,916	1,543	1,794	1,162.6	14.4*	6.5	8.7	8.8
Appalachian	276,453	1,873	2,151	1,148.4	7.8*	14.4	10.6	10.5
Southeast	134,110	803	966	1,203.0	7.2*	7.0	4.5	4.7
Delta	101,587	636	740	1,163.5	7.2*	5.3	3.6	3.6
Corn Belt	405,724	3,715	4,202	1,131.0	10.4	21.0	20.9	20.7
Lake States	189,600	2,863	3,275	1,143.9	17.2*	9.8	16.1	16.0
Northern Plains	181,381	2,227	2,512	1,128.0	13.8*	9.4	12.6	12.3
Southern Plains	247,581	1,522	1,721	1,130.7	7.0*	12.9	8.6	8.4
Mountain	118,275	1,414	1,648	1,165.4	13.9*	6.1	8.0	8.0
Pacific	145,673	1,129	1,421	1,258.6	9.8*	7.6	6.4	7.0

* Significantly different from the U.S. average at the 95-percent confidence level.

Sources: Calculated by ERS using data from the 1992 Census of Agriculture and Appendix table 1.

between the Lake States and dairy farms. Dairy farms, according to Census of Agriculture data, were more likely than the average U.S. farm to be operated by persons less than 25 years of age; to be run by part owners or partnerships; to have 500 to 999 acres; and to have sales of \$500,000 and over. Also, more than half of the U.S. dairy farms are located in the Lake States region. These farms require working closely with animals and machinery in an environment that includes wet floors that can become slippery (especially in winter), heavy lifting, and exposure to hay and animal dusts as well as to gasses from silos and manure (Murphy, Popendorf, Runyan, Von Essen, and Zwemer et al.). In addition, dairy farms are year-round rather than seasonal operations, resulting in more exposure to agents that cause injuries.

Hired Workers

In 1992, there were 693,011 farms with hired labor expenditures, and injuries to hired workers were reported for 18,014 (about 3 percent) of these farms (table 3). The estimated total number of injuries to hired workers was 44,383, or about 2,464 injuries per 1,000 farms where injuries occurred, 64 injuries per 1,000 farms with hired labor expenditures, and 3.4 injuries per million dollars of hired labor expenditures (table 3). These injury rates are higher than the rate for operators and family members discussed above. However, many farms have more hired workers than operator and family workers and, therefore, a greater number of hired workers than operators and family members are exposed to injury on such farms. These results are similar to those reported in an earlier study by the National Safety Council (Hoskin et al., 1988).

The analysis of injuries to hired laborers will be based on rates of injuries per 1,000 farms where injuries occurred, rates of injuries per 1,000 U.S. farms, and rates per million dollars of hired labor expenditures. A comparison with the U.S. average determined levels of significance (at the 95-percent confidence level) for rates of injury in each category, and rates for States.

Injuries per 1,000 Farms Where Injuries Occurred

Two injury rates per 1,000 farms where injuries occurred stand out in the tables. First, in table 3, the rates on farms that were organized as "other" held corporations were 7,995.9 per 1,000 farms, or nearly 8 per farm. Second, in appendix table 2, the rates on

farms in Hawaii were 9,080.4 per 1,000 farms, or about 9 per farm. These rates indicate that some farms had large numbers of people injured.

Injuries per 1,000 Farms Reporting Hired Labor Expenditures

Based on an analysis of the data in table 3 concerning injuries per farm with hired-labor expenditures, 24 groups and 17 States had higher rates than the national average (table 3 and appendix table 2). Other-held corporations had the highest injury rate per farm with hired-labor expenditures, and farms with less than \$20,000 in sales had the lowest. These two groups also had the highest and lowest hired-labor expenditures per farm, respectively (table 4). The results of analyzing injury rates per 1,000 farms with hired labor expenditures within the broad groupings shown in table 3 (statistically different at the 95 percent level) are:

- Occupation: Higher injury rates for farming as principal rather than secondary occupation.
- Age: Lower injury rates on farms operated by those less than 25 years than by other age groups, and higher on farms operated by those 45 to 64 years of age.
- Tenure: Lower rates on farms operated by full owners, and higher on farms operated by tenants.
- Organization: Lower rates on farms organized as individual or family farms, and higher on farms organized as other-held corporations.
- Size of farm: Injury rates increase as size of farm increases: lower rates on farms with less than 219 acres in size, and higher on farms 1,000 acres and over in size.
- Sales: Injury rates increase as sales increase: lower rates on farms with sales amounting to less than \$20,000, and higher on farms with sales of \$500,000 and over.
- Type of farm: Lower rates on cash grain and tobacco farms, and higher on horticultural-specialty farms.
- Region: Lower rates on farms in the Northern Plains region, and higher on farms in the Pacific region.

Injuries per Million Dollars of Labor Expenditures

Another measure of injury rates for hired farm laborers is injuries per dollar of hired labor expenditures. In 1992 there were 3.4 injuries to hired laborers on

Table 3—Nonfatal injuries to hired workers on U.S. farms, 1992

Item	Number of farms			Number of injuries			Percent by group		
	With hired labor expenditures	With injuries	Total	Per 1,000 farms with injuries	Per 1,000 farms with hired labor expenditures	Per \$1,000,000 of labor expenditures	Farms with hired labor expenditures	Farms with injuries	Total injuries
Total U.S.	693,011	18,014	44,383	2,463.8	64.0	3.4	100.0	100.0	100.0
Principal occupation of operator									
Farming	467,244	15,091	37,623	2,493.0	80.5*	3.3*	67.4	83.8	84.8
Other occupations	225,767	2,923	6,760	2,312.7	29.9*	4.2*	32.6	16.2	15.2
Age of operator									
Less than 25 years	10,082	130	230	1,769.2	22.8*	2.9*	1.5	0.7	0.5
25 to 44 years	215,950	6,062	13,341	2,200.8*	61.8*	3.5	31.1	33.7	32.8
45 to 64 years	315,854	8,482	22,713	2,677.8*	71.9*	3.4	45.6	47.1	51.2
65 years and older	151,125	3,340	8,099	2,424.8	53.6*	3.4	21.8	18.2	18.2
Tenure group									
Full owners	313,371	6,777	16,854	2,486.9	53.8*	3.6*	45.3	37.6	39.4
Part owners	293,483	8,321	20,502	2,463.8	69.8*	3.3*	42.3	46.2	46.2
Tenants	86,157	2,916	7,027	2,409.8	81.6*	3.5	12.4	16.2	15.8
Type of organization									
Individual or family	553,004	8,265	11,239	1,359.8*	20.3*	2.5*	79.8	45.9	25.3
Partnership	83,260	3,432	7,542	2,197.6*	90.6*	3.3*	12.0	19.0	17.0
Corporation:									
Family held	46,281	4,851	16,514	3,404.2*	356.8*	3.6*	6.6	26.9	37.2
Other held	5,392	982	7,852	7,995.9*	1,456.2*	5.6*	0.9	5.9	17.7
Other	5,074	484	1,236	2,553.7	243.6*	6.4*	0.7	2.7	2.8
Size of farm									
Less than 100 acres	214,455	3,941	7,739	1,963.7*	36.0*	3.3*	40.0	21.8	17.4
100 to 219 acres	125,014	2,229	4,385	1,967.2*	35.0*	3.5*	18.0	12.4	9.9
220 to 499 acres	139,866	3,112	6,232	2,002.6*	44.6*	3.2*	20.2	17.3	14.0
500 to 999 acres	98,545	2,979	6,870	2,306.1	69.7*	3.2*	14.2	16.6	15.5
1,000 acres and over	115,131	5,753	19,157	3,329.9*	166.4*	3.7*	16.6	31.9	43.2
Value of agricultural products sold									
Less than \$20,000	258,857	1,837	2,197	1,196.0*	8.4*	8.9*	37.4	10.2	4.9
\$20,000 to \$39,999	76,842	817	945	1,156.6*	12.3*	5.0*	11.1	4.5	2.1
\$40,000 to \$99,999	116,409	1,801	2,115	1,174.3*	18.2*	3.4	16.8	10.0	4.8
\$100,000 to \$249,999	136,282	3,531	4,350	1,231.9*	31.9*	2.5*	19.6	19.6	9.8
\$250,000 to \$499,999	62,072	3,212	4,511	1,404.4*	72.6*	2.4*	9.0	17.8	10.2
\$500,000 and over	42,548	6,816	30,265	4,440.2*	711.3*	3.7*	6.1	37.9	68.2

continued--

farms per million dollars of hired labor expenditures (table 3).

Based on an analysis of these data, all but eight groups of operators and farms and eight States had different than U.S.-average rates of injuries per million dollars of hired expenditures. Twenty groups and 30 States had lower rates than the U.S. average and 17 groups and 14 States had higher rates than the U.S. average (table 3 and appendix table 2). The results of analyzing injury rates per million dollars of hired

labor expenditures within the groups of farms shown in table 3 (statistically different at the 95-percent level) are:

- Occupation: Injury rates were higher on farms with operators with primary occupations other than farming.
- Age: Lower rates on farms operated by those less than 25 years old.
- Tenure: Lower rates on farms operated by part owners, and higher rates on farms operated by full owners.

Table 3—Nonfatal injuries to hired workers on U.S. farms, 1992 (cont.)

Item	Number of farms			Number of injuries			Percent by group		
	With hired labor expenditures	With injuries	Total	Per 1,000 farms with injuries	Per 1,000 farms with hired labor expenditures	Per \$1,000,000 of labor expenditures	Farms with hired labor expenditures	Farms with injuries	Total injuries
Type of farm									
Cash grains	144,251	1,717	2,111	1,229.4*	14.6*	1.7*	20.8	9.5	4.8
Cotton	14,252	494	1,072	2,170.0*	75.2*	NA	2.0	2.7	2.4
Tobacco	48,561	464	699	1,506.4*	14.4*	2.6*	7.0	2.6	1.6
Vegetables and melons	12,979	924	3,995	4,323.6*	307.8*	3.3	1.9	5.1	9.0
Fruit and tree nuts	44,153	2,962	8,634	2,914.9*	195.5*	4.4*	6.4	16.4	19.4
Horticultural specialty	21,374	2,049	8,597	4,195.7*	402.2*	3.6*	3.1	11.4	19.4
Other crop	57,817	1,667	5,342	3,204.6*	92.4*	4.1*	8.3	9.3	12.0
Beef, hog, and sheep	236,215	3,819	6,455	1,690.2*	27.3*	3.6*	34.1	21.2	14.5
Dairy	68,045	2,403	3,772	1,569.7*	55.4*	2.5*	9.8	13.3	8.5
Poultry and eggs	16,726	546	1,979	3,624.5*	118.3*	3.2*	2.4	3.0	4.5
Animal specialty	22,027	839	1,496	1,783.1*	67.9*	6.2*	3.2	4.7	3.4
Other livestock	6,611	130	231	1,776.9	34.9*	NA	1.0	0.7	0.5
Farm production region									
Northeast	44,793	1,748	3,951	2,260.3	88.2*	3.3*	6.5	9.7	8.9
Appalachian	109,098	1,687	2,925	1,733.8*	26.8*	3.1*	15.7	9.4	6.6
Southeast	46,581	1,427	6,397	4,482.8*	137.3*	4.4*	6.7	7.9	14.4
Delta	37,156	694	1,132	1,631.1*	30.4*	2.1*	5.4	3.9	2.6
Corn Belt	128,019	1,804	3,069	1,701.2*	24.0*	2.5*	18.5	10.0	6.9
Lake States	71,864	1,319	2,175	1,649.0*	30.2*	2.3*	10.4	7.3	4.9
Northern Plains	65,576	837	1,439	1,719.2*	21.9*	2.1*	9.4	4.6	3.2
Southern Plains	78,022	1,334	2,959	2,218.1*	37.9*	3.4	11.2	7.4	6.7
Mountain	46,295	1,848	3,515	1,902.0*	75.9*	3.4	6.7	10.3	7.9
Pacific	65,607	5,316	16,821	3,164.2*	256.4*	4.1*	9.5	29.5	37.9

NA = not available.

* Significantly different from the U.S. average at the 95-percent confidence level.

Sources: Calculated by ERS using data from the 1992 *Census of Agriculture* and Appendix table 4.

- **Organization:** Lower rates on farms organized as individual or family farms, and higher rates on other types of organizations.
- **Size of farm:** Higher rates for 1,000 acres and over.
- **Sales:** Lower rates on farms with sales of \$250,000 to \$499,999, and higher rates on farms with sales less than \$20,000. Distribution appears to be U-shaped.
- **Type of farm:** Lower rates on cash grain farms, and higher rates on animal specialty farms.
- **Region:** Lower rates on farms in the Delta and Northern Plains regions, and higher rates on farms in the Southeast region.

When analyzed by both injuries per farm reporting hired-labor expenditures and injuries per dollar of labor expenditures, a few groups were found to have comparable injury rates, either significantly higher or significantly lower than the U.S. average, under both categories. The less than 25 years-of-age group, individual or family-organization group, cash grain farms, and farms located in the Northern Plains were among

those having the lowest injury rates, while farms with 1,000 acres and over had the highest injury rates per 1,000 farms and per million dollars of labor expenditures.

Several groups of farms and States had injury rates per 1,000 farms where injuries occurred, per 1,000 farms that reported hired labor expenditures, and per million dollars labor expenditures that were different from the U.S. average. Ten groups had higher than the national average rates in all three categories (table 3):

- Family and other-held corporations,
- Other types of organizations,
- 1,000 acres and over,
- \$500,000+ in value of sales,
- Fruit and tree nut farms,
- Horticultural specialty farms,
- Other crop farms, and
- Farms located in the Southeast and Pacific regions.

These groups had higher than U.S. average labor expenditures per farm, indicating higher per farm

Table 4—Hired labor expenditures per U. S. farm reporting hired labor expenditures, 1992

Item	Number of farms	Total labor expenditures	Labor expenditures per farm	Percent of labor expenditures
	<i>Number</i>	<i>\$1,000</i>	<i>\$1,000</i>	<i>Percent</i>
Total U.S.	693,011	12,961,640	18.7	100.0
Principal occupation of operator				
Farming	467,244	11,379,979	24.4*	87.8
Other occupations	225,767	1,581,660	7.0*	12.2
Age of operator				
Less than 25 years	10,082	80,161	8.0*	0.6
25 to 44 years	215,950	3,862,172	17.8	29.8
45 to 64 years	315,854	6,623,747	21.0*	51.1
65 years and older	151,125	2,395,560	15.8*	18.5
Tenure group				
Full owners	313,371	4,740,525	15.1*	36.6
Part owners	293,483	6,182,514	21.0*	47.7
Tenants	86,157	2,038,600	23.6*	15.7
Type of organization				
Individual or family	553,004	4,507,106	8.2*	34.8
Partnership	83,260	2,316,890	27.8*	17.9
Corporation:				
Family held	46,281	4,552,238	98.4*	35.1
Other held	5,392	1,391,926	258.1*	10.7
Other	5,074	193,480	38.1*	1.5
Size of farm				
Less than 100 acres	214,455	2,363,431	11.0*	18.2
100 to 219 acres	125,014	1,237,759	9.9*	9.5
220 to 499 acres	139,866	1,952,916	14.0*	15.1
500 to 999 acres	98,545	2,170,673	22.0*	16.8
1,000 acres and over	115,131	5,236,860	45.4*	40.4

continued--

labor use, thus greater numbers of hired laborers exposed to situations that may cause injuries (table 4). The Southeast and Pacific regions also averaged more workers per farm than the U.S. average.

Rates higher than the national-average injury rates per 1,000 farms where injuries occurred, per 1,000 farms that reported hired labor expenditures, and per million dollars in labor expenditures that were different from the U.S. average also occurred in four States--California, Connecticut, Florida, and Hawaii. The number of workers on farms in these States was greater than the U.S. average (appendix table 2).

Twelve farm groups--individual or family, less than 100 acres, 220 to 499 acres, \$100,000 to \$249,999 value of sales, cash grains, tobacco, dairy, and farms located in the Appalachian, Delta, Corn Belt, Lake States, and Northern Plains regions--had lower than national average rates per 1,000 farms where injuries occurred, per 1,000 farms that reported hired labor

expenditures, and per million dollars labor expenditures (table 3). All of these groups except dairy had lower labor expenditures per farm than the U.S. average (table 4). The significantly lower than national average rates of injuries for hired labor on dairy farms contrast with the significantly higher than national-average rates of injuries for operators and families.

Rates lower than the national average in all three categories (rates per 1,000 farms where injuries occurred, rates per 1,000 farms that reported hired labor expenditures, and rates per million dollars labor expenditures) also occurred in 14 States--Arkansas, Illinois, Iowa, Kansas, Louisiana, Michigan, Minnesota, Missouri, North Carolina, North Dakota, Ohio, South Dakota, Tennessee, and Wisconsin (appendix table 2).

Farm Safety Policy

Reducing the risk of injuries in farming may be accomplished by regulation, engineering, and educa-

Table 4—Hired labor expenditures per U. S. farm reporting hired labor expenditures, 1992 (cont.)

Item	Number of farms	Total labor expenditures	Labor expenditures per farm	Percent of labor expenditures
	<i>Number</i>	<i>\$1,000</i>	<i>\$1,000</i>	<i>Percent</i>
Value of agricultural products sold				
Less than \$20,000	285,857	246,796	1.0*	1.9
\$20,000 to \$39,999	76,842	187,551	2.4*	1.5
\$40,000 to \$99,999	116,409	614,728	5.2*	4.7
\$100,000 to \$249,999	136,282	1,773,803	13.0*	13.7
\$250,000 to \$499,999	62,072	1,918,430	30.9*	14.8
\$500,000 and over	42,548	8,220,331	193.2*	63.4
Type of farm				
Cash grains	144,251	1,233,607	8.6*	9.5
Cotton	14,252	NA	NA	NA
Tobacco	48,561	266,598	5.4*	2.1
Vegetables and melons	12,979	1,197,728	92.2*	9.2
Fruit and tree nuts	44,153	1,978,672	44.8*	15.3
Horticultural specialty	21,374	2,366,880	110.7*	18.3
Other crops	57,817	1,290,975	22.3	10.0
Beef, hog, and sheep	236,215	1,774,407	7.5*	13.7
Dairy	68,045	1,486,750	21.8	11.5
Poultry and eggs	16,726	625,283	37.4*	4.8
Animal specialty	22,027	238,931	10.8*	1.8
General livestock	6,611	NA	NA	NA
Farm production regions				
Northeast	44,793	1,207,023	26.9*	9.3
Appalachian	109,098	944,944	8.6*	7.3
Southeast	46,583	1,442,542	31.0*	11.1
Delta	37,156	538,255	14.4	4.2
Corn Belt	128,019	1,217,941	9.5*	9.4
Lake States	71,864	942,281	13.1*	7.3
Northern Plains	65,576	689,507	10.5*	5.3
Southern Plains	78,022	874,665	11.2*	6.7
Mountain	46,295	1,030,715	22.2	8.0
Pacific	65,607	4,073,767	62.1*	31.4

NA = Not available.

* Significantly different from the U.S. average at the 95-percent confidence level.

Source: Calculated by ERS using data from the 1992 *Census of Agriculture*.

tion, or a combination of these methods. However, the scope of each method is limited.

Farming presents unique problems for most safety regulations. Two Federal agencies, the U.S. Department of Labor and the U.S. Environmental Protection Agency, have regulations that affect farm safety. The U.S. Department of Labor administers both the Fair Labor Standards Act (FLSA), which has a child labor provision, and the Occupational Safety and Health Administration (OSHA). FLSA's child labor provision sets limits on the ages, hours, and conditions that children can be hired to perform farm work, but contains no protection for children of farm owners or operators when working on farms owned or operated by their parents. Safety regulations under OSHA apply to all employers, but Congress has

added riders to annual appropriations bills exempting farm operations that employ 10 or fewer employees and that do not maintain a labor camp. According to the 1992 Census of Agriculture, only 3 percent of all U.S. farms employed 10 or more workers, and about 56 percent of all hired workers on farms were employed on farms with 10 or more employees. Since these data indicate farms that employ 10 or more workers (as opposed to 11 or more in the OSHA regulations) and since they do not reveal how many farms employed 11 or more on a given day, OSHA regulations could apply to less than 3 percent of U.S. farms and cover less than 56 percent of hired workers on farms.

The U.S. Environmental Protection Agency (EPA) administers the Federal Insecticide, Fungicide, and

Rodenticide Act. In order to protect workers from pesticide poisoning, EPA promulgated the Worker Protection Standards (WPS), which contain provisions that apply to workers and to both employers of farmworkers and to non-employer owners and operators and their family members. Scientific research results about the effectiveness of WPS have not been reported.

Safety engineers and equipment designers have provided devices, warning labels, and equipment to attempt to reduce farm accidents resulting from using machinery. Since most machinery-related traumatic injuries involve farm tractors, engineering efforts have

focused on improving tractor safety, developing such tools as power take-off shields, warnings about moving parts and slow-moving vehicle signs, and roll-over protection. One of the problems with improving tractor safety is that tractors outlast their safety devices, warnings become hard to read, and innovations take years to become widely used (Murphy).

Education, properly planned and executed, holds great potential for improving farm safety. Farm safety education programs are most effective when operators, family members, farmworkers, manufacturers, researchers, and farm safety specialists are all involved in program development.

References

- Gerberich, Susan Goodwin, Robert W. Gibson, L. Donald French, Peter Carr, Colleen M. Renier, Paul D. Gunderson, Frank Martin, John A. True, John Shutske, and Karen Brademeyer (1993). *The Rural Injury Study-I (RRIS-I): A Population-Based Effort*. Minneapolis: Univ. of Minnesota, *A Report to the Centers for Disease Control*.
- Hoskin, A.F., T.A. Miller, W.D. Hanford, and S.R. Landes (1988). *Occupational Injuries in Agriculture: A 35-State Summary*. Chicago: National Safety Council under contract to the U.S. Dept. of Health and Human Services, Nat. Institute for Occupational Safety and Health.
- Kanji, Gopal K. (1994). *100 Statistical Tests*. London: Sage Publications Ltd. Pp. 25.
- Murphy, Dennis J. (1992). *Safety and Health for Production Agriculture*. St. Joseph, MI: American Society of Agricultural Engineers.
- Personick, Martin E., and Janice A. Windau (August 1995). "Self-Employed Individuals Fatally Injured at Work." *Monthly Labor Review*. U.S. Dept. of Labor.
- Popendorf, William (1991). "Gasses, Vapors, Liquids, and Drugs," *Papers and Proceedings of the Surgeon General's Conference on Agricultural Safety and Health*. Des Moines, IA, Apr. 30 - May 3, pp. 243-54.
- Runyan, Jack L. (1993). *A Review of Farm Accident Data Sources and Research*. BLA-125. U.S. Dept. of Agr., Econ. Res. Serv., Oct.
- U.S. Department of Commerce, Bureau of the Census. *1992 Census of Agriculture*.
- Von Essen, Susanna (1991). "Airborne Dusts," *Papers and Proceedings of the Surgeon General's Conference on Agricultural Safety and Health*, Des Moines, IA, Apr. 30-May 3, pp. 204-15.
- Zwemer, F.L., D.S. Pratt, and J.J. May (1992). "Silo Fillers Disease in New York, 1980-85," *Abstracts. Third International Symposium: Issues in Health, Safety, and Agriculture*. Saskatoon, Saskatchewan, May 10-15, p. 32.

Glossary

Deaths: Includes all deaths that resulted from injuries or accidents related to farm or ranch work on or for "this place." Deaths of family members, the operator, paid hired workers, and unpaid workers are included, but neither deaths of contract workers nor deaths that resulted from natural or accidental causes such as heart attacks, cancer, suicide, etc., are included.

Farm Production Regions: The States in Farm Production Regions are:

- Northeast--CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT;
- Appalachian--KY, NC, TN, VA, WV;
- Southeast--AL, FL, GA, SC;
- Delta--AR, LA, MS;
- Corn Belt--IL, IN, IA, MO, OH;
- Lake States--MI, MN, WI;
- Northern Plains--KS, NE, ND, SD;
- Southern Plains--OK, TX;
- Mountain--AZ, CO, ID, MT, NV, NM, UT, WY; and
- Pacific--AK, CA, HI, OR, WA.

Injuries: Includes all injuries resulting in lost work time or medical care expenses that occurred while doing farm or ranch work on or for "this place" during 1992. Injuries of family members, the operator, paid hired workers, and unpaid workers are included, but neither injuries to contract workers nor household injuries not related to the farming operation are included.

Tenure of Operator: The operators of the farms used in this analysis were either:

- Full owners--operated only land they owned.
- Part owners--operated land they owned and also land they rented from others.
- Tenants--operated only land they rented from others or worked on shares for others.

Type of Farm: The types of farms and their descriptions used in this analysis are:

- Cash grains--wheat, rice, soybeans, barley, buckwheat, cowpeas, dry field and seed beans and peas, flaxseed, lentils, mustard seed, oats, popcorn, rye, safflower, sorghum, and other small grains.
- Cotton and cottonseed.
- Tobacco.

- Vegetables and melons--grown in the open.
- Fruits and tree nuts--berries, grapes, tree nuts, citrus fruits, deciduous tree fruits, avocados, bananas, coffee, dates, figs, olives, pineapples, and tropical fruits.
- Horticultural specialties--bedding plants, bulbs, florists' greens, flower and vegetable seeds, flowers, foliage, fruit stocks, nursery stock, ornamental plants, shrubbery, sod, mushrooms, and vegetables grown under cover.
- Other crops--sugar cane, sugar beets, Irish potatoes, alfalfa, broomcorn, clover, grass seed, hay, hops, mint, peanuts, sweet potatoes, timothy, yams, and other crops (including horticultural specialties) but less than 50 percent of the total value of sales from any single industry group.
- Beef, hogs, and sheep--cattle, calves, hogs, sheep, goats, goats' milk, mohair, and wool.
- Dairy farms--production of cows' milk and other dairy products and raising of dairy heifer replacements.
- Poultry and eggs--chickens, chicken eggs, turkeys, ducks, geese, pheasants, pigeons, quail, and squab.
- Animal specialties--fur-bearing animals, rabbits, horses, ponies, bees, fish in captivity except fish hatcheries, worms, and laboratory animals.
- Other livestock--livestock and animal specialties and their products, but less than 50 percent of sales from any single industry group.

Types of Organizations: Based on the individual(s) or group governing the farm's legal and financial decisions:

- Individual or family operation--controlled and operated by an individual (sole proprietorship). Includes family operations that are not incorporated and not operated under a partnership agreement.
- Partnership operation--two or more persons who have agreed on the amount of their contribution (capital and labor) and the distribution of profits.
- Corporate operations--a legal entity or artificial person created under the laws of a State to carry on a business. Includes both family held (more than 50 percent of the stock is owned by persons related by blood or marriage) and other-held corporations.
- Other organizations--cooperatives (defined as an incorporated or unincorporated enterprise or an association created and formed jointly by the members), estate or trust (defined as a fund of money or property administered for the benefit of another

individual or organization), prison farm, grazing association, Indian reservation, institution run by a government or religious entity, etc.

Appendix table 1—Nonfatal injuries to operators and family members on U. S. farms by State, 1992

Item	Number of farms		Number of injuries			Percent		
	Total	With injuries	Total	Per 1,000 farms with injuries	Per 1,000 farms	Total farms	Farms with injuries	Injuries
Total U.S.	1,925,300	17,725	20,430	1,152.6	10.6	100.0	100.0	100.0
Alabama	37,905	236	254	1,076.2	6.7*	2.0	1.3	1.2
Alaska	512	5	6	1,200.0	11.7	0.0	0.0	0.0
Arizona	6,773	90	115	1,277.8	17.0*	0.4	0.5	0.6
Arkansas	43,937	308	361	1,172.0	8.2*	2.2	1.7	1.8
California	77,669	530	705	1,330.2	9.0*	4.0	3.0	3.4
Colorado	27,152	274	311	1,135.0	11.4	1.4	1.5	1.5
Connecticut	3,427	43	50	1,162.8	14.6*	0.2	0.2	0.2
Delaware	2,633	20	21	1,050.0	8.0	0.1	0.1	0.1
Florida	35,204	207	288	1,391.3	8.2*	1.8	1.2	1.4
Georgia	40,759	243	275	1,131.6	6.7*	2.1	1.4	1.3
Hawaii	5,336	45	59	1,311.1	11.0	0.2	0.2	0.2
Idaho	22,124	237	280	1,181.4	12.6*	1.1	1.3	1.4
Illinois	77,610	622	705	1,133.4	9.0*	4.0	3.5	3.4
Indiana	62,788	562	642	1,142.3	10.2	3.2	3.2	3.1
Iowa	96,543	1,195	1,351	1,130.5	14.0*	5.0	6.7	6.6
Kansas	63,278	608	698	1,148.0	11.0	3.2	3.4	3.4
Kentucky	90,281	615	704	1,144.7	7.8*	4.6	3.4	3.4
Louisiana	25,652	143	166	1,160.8	6.4*	1.3	0.8	0.8
Maine	5,776	62	75	1,209.6	13.0	0.3	0.3	0.4
Maryland	13,037	137	159	1,160.5	12.2	0.6	0.8	0.8
Massachusetts	5,258	44	48	1,090.9	9.1	0.2	0.2	0.2
Michigan	46,562	416	473	1,137.0	10.2	2.4	2.3	2.3
Minnesota	75,079	1,086	1,226	1,128.9	16.3*	3.9	6.1	6.0
Mississippi	31,998	185	213	1,151.4	6.6*	1.6	1.0	1.0
Missouri	98,082	739	847	1,146.1	8.6*	5.0	4.2	4.1
Montana	22,821	305	342	1,121.3	15.0*	1.2	1.7	1.6
Nebraska	52,923	663	744	1,122.2	14.0*	2.7	3.7	3.6
Nevada	2,890	39	48	1,230.8	16.6*	0.2	0.2	0.2
New Hampshire	2,445	27	33	1,222.2	13.5	0.1	0.2	0.2
New Jersey	9,079	72	96	1,333.3	10.6	0.4	0.4	0.4
New Mexico	14,279	116	137	1,181.0	9.6	0.7	0.6	0.6
New York	32,306	498	590	1,184.7	18.2*	1.6	2.8	2.8
North Carolina	51,854	348	417	1,198.2	8.0*	2.6	2.0	2.0
North Dakota	31,123	434	488	1,124.4	15.6*	1.6	2.4	2.4
Ohio	70,711	597	657	1,100.5	9.2*	3.6	3.4	3.2
Oklahoma	66,937	484	540	1,157.0	8.0*	3.4	2.7	2.6
Oregon	31,892	247	280	1,133.6	8.8*	1.6	1.4	1.4
Pennsylvania	44,870	543	608	1,119.7	13.6*	2.3	3.0	3.0
Rhode Island	649	5	6	1,200.0	9.2	0.0	0.0	0.0
South Carolina	20,242	117	149	1,273.5	7.4*	1.0	0.6	0.7
South Dakota	34,057	522	582	1,114.9	17.0*	1.8	2.9	2.8
Tennessee	75,076	457	508	1,111.6	6.8*	3.9	2.6	2.4
Texas	180,644	1,038	1,181	1,137.8	6.5*	9.4	5.8	5.8
Utah	13,520	188	221	1,175.5	16.3*	0.7	1.0	1.0
Vermont	5,436	92	108	1,173.9	19.8*	0.2	0.5	0.5
Virginia	42,222	331	385	1,163.1	9.1*	2.2	1.8	1.8
Washington	30,264	302	371	1,228.4	12.2*	1.6	1.7	1.8
West Virginia	17,020	122	137	1,123.0	8.0*	0.8	0.6	0.6
Wisconsin	67,959	1,361	1,576	1,158.0	23.2*	3.5	7.6	7.7
Wyoming	8,716	165	194	1,175.8	22.2*	0.4	0.9	0.9

* Significantly different from the U.S. average at the 95-percent confidence level.

Source: Calculated by ERS using data from the 1992 *Census of Agriculture*.

Appendix table 2—Nonfatal injuries to hired workers on U.S. farms by State, 1992

State	Farms				Number of injuries					Percent			
	With hired labor expenditures	With injuries	Number of hired workers	Hired labor expenditures (\$1,000)	Total injuries	Per 1,000 farms with injuries	Per 1,000 farms with hired labor expenditures	Per 1,000 workers	Per \$1,000,000 of labor expenditures	Total farms	Farms with injuries	Injuries	Workers
Total U.S.	693,011	18,014	3,801,878	12,961,640	44,383	2,463.8	64.0	11.6	3.4	100.0	100.0	100.0	100.0
Alabama	12,754	157	43,903	140,414	431	2,745.2	33.8*	9.8*	3.1*	1.84	0.87	0.97	1.15
Alaska	188	7	1,094	3,928	20	2,857.1	106.4*	18.7*	5.1	0.02	0.04	0.04	0.02
Arizona	2,946	299	34,361	190,442	734	2,454.8	249.2*	21.4*	3.8*	0.42	1.66	1.65	0.90
Arkansas	15,422	250	52,586	223,124	368	1,472.0*	23.8*	7.0*	1.6*	2.22	1.38	0.82	1.38
California	38,347	3,436	677,894	2,922,390	11,568	3,366.7*	301.6*	17.0*	4.0*	5.53	19.07	26.06	17.83
Colorado	9,137	363	46,424	209,675	703	1,936.6*	76.9*	15.1*	3.4	1.32	2.02	1.58	1.22
Connecticut	1,001	78	11,416	77,980	422	5,410.2*	421.6*	37.0*	5.4*	0.14	0.43	0.95	0.30
Delaware	946	19	4,730	23,911	33	1,763.8	34.8*	7.0*	1.4*	0.14	0.10	0.07	0.12
Florida	13,151	906	161,047	937,571	5,220	5,766.6*	396.9*	32.4*	5.6*	1.90	5.02	11.76	4.24
Georgia	13,720	228	64,584	252,721	480	2,105.2	35.0*	7.4*	1.9*	1.98	1.26	1.08	1.70
Hawaii	1,447	112	14,745	178,788	1,017	9,080.4*	702.8*	69.0*	5.7*	0.20	0.62	2.29	0.38
Idaho	10,005	354	72,231	245,990	637	1,799.4*	63.6	8.8*	2.6*	1.44	1.96	1.44	1.90
Illinois	25,398	413	83,976	300,090	722	1,748.2*	28.4*	8.6*	2.4*	3.66	2.29	1.62	2.20
Indiana	19,252	269	65,334	209,089	547	2,033.4	28.4*	8.4*	2.6*	2.78	1.49	1.23	1.72
Iowa	36,520	401	107,178	259,210	553	1,379.0*	15.1*	5.2*	2.1*	5.27	2.22	1.24	2.82
Kansas	21,093	253	59,519	239,629	474	1,873.5*	22.4*	8.0*	2.0*	3.04	1.40	1.06	1.56
Kentucky	39,979	532	199,785	202,545	901	1,693.6*	22.5*	4.5*	4.4*	5.76	2.95	2.03	5.25
Louisiana	10,361	255	41,456	146,667	407	1,596.0*	39.2*	9.8*	2.8*	1.50	1.42	0.92	1.09
Maine	2,485	89	22,951	61,086	215	2,415.7	86.5*	9.4*	3.5	0.36	0.49	0.48	0.60
Maryland	4,875	127	20,453	93,631	256	2,015.7	52.5*	12.5	2.7*	0.70	0.70	0.58	0.54
Massachusetts	1,847	95	12,469	77,337	216	2,273.6	116.9*	17.3*	2.8*	0.26	0.52	0.48	0.32
Michigan	15,908	454	104,424	318,276	861	1,896.4*	54.1*	8.2*	2.7*	2.30	2.52	1.94	2.74
Minnesota	28,275	391	104,180	261,649	577	1,475.7*	20.4*	5.5*	2.2*	4.08	2.17	1.30	2.74
Mississippi	11,373	189	41,085	168,464	357	1,888.8	31.4*	8.6*	2.1*	1.64	1.04	0.80	1.08
Missouri	26,290	295	73,856	190,051	429	1,454.2*	16.3*	5.8*	2.2*	3.79	1.64	0.96	1.94
Montana	8,191	319	27,837	107,632	442	1,385.6*	54.0*	15.8*	4.1*	1.18	1.77	1.00	0.73
Nebraska	19,889	302	63,401	254,132	626	2,072.8	31.4*	9.8*	2.4*	2.87	1.68	1.41	1.66
Nevada	1,143	93	5,758	31,652	256	2,752.6	224.0*	44.4*	8.1*	0.16	0.52	0.58	0.15
New Hampshire	885	44	4,534	21,601	79	1,795.4	89.2*	17.4*	3.7	0.12	0.24	0.18	0.12
New Jersey	2,659	127	22,541	115,161	222	1,748.0	83.4*	9.8*	1.9*	0.38	0.70	0.50	0.59
New Mexico	5,597	143	27,742	115,633	280	1,958.0	50.0*	10.0*	2.4*	0.80	0.79	0.63	0.72
New York	12,903	602	66,082	336,461	1,033	1,715.9*	80.0*	15.6*	3.1*	1.86	3.34	2.32	1.73
North Carolina	21,919	434	153,796	388,338	825	1,900.9*	37.6*	5.4*	2.1*	3.16	2.40	1.86	4.04
North Dakota	11,895	142	38,975	99,790	170	1,197.2*	14.2*	4.4*	1.7*	1.72	0.78	0.38	1.02
Ohio	20,559	426	83,023	259,501	818	1,920.2*	39.8*	9.8*	3.2*	2.96	2.36	1.84	2.18
Oklahoma	20,070	255	53,195	144,750	582	2,282.4	29.0*	10.9	4.0*	2.90	1.42	1.31	1.40
Oregon	11,480	602	120,706	367,047	1,342	2,229.2	116.9*	11.1	3.7*	1.66	3.34	3.02	3.17
Pennsylvania	14,447	448	67,085	352,456	1,321	2,948.6	91.4*	19.7*	3.7*	2.08	2.48	2.98	1.76
Rhode Island	237	9	1,335	9,076	11	1,222.2	46.4	8.2	1.2*	0.03	0.05	0.02	0.04

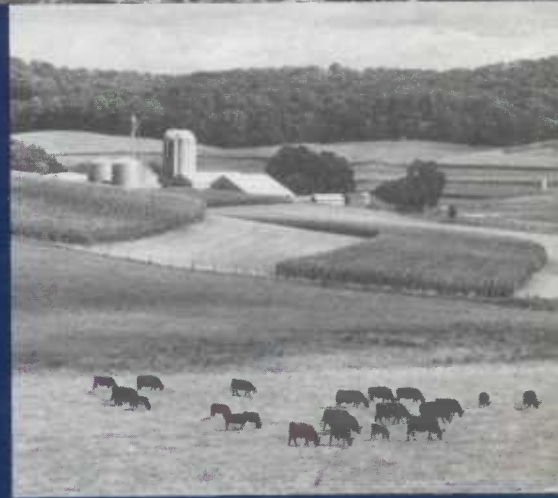
continued--

Appendix table 2—Nonfatal injuries to hired workers on U.S. farms by State, 1992 (cont.)

State	Farms				Number of injuries					Percent			
	With hired labor expenditures	With injuries	Number of hired workers	Hired labor expenditures (\$1,000)	Total injuries	Per 1,000 farms with injuries	Per 1,000 farms with hired labor expenditures	Per 1,000 workers	Per \$1,000,000 of labor expenditures	Total farms	Farms with injuries	Injuries	Workers
South Carolina	6,958	136	38,126	111,836	266	1,955.8	38.2*	7.0*	2.4*	1.00	0.75	0.60	1.00
South Dakota	12,699	140	33,911	95,956	169	1,207.1*	13.3*	5.0*	1.8*	1.83	0.78	0.38	0.89
Tennessee	25,662	268	172,295	138,434	381	1,421.6*	14.8*	2.2*	2.8*	3.70	1.48	0.86	4.53
Texas	57,952	1,079	204,022	729,915	2,377	2,203.0	41.0*	11.6	3.3*	8.36	5.99	5.36	5.36
Utah	5,860	103	26,122	72,014	207	2,009.7	35.3*	7.9*	2.9*	0.84	0.57	0.46	0.68
Vermont	2,508	110	8,501	38,323	143	1,300.0*	57.0	16.8*	3.7	0.36	0.61	0.32	0.22
Virginia	16,358	381	70,297	188,671	684	1,795.2*	41.8*	9.7*	3.6	2.36	2.12	1.54	1.84
Washington	14,145	1,159	250,934	601,614	2,874	2,479.7	203.2*	11.4	4.8*	2.04	6.43	6.48	6.60
West Virginia	5,179	72	17,474	26,956	134	1,861.1	25.8*	7.6*	5.0*	0.74	0.40	0.30	0.46
Wisconsin	27,681	474	109,444	362,356	737	1,554.8*	26.6*	6.7*	2.0*	3.99	2.63	1.66	2.88
Wyoming	3,416	174	13,061	57,677	256	1,471.2*	74.9*	19.6*	4.4*	0.49	0.96	0.58	0.34

* Significantly different from the U.S. average at the 95-percent confidence level.

Source: Calculated by ERS using data from the 1992 Census of Agriculture.



United States Department of Agriculture
Economic Research Service
1800 M Street, NW
Washington, DC 20036-5831