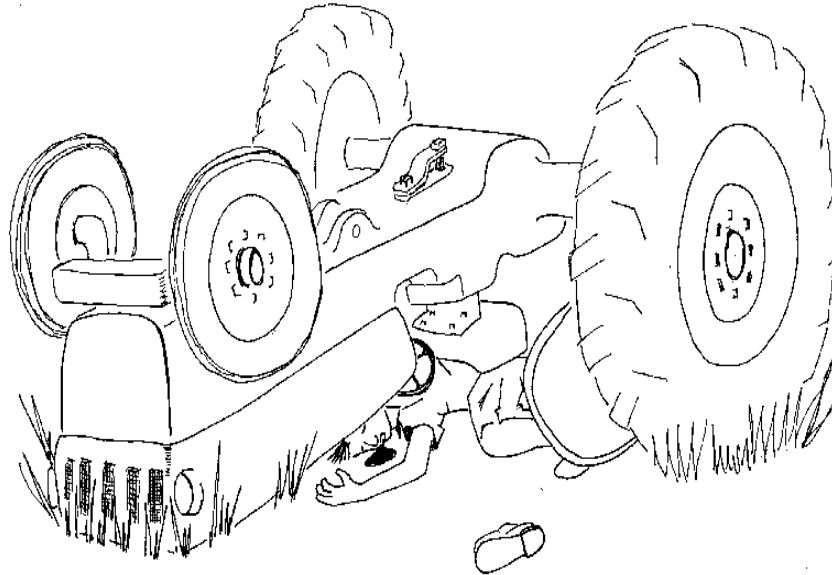


Facts about Tractor/Motor Vehicle Collisions



During a highway collision with a motor vehicle, a ROPS and seat belt can be the difference between life and death!

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Facts about Tractor/Motor Vehicle Collisions ¹

Deadly tractor/motor vehicle collisions are increasing in the United States for three reasons. First, more people are moving to the country and commuting to work in distant towns and cities.

Second, two-lane rural roads have been improved to permit high-speed driving. These improvements make the roads safer, but excessive speed creates hazards like those described in these materials, especially when highways run through farming communities.

Third, many farmers own or lease land not connected to their main farm. They have to drive farm equipment on public roadways to reach this land.

It appears that these collisions are becoming more deadly for occupants of motor vehicles and somewhat less deadly for tractor operators. There are two reasons for this. First, tractors are becoming larger. Second, newer and larger tractors are equipped with ROPS, seat belts, and often have enclosed cabs. If the tractor operator stays inside the cab and is held by a fastened seat belt within the frame of safety provided by the ROPS, he or she has a good chance of surviving even very severe crashes.

The materials that follow are real cases of tractor/motor vehicle collisions like the one described in the “No Way to Meet a Neighbor” exercise. The sources are newspaper clippings, an official fatality investigation, and three major studies of tractor and motor vehicle highway collisions.

¹ Developed September-November 1997 by Henry P. Cole, Carol J. Lehtola, Shannon R. Thomas, and Melody Hadley at a two-day workshop titled “Translating Injury Surveillance Data into Health and Safety Educational Materials and Activities for Farm Workers and Families” at the University of Florida, Biological and Agricultural Engineering Department. The workshop and the development of this simulation exercise were supported by CDC/NIOSH Cooperative Agreements U07/CCU408035-05-2 and U06/CCU412900-01, 02, 03 awarded to the University of Kentucky, Southeast Center for Agricultural Health and Injury Prevention. The views expressed in this document are those of the authors and not necessarily those of CDC/NIOSH or the US Government.

Newspaper Clippings

The three newspaper stories that follow describe common types of tractor and motor vehicle collisions. The names of the people and communities have been changed.

Greenfield Man Dies when Tractor is Struck by Truck

A well-known farmer was killed Thursday afternoon when the tractor he was driving was struck by a bread delivery truck.

Roy Moss, 52, of 360 Sage Road, was driving his tractor and a wagon load of corn silage on Sage Road when he slowed to make a left turn onto a private farm lane. A bread delivery truck driven by Gene Greer, 36, of 221 Hurley Ave., approached Moss from behind and moved into the oncoming lane to pass the wagon and tractor. Greer's truck struck the tractor as Moss turned left into the farm lane. Moss was severely injured when the tractor overturned on top of him.

Greenfield Fire and Rescue EMS workers responded to the scene. Both Moss and Greer were taken to Clayton Memorial hospital. Moss was dead on arrival and Greer remains in critical condition with head and neck injuries.

Trooper R.J. Wanglin charged Greer with failing to reduce speed. Moss' tractor did not have a rollover protective structure (ROPS) or a seat belt.

Three Injured in Tractor and Automobile Crash

An older farmer from Eastwick County and a young couple from Langston City were injured at 2:30 PM Monday in a highway crash on Elm Road 3.5 miles from Eastwick Center.

The farmer, Al Morgan, 82, was pulling a load of hay with a tractor on Elm Road. As he approached his barn, Morgan slowed and turned left into the driveway. Gerald Meeks, 23, coming from behind, pulled into the oncoming lane and attempted to pass. His car struck and broke off the left rear wheel of the tractor. Meeks and his passenger, Wendy Martin, 21, received severe injuries when the car ran underneath the tractor and continued into a ditch. Morgan was thrown from the tractor and injured when he struck a tree.

Eastwick Fire and Rescue EMS responder Doug Reynolds said the tractor did not have a rollover protective structure (ROPS) or a seat belt and that Meeks and Morgan were not wearing their seat belts.

All three are in critical condition at Hagen Regional Medical Center.

The following news story describes an event that occurred in Iowa in 1989. It shows that a ROPS and fastened seat belt can be the difference between life and death for the tractor operator, even in high-speed and very destructive tractor/motor vehicle collisions.

ROPS and Seat Belt Saves Farmer's Life

A Brookside man was killed and a rural Atkins farmer suffered minor injuries as a result of a nearly head-on collision between a car and a tractor pulling two wagons five miles north of Shelton on Highway 83 on Wednesday at 5:15 PM.

Dead is Elven Whethers, 63, of Brookside, who was flown from the crash scene by helicopter to Marshall Health Center in Lawrence, where he was later pronounced dead.

Slightly injured was Roger Sargent, 52, who was driving the 4440 John Deere tractor pulling two wagon loads of harvested corn. Sargent was taken to Brookside hospital where he received stitches above his left eye and was released.

According to official reports, Sargent was northbound on Highway 83, driving the tractor and wagons in his lane. Whethers, driving a 1982 Buick, was southbound when he crossed the center line and drove nearly head on into Sargent's tractor, striking the tractor's left front wheel, then crashing into the main body of the tractor.

The resulting collision broke the tractor in half and stripped the box from the frame of the wagon directly behind the tractor.

Sargent remained in the cab during the incident. After the tractor broke apart, he unbuckled his seat belt and crawled out of the cab. A witness to the crash, who was driving behind Sargent, stopped and told Sargent to sit down a moment.

"I must have been knocked out," Sargent said. "I remember the car coming at me and then I remember sitting in the cab."

The collision resulted in \$5,000 damage to the Buick and \$32,000 damage to the John Deere. Both were considered total losses.

"Roger Sargent probably would not have survived the collision without the ROPS and seat belt," said Dr. Carol Lehtola, an agricultural engineer and farm safety expert. ROPS is the abbreviation for a tractor roll bar known as a Roll Over Protective Structure.

Kentucky Fatality Investigations

The Kentucky Fatality Assessment and Control Evaluation (KY FACE) Project is located at the University of Kentucky. Project staff investigate many farm fatalities in the state as well as other occupational fatalities. The reports from these investigations help to identify people at greatest risk of specific types of injuries (like tractor overturns) and also help to develop strategies to prevent these fatalities and injuries in the future. The summary that follows was taken from a fatality report on the KY FACE website. The full report and all other agricultural fatality reports from 1994 to the present are available on-line at Internet address <http://www.kiprc.uky.edu/oipp/face.htm>

KY FACE Fatality Report #9411101

Date: 26 October 1994

Subject: Farmer Struck by Truck and Killed on Public Roadway

Summary: A 63-year-old farmer was fatally injured while transporting hay to his farm when the wagon he was pulling was struck by a two-ton log truck. After loading five round bales of hay onto a flatbed wagon, the victim drove his tractor and wagon north on a public roadway to transfer the hay to another pasture for winter storage. While also heading north on the two-lane asphalt highway, the log truck crested a hill at 55 mph. The truck driver saw the wagon and round bales directly ahead in his lane, saw a car approaching in the oncoming southbound lane, and saw a steep embankment dropping off to the right. Unable to stop, and to avoid a head-on collision or going over the embankment, the truck driver ran into the rear of the hay wagon. The impact caused the bed of the wagon to move forward off the wagon frame and strike the rear tires and fenders of the tractor. The tractor jackknifed, rolled over on its side and slid northward in the southbound lane, and then turned over again, coming to rest upside down on the west side of the road. The farmer was thrown from the tractor and landed on the asphalt near the tractor. He sustained massive head injuries. A witness who was traveling by car in the opposite direction called 911 to summon help. The victim was pronounced dead at the scene by the coroner at 1:25 PM. The truck driver was not injured. The tractor did not have a Roll Over Protective Structure (ROPS) or a seat belt. Neither the tractor nor the wagon had a Slow Moving Vehicle (SMV) emblem. The weather was clear and the highway dry.

Recommendations:

In order to prevent future fatalities of this type, the FACE investigator recommends:

- Tractors should be retrofitted with ROPS and seat belts.
- All equipment should be clearly marked with Slow Moving Vehicle (SMV) emblems before driving on public roadways.
- A trailing unit to warn drivers should follow tractors pulling harvest products or equipment on public roadways.

A Study of Ohio Tractor and Motor Vehicle Crashes

Collisions involving 1,432 Ohio farm vehicles and other motor vehicles were analyzed for a four-year period (1989-1992). The results are summarized below.²

Four years of Ohio highway accident data (1989-1992) were analyzed for trends in collisions involving agricultural machinery. Seventy-eight percent of two-vehicle collisions occurred during daylight hours, with a peak occurrence during the time interval from 3:00 to 6:00 P.M. Sideswipe and angle impacts were the predominant collision types. Forty-two percent of the nighttime crashes were rear-end collisions, compared to 8% of the daylight crashes. Failure to recognize that farm equipment was turning left was a significant factor in sideswipe and angle collisions. Operator age, weather conditions, and alcohol use were not significant factors in the majority of these crashes.

The last sentence in the above summary suggests that most tractor/motor vehicle crashes (like the one depicted in the “No Way to Meet a Neighbor” exercise) happen to ordinary people engaged in ordinary daily driving activity. If you don’t live on a farm and drive a tractor, why should you know about tractors and farm equipment traveling on public roads? Because the life you save may be your own! If Sam had known more about farming, stopping times, and had paid attention, he and Jake would not have died in the collision. Their families could have been spared the tragic loss of loved ones. Jake could have helped too! He could have anticipated that many drivers are like Sam, that is, they are good people with good intentions, but know little about farming and often fail to recognize highway hazards related to farm vehicles.

Figure 1 is a pie chart that shows the frequency of Ohio farm vehicle (mainly tractors) and motor vehicle crashes under different light conditions. Figure 2 is a pie chart that shows that left turns (like the case described in the “No Way to Meet a Neighbor” exercise) account for 52% of these crashes. Both figures are from the Ohio study.

² From Glascock, L.A., Wood, R.K., Carpenter, T.G. & Holmes, R.G. (1993). Characteristics of SMV accidents. Paper presented at the December 14-17, 1993 Winter meeting of the American Society of Agricultural Engineers, Paper No. 931618, ASAE, 2950 Niles Rd., St. Joseph, MI 49085-9659. See also Glascock, L.A., Bean, T.L., Wood, R.K., Carpenter, T.G., and Holmes, R.G. (1995). A summary of roadway accidents involving agricultural machinery. Journal of Agricultural Safety & Health 1 (2): 93-104.

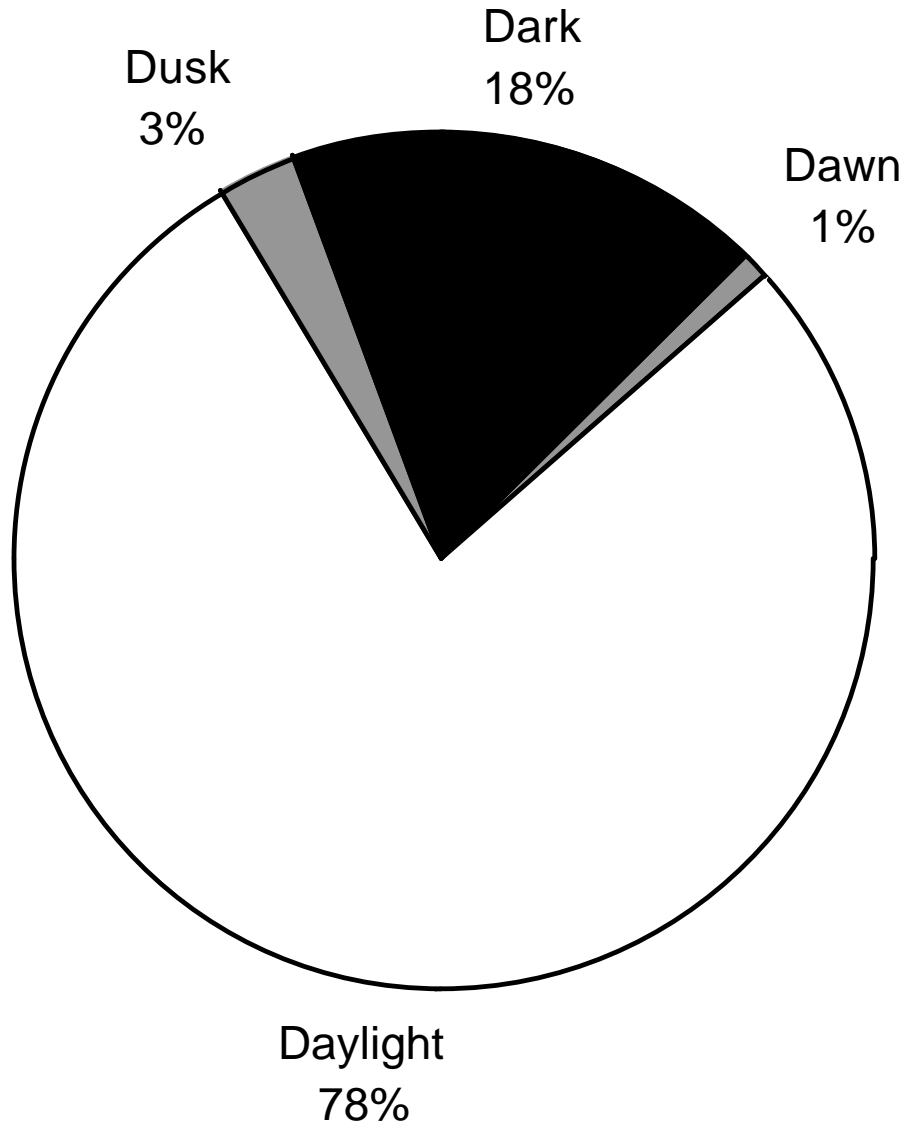


Figure 1: Percent of Ohio farm vehicle and motor vehicle collisions by light conditions

Most tractor/motor vehicle collisions occur during daylight hours from 3:00 P.M. to 6:00 P.M. Most of these crashes involve a motor vehicle traveling straight ahead at a high speed. The crash often occurs when the tractor and trailing farm equipment make a left turn, resulting in a collision such as the one depicted in the “No Way to Meet a Neighbor” exercise (see Figures 2 and 3 in the exercise). During daylight hours, only 8% of the collisions are rear-end crashes in which the farm equipment is struck from behind by an approaching motor vehicle.

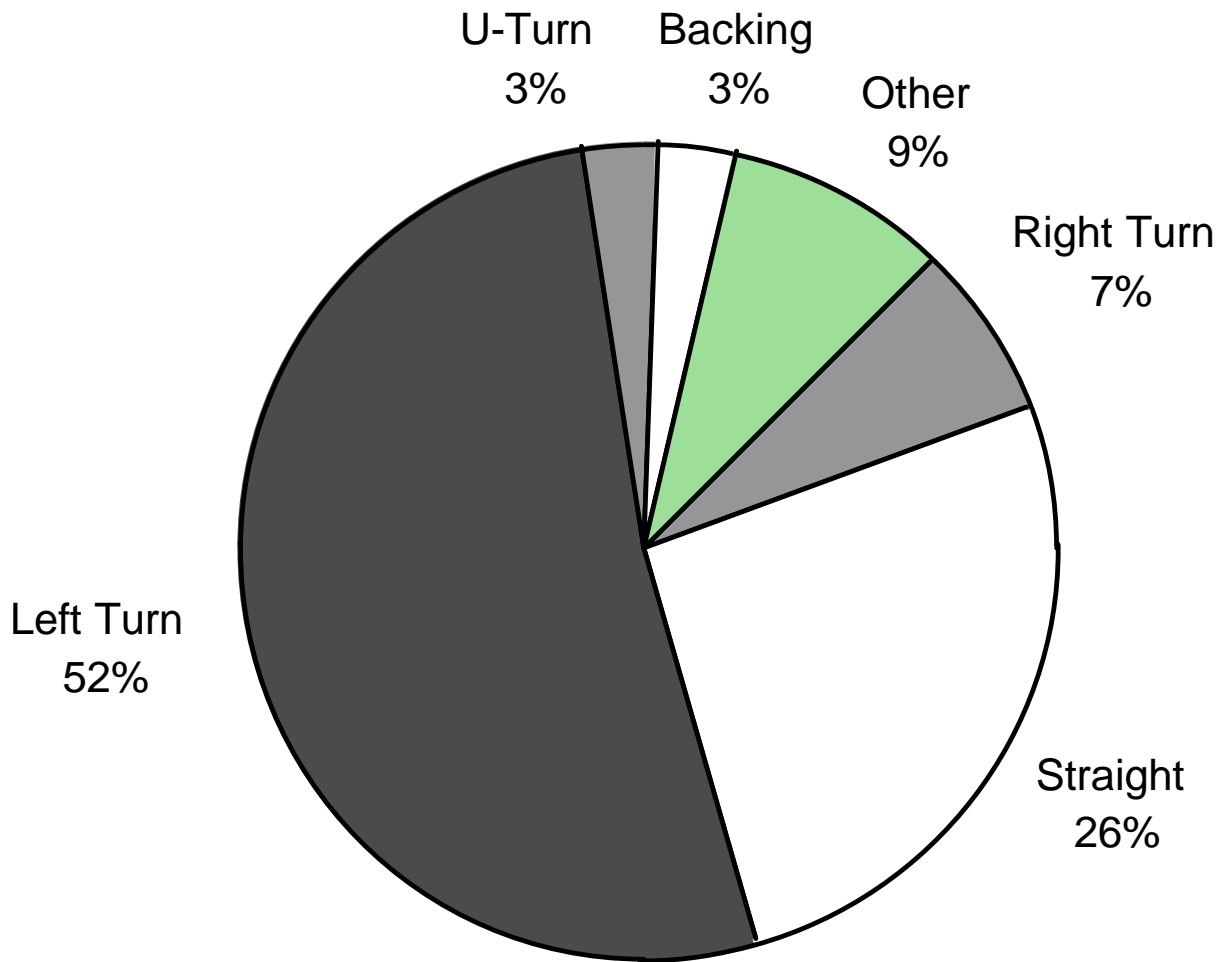


Figure 2: Percent of Ohio farm vehicle and motor vehicle daylight collisions by farm equipment travel direction

Studies of Iowa Tractor and Motor Vehicle Crashes

In Iowa collisions involving 1,490 farm vehicles and other motor vehicles were analyzed for a five-year period (1988-1992). The data were gathered from Iowa law enforcement files for events involving over \$500 in property damage and for every incident that resulted in a personal injury.³ The results of this study are summarized below.

About 81% of all farm equipment and motor vehicle highway collisions occurred during daylight hours. Peak collision times were during the hours from 12-4 P.M. and again from 4-8 P.M.

When all two-vehicle farm equipment and motor vehicle collisions were totaled across daylight and dark, farm vehicles turning left accounted for 22.4%, and rear-end straight-on collisions accounted for 21.8% of the total. Sideswipe and angle collisions accounted for 38.3% of all collisions, including sideswipes during farm vehicle left turns. The road surface was dry pavement in 79.1% of these collisions, indicating that in most incidents road conditions do not contribute to the crash. The number of collisions was not related to the age of the individuals injured in the crashes. The year-to-year tractor/motor vehicle crash injury rate did not vary significantly across the five-year period.

Figure 3 on the next page is a pie chart that shows the frequency of Iowa farm vehicle (mainly tractors) and motor vehicle crashes under different light conditions. Note the similarity of these data to the Ohio study reported in Figure 1.

³ Flynn, D. (1994). An analysis of farm vehicle-related accidents on Iowa roadways. Unpublished paper. Ames, Iowa: University of Iowa, Department of Agricultural and Biosystems Engineering.

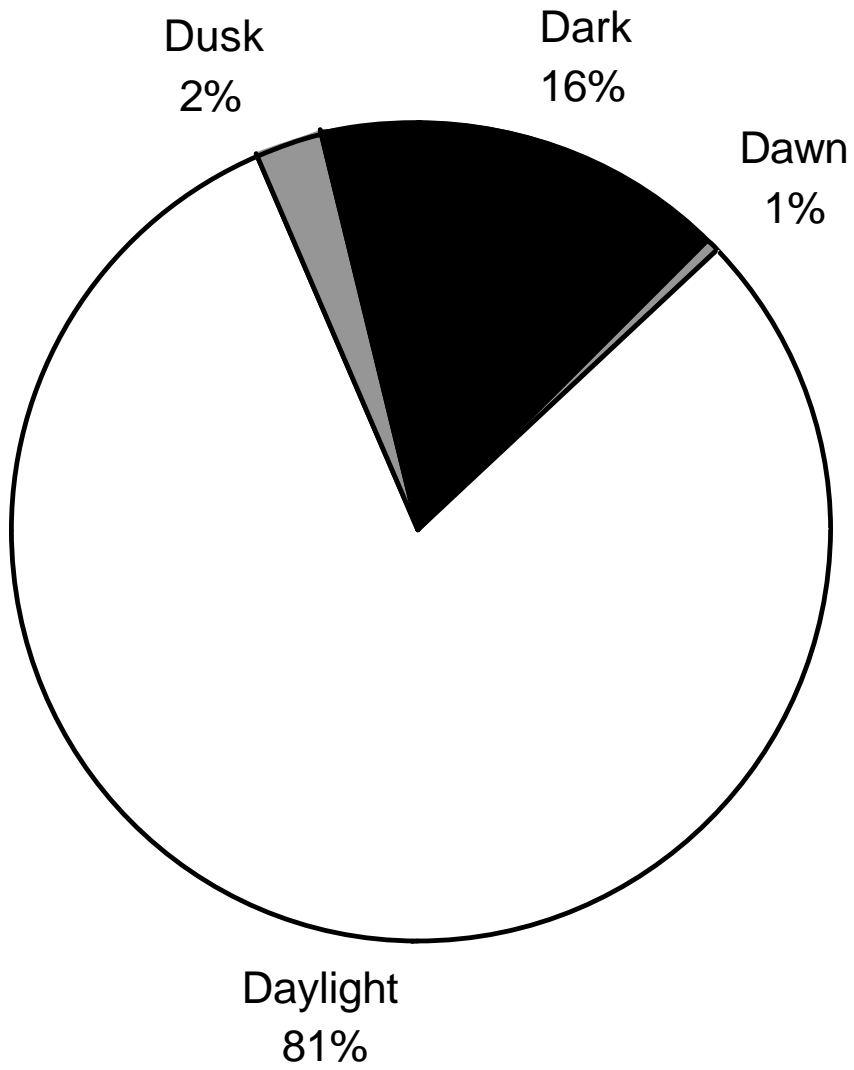


Figure 3: Percent of Iowa farm vehicle and motor vehicle collisions by light conditions

Another study was conducted of the 136 Iowa 1988-92 agricultural tractor-related fatalities. Tractor/motor vehicle collisions that resulted in fatalities to the tractor operator or to the occupants of the motor vehicles were included in this study.⁴ The results are summarized below.

Eleven percent, or 14 of 131 tractor fatality incidents, occurred on public roadways and involved other vehicles, accounting for 14% or 19 of the 136 total deaths. Twelve of the 19 killed in roadway collisions were motor vehicle occupants. The three most frequent scenarios were:

1. Tractor hit from the rear (43%) [6 of the 14 fatal incidents and 9 of the 19 deaths]
2. Tractor turning left while motorist attempting to pass (28.6%) [4 of the 14 fatal incidents and 4 of the 19 deaths]
3. Head-on collision (28.6%) [4 of the 14 fatal incidents and 6 of the 19 deaths]

A tractor being struck from behind was the most frequent category of fatal incidents. In some instances the motorist had not applied the brakes, indicating that the farm equipment was not recognized as a hazard until it was too late to react.

The second most frequent category of fatal tractor/motor vehicle collisions involved the tractors pulling wagons or equipment that obstructed the operator's view to the sides and rear. These collisions occurred when a motor vehicle approached from the rear and attempted to pass just as the tractor turned left into a farm road or driveway. (This scenario usually results in a high-speed, high-impact crash that the tractor operator may survive if he or she is wearing a seat belt on a ROPS-equipped tractor. The motor vehicle occupants are not as likely to survive such a crash.)

Fatal tractor/motor vehicle highway collisions may be increasing. For the three-year period including 1988-90, these types of crashes accounted for 9% of all Iowa tractor-related fatalities. Yet for the two-year period including 1991-92, they accounted for 22% of the total deaths. This trend may be related to farmers more frequently hauling farm equipment on public roadways and their use of larger tractors and equipment.

⁴ Lehtola, C.J., Marley, S.J., & Melvin, S.W. (1994). A study of five years of tractor-related fatalities in Iowa. *Applied Engineering in Agriculture*, 10 (5): 627-632.

Getting Tractor/Motor Vehicle Collision Data for Your Area

Information about tractor/motor vehicle crashes (MVCs) in and around communities can help communicate the risks of these crashes to local drivers and farmers. The information can lead to increased awareness, better defensive driving, and a possible reduction of these injury events.

The statistics for tractor and motor vehicle crashes in your area can be obtained by following these steps.

1. Contact the state police highway safety department. Find out which state agency is responsible for collecting, analyzing, and reporting information on motor vehicle crashes.
2. Call this agency and ask for a breakdown of motor vehicle crashes involving farm equipment. If you want specific information (e.g. time of day, month, roadway involved, weather conditions, etc.), clearly describe what you want and make a follow-up request in writing. Most agencies will cooperate and grant your request, especially if you tell them that you are using the information for a community education activity.
3. Allow plenty of time for the agency to respond to your request. Most agencies are busy and are about a year behind in tabulating these types of figures. If you call and request information for the current year, you will most likely receive those figures the next year.
4. In most cases you can get information as specific as you want or need. For example, tractor and motor vehicle crashes on specific highways, in certain counties, or even for smaller geographic areas.

Using the Evaluation Questionnaire

The evaluation questionnaire on the next page can be administered to people who have read this document or listened to a presentation of the material. The questionnaire solicits three types of information. These are the participants' (a) demographic characteristics, (b) involvement in tractor/motor vehicle collisions and close calls, and (c) their evaluation of the value of the material and its impact upon their thinking and future highway driving behavior.

Tractor/Motor Vehicle Collision Evaluation Questionnaire

(Please complete this questionnaire after you have finished this activity.)

1. Activity: Tractor/Motor Vehicle Collisions
2. What year were you born? 19_____
3. Your sex? (check one) ___ M ___ F
4. Do you work on a farm? ___ Yes ___ No
5. Acres currently farmed? _____
6. Do you drive a tractor? ___ Yes ___ No
7. If "Yes," how many days a month? _____
8. Years experience tractor driving? _____
9. Do you drive tractors on public roads? ___ Yes ___ No
10. Years you have had a driver's license? _____
11. Have you ever been involved in collisions between a tractor and a motor vehicle on a public highway? ___ Yes ___ No
12. If "Yes" to item 11, time of day a collision occurred? Hour _____ AM ___ PM
13. If "Yes", to item 11, was anyone injured? ___ Yes ___ No
14. If "Yes" to item 13, who was injured? ___ Motor Vehicle occupant ___ Tractor driver or rider
15. Have you ever almost had a collision between a tractor and a motor vehicle? ___ Yes ___ No
16. If "Yes" to item 15, were you in the motor vehicle or on the tractor? ___ In MV ___ On tractor

Think about the activity you just finished. Circle the number that tells how much you agree or disagree with the following statements.

Statements	Strongly Disagree		Strongly Agree	
17. The situations described in this activity can happen to my loved ones or me.	1	2	3	4
18. This activity taught me ways to avoid collisions like the ones described.	1	2	3	4
19. During a highway crash a ROPS and fastened seat belt can keep the tractor operator from being injured.	1	2	3	4
20. Farmers who drive tractors on highways should have ROPS on their tractors.	1	2	3	4
21. Farmers should always wear their seat belts while driving tractors with ROPS.	1	2	3	4
22. This activity will help me to be a more alert and cautious driver.	1	2	3	4
23. The activity took too long to complete.	1	2	3	4
24. The activity materials were easy to understand.	1	2	3	4
25. I had a chance to discuss and share my ideas during the activity.	1	2	3	4
26. Most tractor/motor vehicle collisions occur in broad daylight.	1	2	3	4
27. Most tractor/motor vehicle accidents are rear end collisions.	1	2	3	4
28. Tractor/motor vehicle collisions have decreased in the last 10 years.	1	2	3	4
29. Many city drivers don't know how to drive safely through farm country.	1	2	3	4
30. I learned important things from this activity that I will tell other people.	1	2	3	4

If you have other comments, please write them on the bottom and back of this page.