

Pennsylvania Farm Fatalities During 2010-2014



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Penn State EXTENSION

This publication is the seventh in a series of five-year summaries of Pennsylvania farm fatalities. The first six publications were Pennsylvania Farm Fatalities During 1980-84 (Special Circular 319), Pennsylvania Farm Fatalities During 1985-89 (Extension Circular 390), Pennsylvania Farm Fatalities During 1990-94 (Extension Circular 424), Pennsylvania Farm Fatalities During 1995-99, Pennsylvania Farm Fatalities During 2000-2004, and Pennsylvania Farm Fatalities During 2005-2009. The data summarized in this report come from death certificates provided by the Pennsylvania Department of Health's Office of Vital Statistics, police and coroner investigative reports, a newspaper and media clipping service, and reports of farm-related injury incidents by county agricultural and extension educators and rural volunteer emergency medical service (EMS) providers. Multiple sources of information to clarify details of potential cases were used for each case before it was entered into the database. Penn State's Institutional Review Board (IRB) and the Pennsylvania Department of Health have approved the procedures for collecting and storing the injury data.

- There were 141 farm-related fatality incidents during the 2010-2014 five-year period. This is slightly less than the number that occurred during the prior five-year period (145 in 2005-2009).
- The percentage of occupational related fatalities increased from 55% (2005-2009) to 65% between 2010 and 2014. Of the incidents that occurred to adults aged 65 and over, 74% were killed during farm production work. For children less than 5 years of age, 62.5% of the deaths resulted from exposure to farm equipment, tools and product hazards while not actively engaged in farm work.
- The death rate has not changed appreciably (4.6 to 4.7 deaths per 10,000 farms) over the past three reports.
- The fatality rate per year over the past 5 years averaged 34.5 per 100,000 farm household residents.
- Deaths mostly occurred in the afternoon and in summer months.
- Eighty-eight percent of the all injury deaths were to males.
- Children aged 14 and under and adults aged 65 and over accounted for 71 of the 141 fatalities (50.4%). This result is consistent with previous summary reports.
- The leading sources of the fatalities were vehicles (primarily tractors at 52%; machinery (17%); person, plants, animals, and minerals (14%); structures and surfaces (6%); and others (e.g., containers, parts and materials, tools, instruments, chemicals).

CLASSIFYING FARM FATALITIES

The Farm and Agricultural Injury Classification (FAIC) code was established to ensure greater consistency in coding injury incidents related to farms and agriculture. The FAIC Code was adopted by the American Society of Agricultural Engineers (ASAE) – Ergonomics, Safety, and Health Division in 1998, revised in 2002, and revised editorially in 2007. The FAIC code is a classification system that:

- parallels, to the extent appropriate, current nationally established methods for classifying and assigning work-related injury cases to an industry sector;
- provides a systematic scheme for separating farm production work cases from non-farm and non-farm production work cases; and
- allows for identification of cases that reflect unique situational exposures prevalent in the production agriculture industry, for example, children in work environments.

Table 1 identifies the FAIC code categories and provides the number of fatality cases in each category from 2010-2014. FAIC code categories are further explained in the Appendix. Four fatality cases could not be categorized because of a lack of detailed information although the information available did indicate that they were farm or agriculturally-related.

Table 1. Fatalities by Farm and Agricultural Injury Classification Code in Pennsylvania: 2010-2014

FAIC Category	Number of fatalities
Occupational related	
FAIC-01. Farm production work	90
FAIC-02. Agricultural services	-
FAIC-03. Forestry	-
FAIC-04. Fishing, hunting, trapping	1
Total occupational related deaths	91
Non-occupational/Farm Lifestyle	
FAIC-05. Worksite exposure: workers, outside services	6
FAIC-06. Farm hazard exposure: equipment, tools and products	22
FAIC-07. Farm hazard exposure: structures and landscape	6
FAIC-08. Farm hazard exposure: animals	3
FAIC-09. Farm hazard exposure: roadway accident	9
Total non-occupational deaths	46
Undetermined	4
Total	141

Of the 141 fatalities from 2010 through 2014, 64.5% (n=91) were occupational (FAIC-01 through FAIC-04), 32.6% (n=46) were non-occupational (FAIC-05 through FAIC-09), and 2.8% (n=4) lacked sufficient information to make a FAIC code determination. The majority of the occupational deaths were associated with production agriculture work (99%, FAIC 01). There were no fatalities in the FAIC-02 and FAIC-03 categories.

The majority of non-occupational fatalities (22 cases, 47.8%) were during an activity involving agricultural equipment, tools, and products (FAIC-06). Many of these incidents were connected to farm production operations even though the victim was not directly working in a production activity (e.g., run over by tractor, overturned tractor during dragging a tree for cutting firewood, crushed under a falling gate, suffocated under grain while riding in grain wagon, etc.). Six cases (4.3%) occurred to a worker who provided services on a farm (FAIC-05) and another six cases (4.3%) were related to farm structures and landscapes (FAIC 07), e.g., drowning in a farm pond, suffocation in a feed bin, falling into a manure pit, etc. There were three non-occupational animal-related incidents (FAIC-08). Nine non-occupational fatalities (6.4%) occurred as a result of roadway traffic (FAIC-09).

The 65% of occupational-related fatalities during the 2010-2014 period was higher than recent reporting periods: 55% during 2005-2009, 52% during 2000-2004, 43% during 1995-1999, and 50% during 1990-1994.

FARM WORK FATALITY RATES

Table 2 presents the number of fatalities and the death rate per 10,000 farms each year during 2010-2014. The number of deaths varied between 25 and 37. Table 2 also presents the five-year average over the past 35 years. Overall, the average death rate per 10,000 farms has declined over the past 30 years. The death rate declined unsteadily from a high of 8.4 deaths per 10,000 farms in 1980-1984 to a low of 4.6 deaths per 10,000 farms in 2000-2004. This overall downward trend is illustrated in Table 2.

Table 2. Farm Fatality Rates per 10,000 Farms

Year	No. of Farms	Deaths	Death Rate Per 10,000 Farms
2010	62,700	26	4.2
2011	62,200	25	4.0
2012	62,100	28	4.5
2013	59,300	37	6.2
2014	58,800	25	4.3
5 year average			
2010-2014	61,020	28.2	4.6
2005-2009	61,000	29.0	4.7
2000-2004	58,000	27.0	4.6
1995-1999	59,000	41.0	6.9
1990-1994	55,000	42.0	7.6
1985-1989	56,000	38.8	6.9
1980-1984	60,000	50.6	8.4

GENERAL DESCRIPTIVE DATA

Nearly all fatal injury incidents generate information that can be used to describe general trends and enhance understanding of when, where, how, and to whom farm and agricultural injury occurs. Such details as the victim’s age, the activity he or she was engaged in, and the time the incident occurred are necessary for effective injury prevention planning. Several tables and figures are presented to give readers an overall picture of Pennsylvania farm and agricultural fatality incidents.

Table 3 shows the number of farm fatalities by three-hour intervals and by the days of the week, as well as the percentage that each contributed to the total number of incidents. Two-thirds (66.7%) of the incidents occurred between 6:01 A.M. and 6:00 P.M, with a majority of these incidents occurring between noon and 6:00 P.M. The time of injury was undetermined for less than one-fifth of the fatalities (17.7%). Fatal incidents occurred most often on Tuesday and Sunday with 17% each.

Table 3. Fatalities by Injury Time and Day of the Week

Time	Day/Number of fatalities							% Total
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	
12:01am-6:00am	0	0	0	0	0	2	0	1.4
6:01am-9:00am	0	1	3	3	1	1	0	6.4
9:01am-12:00pm	2	3	3	4	3	4	2	14.9
12:01pm-3:00pm	3	3	2	2	4	3	5	15.6
3:01pm-6:00pm	7	4	5	6	4	7	9	29.8
6:01pm-9:00pm	2	4	2	4	2	0	2	11.3
9:01pm-12:00am	0	2	1	0	0	1	0	2.8
Undetermined	0	7	2	3	4	3	6	17.7
% Total	9.9	17.0	12.8	15.6	12.8	14.9	17.0	100.0

Figure 1 shows the number of fatality cases by the month in which they occurred. Summer is a peak time for farm fieldwork. Summer is also the season when children and adolescents are out of school and are more exposed to farm hazards. A larger number of fatalities would be expected during this time of the year. During 2010-14, more fatalities occurred during the month of July than during any other month of the year. The data show that there were 22 fatalities in July, followed by August with 16 fatalities.

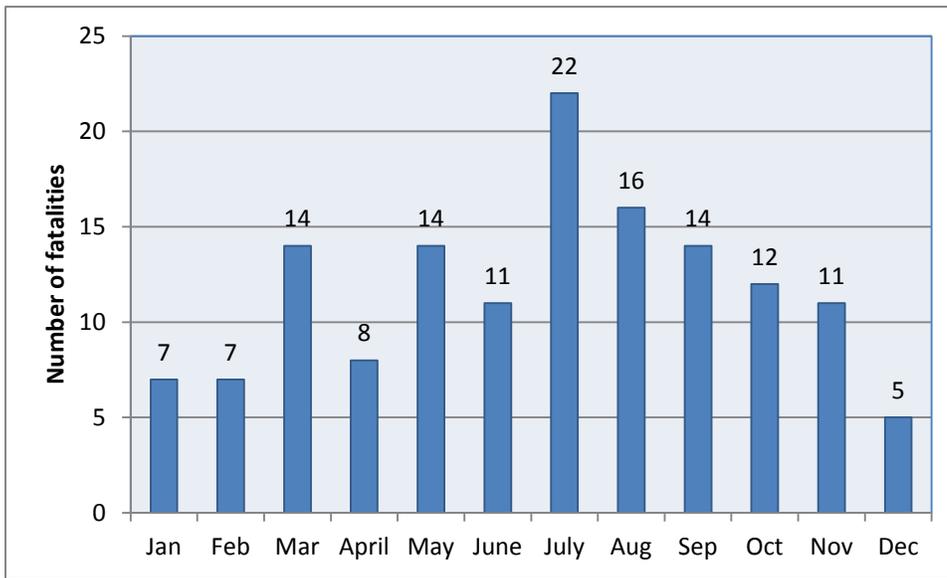


Figure 1. Number of Fatalities by Month

DEMOGRAPHICS

Of the total 141 fatalities, 88% were to males and 12% were to females. Victims` ages ranged from 1 to 95 years old with the mean of 50 years (median=54). The percentage of fatalities by age groups, the estimated percentage of farm household residents by age groups, and the fatality rate per 100,000 farm household residents are presented in Figure 2. The National Institute of Occupational Safety and Health (NIOSH) works with the USDA`s National Agricultural Statistics Service (NASS) to generate estimates of rates of agricultural injury by farm household populations by state. These data provided age and gender specific farm household population estimate for PA in 2012 (n= 81,732). We used the 2012 Pennsylvania population estimate across all five years to develop an estimated five-year fatality rate per 100,000 farm household population, thus our five-year average estimate maybe over or under estimated slightly.

The average fatality rate over the five-year period was 34.5 per 100,000 farm household residents. The NIOSH population data for 20-24 and 25-29 years age groups were combined to meet confidentiality reporting requirements. The smaller intervals in age groups help identify unique factors associated with farm and agricultural injury. Notably, fatal work injury is rare in non-agriculture industries to workers under 15 years of age or over 65 years of age. One-third of the fatalities in Pennsylvania were in the 65 and over age group (34%) while this group was only 22.6% of the farm household population. Fifteen percent of the fatalities were to those 14 and under. Among the victims 14 and under, 6% of all fatalities occurred to those 0 to 4 years old while this age group was only 4% of the farm household population.

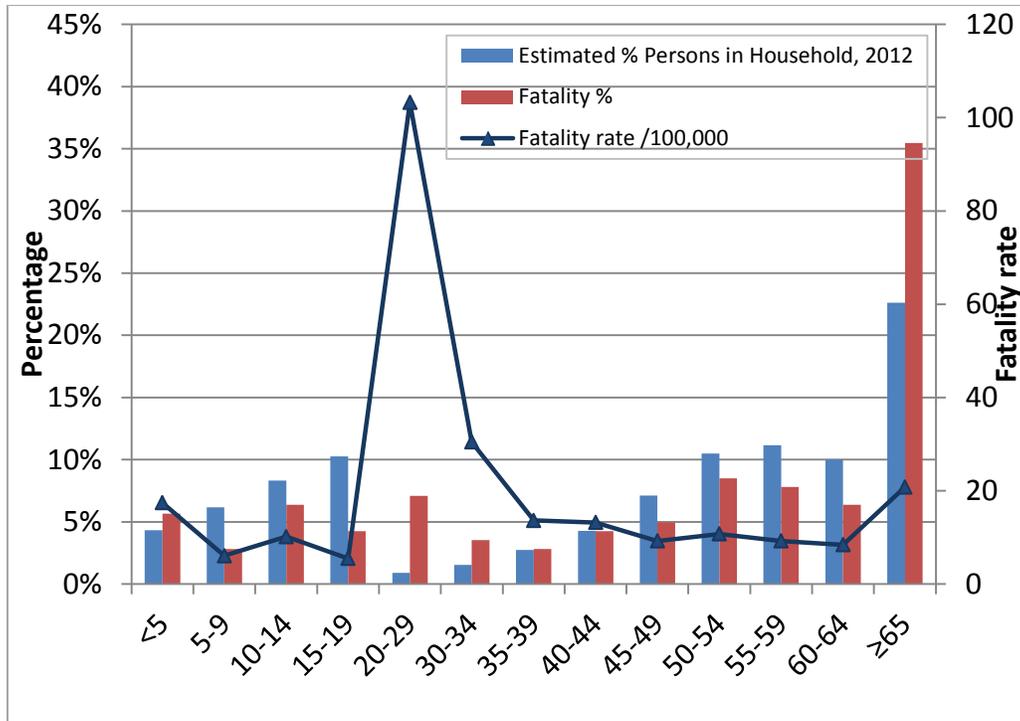


Figure 2. Annual Fatality Rate, Percentage Household, and Percentage of Fatality by Age Group in PA

Children aged 14 and under and adults aged 65 and over accounted for 71 of the 141 fatalities (50.4%). This result is consistent with previous summary reports. For example these two age groups accounted for 47.6% of the deaths in 2005-2009, 51.5% of the deaths in 2000-2004, and 50.2% during the 1995-1999 period.

Children age 14 and under and workers age 65 and over are usually not found in hazardous occupations. There were 21 fatalities to victims aged 14 and under and 50 fatalities to the victims aged 65 and over (Table 4). Children age 14 and under often are untrained, inexperienced, not closely supervised, and emotionally and physically immature. On the other hand, the ability of aged workers to respond to danger often is limited as effects of aging, such as slower reactions or decreased physical mobility, begin to have a pronounced influence on risk and hazard avoidance. The data suggest adults aged 65 and over were 2.4 times more likely to be involved in a fatality than a child aged 14 or under during the 2010-14 period. At the same time, children under 5 years of age were one of the age groups frequently involved in a fatality.

Table 4 cross-classifies the age of victims by FAIC code categories. The table highlights how some types of farm- and agricultural-related fatal injury incidents largely affect specific age groups. For instance, of the incidents that occurred to children less than 5 years of age, 62.5% of the deaths (5 of 8) resulted from exposure to farm equipment, tools and

products while not actively engaged in farm work (FAIC-06). Of the incidents that occurred to all children aged 14 and under, 28.6% (6 of 21) lost their life during farm production work (FAIC-01). On the other hand, of the incidents that occurred to adults aged 65 and over, 74% (37 of 50) were killed during farm production work (FAIC-01). These results are consistent with results from the 2005-09 report. The FAIC code could not be determined in four cases.

Table 4. Fatalities by Age of Victim

Age	FAIC Code								
	Total	1	4	5	6	7	8	9	Undetermined
0-4	8				5	3			
5-9	4			1	2		1		1
10-14	9	6			1			1	
15-19	6	6							
20-24	6	3					1	2	
25-29	4	3		1					
30-34	5	1			1	1	0	2	
35-39	4	2	1	1					
40-44	6	3		1		1	1		
45-49	7	5		1	1				
50-54	12	8		1	2			1	2
55-59	11	7			1			1	
60-64	9	9							
65-69	10	9			1				
70-74	8	6			2				
75-79	13	11			1			1	1
80 and over	19	11			5	1		1	
Total	141	90	1	6	22	6	3	9	4

PRIMARY SOURCE OF INJURY

Farm and agriculturally-related fatalities were coded according to the Occupational Injury and Illness Classification System (OIICS) Version 2.01- U.S. Department of Labor, Bureau of Labor Statistics-BLS. The OIICS is used nationally to code all types of unintentional occupational injury in the United States. Category and sub-category titles are very generic and not always intuitive in the context of a specific field of work. In the data presented here, the most unusual categorization is the inclusion of hay bales in the ‘Containers’ category. We use the OIICS because it allows a comparison of Pennsylvania data with data from other occupational cohorts.

Each fatality case was carefully assigned a primary and/or secondary injury source code based on OIICS selection rules and code descriptions. The primary source of the injury, and when applicable, the secondary source of injury, were determined from the incident description. The primary injury source code is designed to capture “the object, substance, element, or bodily motion, which directly produced the injury.” For example, one incident description reads,

“During repairs, mower fell from blocks, running tractor engaged in gear and dragged the victim.” The primary source in this case would be the tractor and the mower would be the secondary source. The use of these codes allows comparison of our state data with other states, or regional or national data, that also use these source codes to track fatal farm and agricultural injury.

The leading sources of the fatalities were vehicles, which contain the subgroup tractors (52%); machinery (17%); person, plants, animals and minerals (14%); structures and surfaces (6%); and others (Table 5). Overall, tractors-PTOs were the major source of injury, accounting for 38% of all fatalities.

The secondary source is defined as “the object, substance, or person that generated the source or contributed to the event or exposure” (BLS, 2012). A secondary source was involved in (or identifiable) for 25% (35 of 141) of all incidents. Among those incidents with a secondary source, the distribution was vehicles (22.9%); structures and surfaces (14.3%); persons, plants, animals and minerals (28.6%); and machinery (17.1%). The tractors-PTOs category was the secondary source for four fatalities. Thus, tractor-related fatalities were associated with 58 of 141, or 41% of all fatal incidents as either a primary (54) or secondary source (4).

Table 5. Sources and Description of Fatalities

Primary Source	Secondary Source	Description of Incident
MACHINERY (N=24, 17.0%)		
Agricultural and garden machinery (N=15, 10.6%)		
Agricultural and garden machinery	Mammals, except humans	Youth fell from farm equipment (cart) being pulled by team of mules.
		Farm implement fell off blocks while decedent was working beneath.
Harvesting and threshing machinery		Victim pulled into forage blower/recutter while feeding corn through the machine.
		Run over by baler while trying to jump onto hay wagon during harvest.
		Decedent pulled into large hay baler.
		Decedent, attempting to unclog machine, became caught in auger of corn combine.
Mowing machinery		Bush hog mower fell on victim during repairs.
		Bush hog type mower fell on victim during repairs.
		Victim crushed by bush hog mower deck that fell onto him during repairs.
Plowing, planting, and fertilizing machinery		Child playing under soil spreader started machine and was pinned inside.
	Mammals, except humans	Victim fell from disk pulled by mules and was run over.
Other agricultural and garden machinery	Agricultural buildings	Victim pinned between moving wagon and barn.
		Child fell into grain mixer.
		Owner of custom feed grinding truck pinned in machinery during repairs.
		Victim caught in PTO of feeding equipment.
Construction, logging, and mining machinery (N=6, 4.3%)		
Loaders		Fully raised skid steer bucket fell onto victim who was working next to the machine.
		Victim pinned between bucket and skid steer frame while moving hay bales.
		Victim was backed over by skid steer as he drove horse and cart behind the skid steer.
		While working on skid steer, bucket fell onto victim.
	Tires, inner tubes, wheels	Skid steer tire exploded while using ether to seal bead during tire repair.
	Manure pits	Skid steer tipped into manure pit submerging victim.
Material and personnel handling machinery (N=3, 2.1%)		
Conveyors—powered	Tank, bin, vat interiors	Victim caught in silo unloader auger.
	Electric parts	Victim came into contact with power lines while helping to roll a grain auger into place.
Elevators, hoists, aerial lifts, personnel platforms—except truck-mounted		Mechanical lift used to work on barn roof toppled over throwing the decedent to the ground from a 20 ft. height.

Table 5 continued...

Primary Source	Secondary Source	Description of Incident
VEHICLES (N=73, 51.8%)		
Highway vehicles, motorized (N=12, 8.5%)		
Passenger vehicles— automobiles, buses, and passenger vans	Tractors, PTOs	Collided head-on with another vehicle while trying to pass a farm tractor.
		Decedent fixing fence alongside roadway struck by vehicle operated by intoxicated driver.
	Tractors, PTOs	Decedent's vehicle crossed highway center line for unknown reason and struck sheared off tire of farm tractor causing death.
	Tractors, PTOs	Victim's car traveled in middle lane of road crashing into a farm tractor hauling a planter, and then crashed head-on with oncoming vehicle.
	Tractors, PTOs	Victim's vehicle crossed center line of highway and struck farm tractor and feed mixer and was ejected from automobile.
Trucks—motorized freight hauling and utility		Deaf child crawled under milk tank truck and was crushed when unsuspecting driver pulled away.
		While working beneath large farm truck, truck moved and rolled over victim.
	Horse-drawn carriage, buggy	Delivery truck struck Anabaptist horse drawn buggy from rear.
	Vehicle doors, lift gates, tailgates	Dump truck tailgate fell on victim during repair work.
		Decedent fell from top of tractor trailer bed while filling with grain.
		Tractor trailer hit Anabaptist horse and buggy and family.
Animal- and human- powered vehicles (N=1, 0.7%)		
Horse-drawn carriage, buggy		Fell from buggy while doing farm chores. Died 11 days later.
Off-road and industrial vehicles—powered (N=58, 41.1%)		
Tractors, PTOs		Bush hogging too close to road embankment; tractor rollover.
		Child passenger on tractor fell beneath wheel.
		Child seated on tractor, started tractor; was thrown underneath.
		Decedent was brush hogging a neighboring property on steep terrain when tractor rolled over.
		Helping to hitch mower to tractor, lost balance and fell. Tractor operator backed over him.
		Mowing hayfield and tractor overturned.
		Tractor incident, undetermined.
		Tractor overturn during field mowing with sickle bar mower.
		Tractor overturn while driving up steep hillside.
		Tractor overturn while pulling stump of storm damaged tree.
		Tractor pulling wagon load of hay on steep roadway skidded and overturned.
		Tractor ran over victim; crushed by tractor tire.
		Tractor rollover.
		Tractor rollover -road bank involved.
		Tractor rollover to the rear while pulling a downed tree.
		Tractor rollover when tractor hit a tree stump while bush hogging.
		Tractor rollover while doing front-end loader work near house.
		Farm owner mowing close to embankment when tractor rolled over.
		Unoccupied tractor drifted over victim who had got off the tractor.
		Victim fell off tractor and struck head.
	Victim was hit by farm tractor and wagons as she rode her bicycle to work.	
	While pulling a log, farm tractor flipped back pinning the victim.	

Table 5 continued...

Primary Source	Secondary Source	Description of Incident
Tractors, PTOs		Thrown from tractor and run over.
	Mowing machinery	Tractor rollover while mowing farm fields.
	Mowing machinery	When dismounting tractor, caught tractor into gear and was run over by bush hog.
	Agricultural and garden machinery	Decedent stumbled and fell over farm implement striking his head on the tractor due to uneven terrain.
	Mowing machinery	Decedent fell from tractor and was run over by bush hog.
		Due to unknown reasons tractor climbed farm lane embankment and rolled onto victim.
		During tree cutting task, victim backed tractor too close to stream bank and tractor overturned onto him.
		Fell from tractor while mounting it; transmission engaged during fall. Victim was not run-over.
		Infant passenger in an enclosed tractor cab fell against door, thrown from tractor and ran over.
		Malfunctioning tractor stalled, began to roll downhill backwards, roll-over resulted.
		Mowing farm field when tractor overturned.
		Parked tractor began to roll down slope and ran over victim working nearby. Brakes not set.
		Passenger in vehicle killed in motor vehicle collision with unmarked, unlighted tractor.
		Tractor began to roll forward as victim worked on hay rake. While trying to re-mount tractor was run over.
		Tractor left in neutral ran over victim who was opening gate.
		Tractor rollover during fence repairing task.
		Tractor rollover while clearing brush on a steep hillside field.
		Tractor rollover while moving soil.
		Tractor rollover while mowing on sloped ground near pond.
		Tractor rollover.
		Utility tractor at ski resort rolled down slope overturned onto victim.
		Victim pinned at the arm by tractor rollover, died 8 days later.
		Victim run over by tractor upon which he was working.
	Trees, logs, limbs	Crushed by runaway tractor victim was trying to stop while helping to move logs.
	Trees, logs, limbs	Deceased was clearing trees, branch knocked him from tractor which ran over him.
	Trees, logs, limbs	Tractor hit a tree stump along a logging road and rolled onto victim.
	Trees, logs, limbs	While dragging tree, farm tractor flipped backwards onto victim.
	Mowing machinery	During repairs, mower fell from blocks, running tractor engaged in gear and dragged victim.
Mowing machinery	Victim fell from tractor fender beneath bush hog mower.	
Structural elements, n.e.c.	Tractor with load struck concrete abutment; victim was thrown from the tractor which rolled onto him.	
Clothing and shoes	Decedent's clothing caught on gear lever. He was thrown from the tractor which was hooked to a silage bagger and was dragged beneath the spinning tire.	
Fire, flame, smoke	Tractor overturn while raking hay. Victim pinned and burned.	
Off-road passenger vehicles—powered		ATV overturn while riding on forested hillside.
		ATV rollover during spraying of property line.
		Decedent spraying weeds with ATV which overturned onto him.

Table 5 continued...

Primary Source	Secondary Source	Description of Incident	
Industrial vehicles, material hauling and transport—powered	Trucks—motorized freight hauling /utility	Victim left forklift while unloading a truck and forklift began to move pinning him between it and the truck.	
Plant and industrial vehicles—non-powered (N=2, 1.4%)			
Wagon		Run over by wagon while harvesting/loading hay in the field.	
	Mammals, except humans	Struck by horse pulled wagon.	
PERSONS, PLANTS, ANIMALS, AND MINERALS (N=19, 13.5%)			
Animals (N=6, 4.3%)			
Mammals, except humans		Attacked by a bull in barnyard.	
		Fell while attending to a horse.	
		Horse related incident during farm work.	
		Pony kicked child in throat. Child was unable to breathe.	
		Rider thrown from horse while training.	
	Trees, logs, limbs	Dragged by horse 400 yards and struck tree.	
Person—injured or ill worker (N=1, 0.7%)			
Person—injured or ill worker		Farm related accidental hanging.	
Plants, trees, vegetation—not processed (N=12, 8.5%)			
Cash grain crops	Wagon	Suffocated under grain while riding in grain wagon.	
Trees, logs, limbs		Decedent found with 10-15 inch tree lying across him; Had been cutting trees and overgrowth from wood line. Died two days later.	
		Decedent struck by falling tree during farm property maintenance.	
		Removing large tree from blocking a road with front end loader. Branch snapped off and struck victim in head.	
		Struck by falling limb being pulled on by tractor and chain by another operator.	
		Tree fell on decedent during cutting operation.	
		Tree fell on victim during firewood harvest.	
		While dragging a tree from the woods, the decedent's tractor brushed against a dead tree which fell on him.	
	Tractors, PTOs		Large limb fell on victim as he used a farm tractor to move logs he had cut.
			Victim was using tractor to pull down a wedged tree when a second tree fell on him.
			Tree being pushed by tractor and bucket swung back over bucket and struck decedent.
	Mammals, except humans	Victim struck head on tree while horseback riding.	
STRUCTURES AND SURFACES (N=9, 6.4%)			
Confined spaces (N=4, 2.8%)			
Manure pits		Child fell into manure pit and drowned.	
		Victim fell into manure pit and drowned.	
Tank, bin, vat interiors		Decedent entered recently filled silo; asphyxiated lack of oxygen.	
		Fall from silo; struck head.	
Buildings—office, plant, residential (N=2, 1.4%)			
Agricultural buildings		Construction worker fell from trusses of new barn construction.	
		Decedent fell from barn bridge wall and died one month later from complications.	
Other structural elements (N=1, 0.7%)			
Roofs		Fell from barn roof.	

Table 5 continued...

Primary Source	Secondary Source	Description of Incident
Floors, walkways, ground surfaces (N=2, 1.4%)		
Floors		Retired farmer fell through hay hole to lower level of barn while assisting in farm work.
		Worker using pressure washer fell through floor opening to a lower level.
PARTS AND MATERIALS (N=3, 2.1%)		
Machine, tool, and electric parts (N=1, 0.7%)		
Electric parts		Electrocuted while trying to repair manure handling equipment.
Vehicle and mobile equipment parts (N=2, 1.4%)		
Tires, inner tubes, wheels		Tractor tire and rim leaning against barn wall fell on child playing in that area.
Trailers		Decedent fell from farm product trailer.
CONTAINERS, FURNITURE AND FIXTURES (N=6, 4.3%)		
Containers (N=6, 4.3%)		
Containers—non-pressurized	Mammals, except humans	Child knocked from a barrel on which he was sitting when team of horses spooked and knocked shelving which caused barrel to roll onto child.
Containers—variable restraint		Crushed by large compost hay bale.
		Hay bale fell on decedent while working for family member.
		Large hay bale fell on victim.
		Large round bale fell on victim causing asphyxiation.
		Large round bale of hay fell onto decedent.
CHEMICALS AND CHEMICAL PRODUCTS (N=2, 1.4%)		
Other chemicals (N=2, 1.4%)		
Other chemicals, n.e.c	Tank, bin, vat interiors	Victim overcome by silo gas and fell into silo.
Sewer, mine, and similar gases		2 year old inhaled manure gas and was overcome.
TOOLS, INSTRUMENTS, AND EQUIPMENT (N=1, 0.7%)		
Handtools—powered (N=1, 0.7%)		
Cutting handtools—powered		Chain saw injury. He was cutting trees with a chainsaw and he accidentally was cut by his chainsaw.
OTHER SOURCES (N=3, 2.1%)		
Environmental and elemental conditions (N=2, 1.4%)		
Temperature extremes—environmental		Worker overcome by heat (hyperthermia) while working in orchard.
Weather and atmospheric conditions		Struck by lightning while harvesting hay.
Other steam, vapors, liquids, ice (N=1, 0.7%)		
Liquids—nonchemical	Containers—nonpressurized	Child fell into watering trough and drowned.
NON-CLASSIFIABLE (N=1, 0.7%)		
		Farmer fell while building fence; died of complications several months later.

Table 6 lists the number and percentage of fatalities occurring to youth age 14 and under, teens and young adults ages 15-24, working adults ages 25-64, and to senior farmers age 65 and over by major category of primary source of the fatality. This helps to identify differences in type of incidents among major age groups. For senior farmers, vehicles accounted for 73% of the fatalities. The second most prevalent category was machinery, which accounted for 12% of the fatalities in this age group. For youth age 14 and under, the majority of the fatalities were due to machinery (29%) or vehicles (24%). For young adults ages 15-24, machinery and vehicles totaled 75% of all fatalities in this age group. Working adults ages 25-64 were mostly killed by vehicles (48%) followed by persons, plants, animals, and minerals (mostly trees, logs, limbs). A significant percentage of cases were a result of machinery and vehicle related incidents for youth age 14 and under, teens and young adults ages 15-24, and to senior farmers age 65 and over.

Table 6. Fatality Primary Source Categories by Four Age Groups

Primary Source	14 and under		15-24		25-64		65 and over	
	No.	%	No.	%	No.	%	No.	%
Chemicals and chemical products	1	5%	1	8%	0	0%	0	0%
Containers, furniture and fixtures	1	5%	0	0%	4	7%	1	2%
Machinery	6	29%	5	42%	7	12%	6	12%
Parts and materials	1	5%	0	0%	2	3%	0	0%
Persons, plants, animals, and minerals	4	19%	1	8%	12	21%	2	4%
Structures and surfaces	1	5%	1	8%	4	7%	3	6%
Tools, instruments, and equipment	0	0%	0	0%	0	0%	1	2%
Vehicles	5	24%	4	33%	28	48%	36	73%
Other sources	2	10%	0	0%	1	2%	0	0%
Total	21	100%	12	100%	58	100%	49	100%

FATALITIES BY COUNTIES

The Commonwealth of Pennsylvania is comprised of 67 counties. The map in Figure 3 shows the number of fatalities and percentages by county. At least one fatality occurred in 53 of the 67 counties (84%) while twelve counties had 4 or more fatalities each. While a person may suspect that there may be more danger in these twelve counties, a fairer way to look at the data is to also identify the number of farms in these eight counties. Table 7 lists the counties where four or more fatalities occurred between 2010-14. These twelve counties had 55.3% of the fatalities but only 37.5% of the farms. Lancaster County had almost 16% of the deaths but has just under 10% of the farms.

Table 7. Counties with Four or More Fatalities

County	Fatalities		Farms	
	Number	Percent	Number	Percent
Berks	7	5.0%	2039	3.5%
Bradford	6	4.3%	1629	2.8%
Chester	5	3.5%	1730	2.9%
Cumberland	4	2.8%	1415	2.4%
Erie	4	2.8%	1422	2.4%
Franklin	4	2.8%	1596	2.7%
Indiana	4	2.8%	1166	2.0%
Juniata	4	2.8%	737	1.3%
Lancaster	22	15.6%	5657	9.6%
Mercer	4	2.8%	1185	2.0%
Westmoreland	6	4.3%	1274	2.2%
York	8	5.7%	2171	3.7%
Sub-total	78	55.2%	22021	37.5%
Others counties	63	44.8%	36779	62.5%
Total	141	100.0	58800	100%

FOR MORE INFORMATION

The Agricultural Safety and Health Program in the Department of Agricultural and Biological Engineering offers many fact sheets, publications, videotapes, CDs, DVDs, and educational programs to help prevent and control the types of fatal injury incidents described in this report. Most of these are available at <http://www.agsafety.psu.edu> or by contacting the department. Many are also available by contacting county Cooperative Extension offices (<http://extension.psu.edu/counties>).

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APPENDIX: FARM AND AGRICULTURAL INJURY CLASSIFICATION (FAIC) CODE

FAIC-1. Farm Production Work (NAICS 111, Crop Production; 112, Animal Production)

Victim engaged in work activity related to agricultural production. Examples include the following:

Persons using:

- tractors or machinery in farm work;
- all-terrain vehicles or horses for farm work;
- cars or trucks in a farm work activity (including transport of produce, delivery of products, travel to purchase supplies, etc.);
- farm structures for farm work (excluding home in most instances).

Persons working:

- on constructing or maintaining farm machines or structures (excluding hired contractors—see FAIC-5);

FAIC-2. Forestry and Logging (NAICS 113)

Victim engaged in work related to growing and harvesting timber on a long production cycle (e.g., of 10 or more years).

Examples include:

- timber tract operations;
- forest nurseries for re-forestation;
- gathering forest products;
- commercial logging, which includes cutting timber, cutting and transporting timber and producing wood chips in the field.

Also includes:

- intentional injuries occurring during occupational work-related activities.

Excludes:

- forest fire fighting—see FAIC-4;
- collecting maple sap—see FAIC-1;
- persons working for establishments primarily engaged in trucking timber (nonagricultural activity).

FAIC-3. Fishing, Hunting, and Trapping (NAICS 114)

Victim engaged in a work activity related to commercial fishing, hunting, or trapping (NAICS 114). These industries involve harvesting fish and other wild animals from their natural habitats and are dependent upon a continued supply of the natural resource.

Examples include:

- persons engaged in operation of fish and game retreats and preserves;
- commercial catching or taking of fish, finfish, shellfish, and other marine animals;
- commercial hunting and trapping.

Also includes:

- intentional injuries occurring during occupational work-related activity.

Excludes persons:

- injured on fish, frog, or other aquaculture farm or hatcheries—see FAIC-1.

FAIC-4. Agricultural and Forestry Support Activities (NAICS 115)

Victim engaged in work activity related to custom-hired and contracted services that are an essential part of agricultural and forestry production (NAICS 11511–115310).

Examples include:

- aerial dusting and spraying;
- cotton ginning;
- cultivating services;
- farm management services;
- planting crops;
- vineyard cultivation services;
- crop harvesting;
- breeding services for animal production;
- boarding horses;
- dairy herd improvement livestock spraying;
- estimating timber;
- forest firefighting; / forest pest control.

Also includes:

- intentional injuries occurring during occupational work related activity.

Excludes

- persons employed for nonagricultural services such as:
- veterinarians, except when they are primarily engaged in breeding services or boarding horses—see FAIC-5.

FAIC-5. Farm Hazard Exposure, Outside Services

Victim associated with a business or service and injured on a farm while providing services to the farm.

Examples include:

- veterinarians, except those primarily providing breeding services or boarding horses;
- farm machinery repairpersons;
- silo and grain bin erectors;
- builders and construction workers;
- electricians;
- feed salespersons;
- fire fighters and emergency medical technicians, etc.

Excludes:

- persons custom hired for agricultural work—see FAIC-4, Agricultural and Forestry Support Services.

FAIC-6. Farm Hazard Exposure, Nonworkers: Equipment, Tools, Objects, and Products

Victim engaged in an activity involving agricultural machines, equipment, tools, products, etc., but not related to farm production operations.

Examples include persons:

- using tractors to pull a stranded motorist from a ditch;
- operating tractors for a hayride;
- restoring old farm machines or tractors;
- operating a tractor at a tractor pull or county fair; using a tractor to pull vehicles at a mud bog race or other recreation activity;

- operating farm tractors for highway construction;
- using a tractor or chain saw to pull, cut or drag miscellaneous trees, brush, or logs, or to obtain firewood for the home.

Excludes:

- workers on racehorse farms—see FAIC-1;
- victims who were providing services at time of injury—see FAIC-7;
- victims injured while attending to animals at fairs or exhibitions if events support economic activity of farm—See FAIC-1.

FAIC-7. Farm Hazard Exposure, Nonworkers: Structures and Landscape

Victim not actively engaged in a work activity but injured as a result of exposure to hazards of farm structures and landscape.

Examples include:

- children playing on or around farm structures including barns, silos, holding tanks, etc.;
- youth playing on hay mow;
- persons climbing on silos or feed bins;
- children, aged persons or other individuals;
- unintentionally falling into farm ponds;
- persons using barns to store antique automobiles.

FAIC-8. Farm Hazard Exposure, Nonworkers: Animals

Victim not actively engaged in a work activity but injured as a result of exposure to agricultural animal hazards.

Examples include:

- children playing in or around animal pens;
- showing or working with animals at fairs for pleasure only;
- pleasure riding, handling horses or other animals;
- petting animals while visiting a farm or fair.

Excludes:

- victims injured while attending to animals at fairs or exhibitions if events support economic activity of farm—see FAIC-1.

FAIC-9. Farm Hazard Exposure: Roadway Collision

Victim not actively engaged in a work activity but injured as a result of collision with agricultural hazard on roadway.

Examples include:

- pedestrians;
- persons operating or riding as a passenger in a motor vehicle (car, truck, or motorcycle);
- person operating an all-terrain vehicle;
- person riding a pedal cycle;
- horses.

Excludes:

- persons using motor vehicles, ATVs, pedacycles, or horses for farm work activities- see FAIC-1, 2, 3 or 4.

**For questions, contact Dennis Murphy (djm13@psu.edu)
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