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SAFE USE OF FARM MACHINERY Movement on Public Roads



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Information in this folder is based on Minnesota Department of Public Safety requirements for implements of husbandry on public roads. Requirements vary in other states.

Field work on modern farms requires large farm machinery. While the size of this machinery helps you farm more efficiently, transportation on public roads can be dangerous. The accident risk can be reduced significantly, however, if farm machinery operators are familiar with safe methods of moving their machinery on public roads.

In a recent report covering a two-year period, the Minnesota Department of Public Safety identified nearly 500 accidents involving farm machinery on public roads. Most of these occurred during the summer and fall months. This report also revealed that over 80 percent of fatal farm highway accidents occur after 4 p.m. and on local roads, rather than state or U.S. routes.

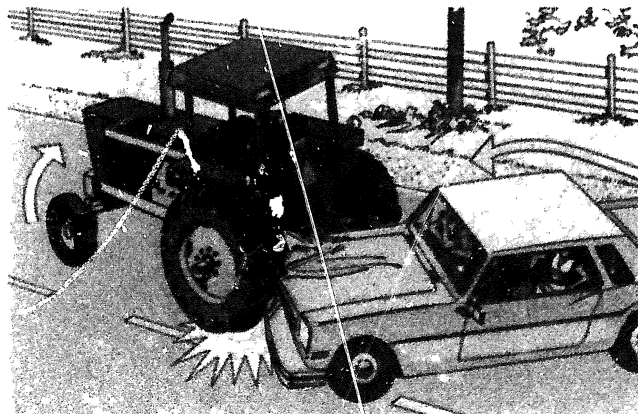
A review of newspaper clippings from a state clipping service indicated that 25 percent of all tractor accidents reported (16 out of 59) occurred while operating on public roads. Approximately 56 percent of these accidents involved another vehicle.

The most frequent type of fatal farm machinery accident reported was collision with motorists traveling in the same direction as the machinery. Running off the road, being struck while making left turns, and collisions with vehicles traveling in the opposite direction comprise most of the remaining accidents.

To reduce the potential of having an accident on a public road with your farm machinery, be familiar with the factors contributing to these accidents and ways you can reduce your risks.

Factors

There are a number of factors in farming today that appear to contribute to farm machinery accidents on public roads.

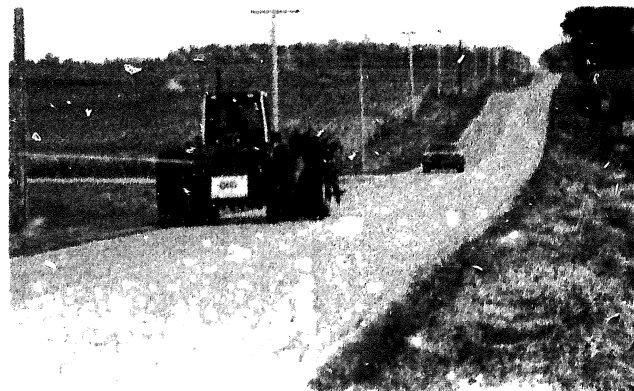


The most frequent type of fatal farm machinery accident reported is collision with motorists traveling in the same direction.

Difference in speed. One of the main contributing factors is the difference in speed between farm machinery and other vehicles on the road. Most farm machinery is transported at 25 mph or less.

Farm size and location. The average farm is getting larger and may be divided, with fields several miles or more apart, requiring transportation of the planting and harvesting equipment on public roads.

Machinery size. Most machinery is larger today in overall dimensions. If a piece of machinery cannot be converted to transport position, its width may overlap into another lane and create a hazardous situation on the highway.



One of the main contributing factors to farm machinery accidents on public roads is the difference in speed between farm machinery and other vehicles.

Operator's ability. Because of the machinery's large size, skillful and attentive operation are necessary to avoid an accident when quick action is required.

Time of year. The frequency of road usage is high during certain periods of the growing season, such as planting and harvesting.

Motorists' knowledge of SMV emblems. Motorists may not know what a slow-moving vehicle (SMV) emblem means and may not adequately reduce speed when they approach farm machinery.

Outdated machinery. Some older pieces of machinery may have only minimal lighting or markings to warn motorists of slow speeds.



Farm operators transporting or towing machinery are responsible for providing adequate lighting and markings, obeying the law, and using proper operating techniques.

lights are required, a red light should be displayed at the extreme end of the load.

PRE-ROAD CHECK

Before driving on public roads, take a few minutes to perform a pre-road check of the tractor and equipment to prevent equipment failure.

A quick walk around the equipment will give you a chance to observe the tires for proper inflation and any defects such as cuts, bulges, or worn areas. Also clean windows, mirrors, reflectors, lights, and SMV emblem, if necessary. Lights should be checked to see if they are working.

Be prepared in case of a breakdown. Have warning markers available and necessary tools if a breakdown does occur. Provide an ABC-rated, dry chemical fire extinguisher to control small fires.

SAFE OPERATING PROCEDURES

There are many machinery operating procedures you can follow to reduce your chance of having an accident when traveling on public roads.

Understand your responsibilities

Make sure you understand your responsibilities as the machinery operator. The Department of Public Safety in our state can provide you with the regulations, concerning such things as lights, SMV emblems, speed limits, right-of-way, turning signals, and traffic signals and signs. Obey all traffic laws. Drive defensively by anticipating the actions of other motorists.

It is recommended that only experienced drivers who are licensed be allowed to drive farm machinery on public roads. Inexperienced and young drivers may react incorrectly and cause an accident.

Do not carry extra riders in or on the tractor, other self-propelled equipment, or towed equipment. Extra riders often distract the operator or may be inattentive, lose their balance, fall, and be run over. Accidents involving extra riders are one of the leading causes of farm injuries and deaths in our state.

Keep these suggestions in mind

- Stop and wait for the traffic lane to clear before entering or crossing. It may take as much as 10 seconds to completely cross a highway with a tractor towing a wagon. Cutting in front of approaching vehicles traveling at high speeds is almost certain to cause an accident.
- Front-mounted equipment, such as a loader, should be at the lowest position possible. This will provide good visibility and tractor stability.
- Be sure all loads are secure in transport. Portions of loads falling onto the road can create an accident situation for other vehicles.



Drive in the right-hand lane as close to the edge of the road as possible, except when passing or turning left.

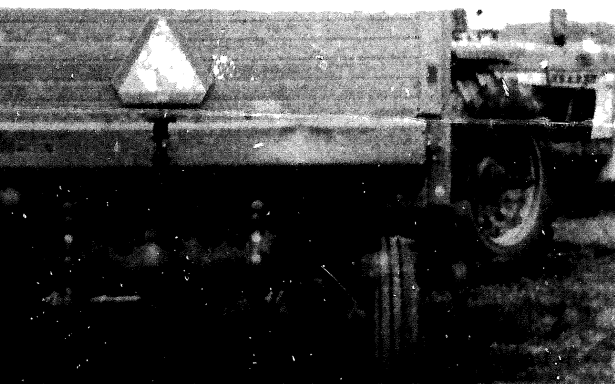
- Have extra help when transporting extra-wide equipment such as a combine. Provide a vehicle in advance of and behind the equipment, with flashing lights to alert other drivers of the potential hazard.
- Drive slow-moving vehicles in the right-hand lane, as close to the edge of the roadway as possible, except when passing or turning left. Traveling half on the shoulder may cause motorists to risk passing in a dangerous situation.
- Avoid encouraging or signaling motorists to pass. Pull over on the shoulder when feasible, and let the traffic pass.



Before entering a roadway, wait and let traffic pass. It may take as long as 10 seconds for a tractor towing a wagon to completely cross.



When turning a corner, make your intentions known with lights or hand signals at least 100 feet in advance.



Slow-moving vehicle emblems identify vehicles moving at 25 mph or less, so motorists can react accordingly.

If you stop on a road or shoulder during hours when lights are required, your machinery must have a white or amber light visible from the front and a red light visible from the rear. Furthermore, both lights must be visible from a distance of 500 feet.

To ensure visibility, agricultural safety specialists and most equipment companies recommend using flashing amber lights while operating machinery on public roads during both day and night driving, except where prohibited by law.

LOW-MOVING VEHICLE (SMV) EMBLEMS

Most farm machinery is designed to travel at 25 mph or less. These pieces of equipment, which are classified "implements of husbandry," are required to display an SMV emblem. Animal-drawn equipment, which can pose special problems on public roads, also must display an SMV emblem.

This identification emblem consists of a fluorescent orange equilateral triangle with a dark red reflective border. The orange border provides daytime identification, while the reflective border illuminates in the path of vehicle headlights at night. This unique emblem can be used only on slow-moving vehicles operated on public roads and does not replace other warning devices such as taillights, reflectors, or flashing lights. It is unlawful to use this emblem on other vehicles or stationary objects such as gates or posts.

SMV emblems are important because they warn an overtaking driver that the vehicle ahead is traveling slowly. It takes a car traveling at 55 mph 400 feet behind a tractor traveling at 15 mph only 7 seconds to reach the tractor.

The SMV emblem must be mounted on the rear, as near the center or left center of the vehicle or equipment as possible, and unobscured. It should be mounted with the point of the triangle upward and from 2 to 6 feet above the ground.

SMV emblems should be replaced before the fluorescent triangle fades to a pale yellow. When the SMV emblem starts to fade, it loses its capability to reflect light, which is a must at night. This may be every 2 years when the equipment is stored outside.

PREPARING EQUIPMENT FOR TRANSPORT

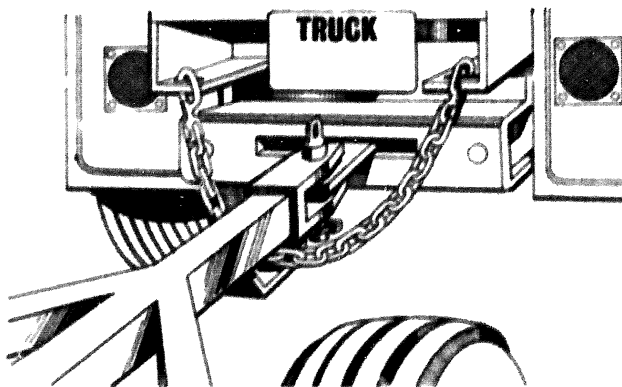
When feasible, farm equipment should be converted to transport position to travel on public roads.



A car traveling at 55 mph 400 feet behind a tractor traveling at 15 mph will take about 7 seconds to reach the tractor.

This will reduce the width of the machine, thereby reducing your risk of an accident. Preparing for transport includes procedures such as relocating the hitch point, removing the headers, and using hydraulic wing folds.

When towing a piece of machinery, use the correct size hitch pin and secure the pin with a clip. Use a safety chain between the tractor and piece of equipment being towed to help maintain control and prevent separation should the hitch pin fail.



When towing a load, use a safety chain in case the hitch fails.

Lock together the tractor brake pedals, so the brakes will be applied evenly and reduce the chance of the tractor swerving unexpectedly. Also check the brakes for adjustment. They may have worn unevenly after extensive field use.

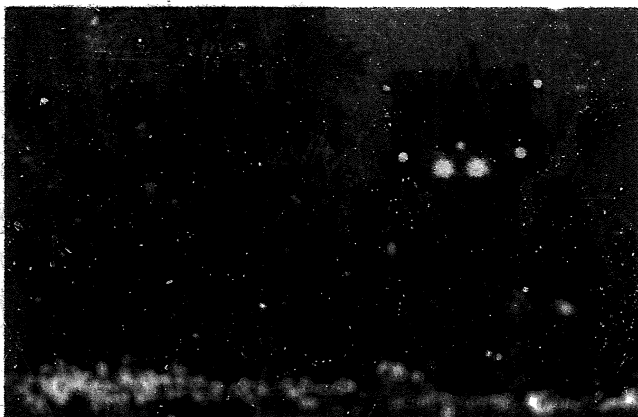
Use extended rear view mirrors to see around the sides of wide equipment. They can be used on tractors and other self-propelled units both with and without operator cabs.

If you are towing equipment on a truck or trailer, make sure the load is secure. This can be done by using binders and blocks of wood to keep wheels from shifting. Make sure tractors are backed onto the bed to provide maximum stability when loading or unloading.

During the day, loads that extend 4 feet or more beyond the rear of the vehicle bed should display a red, yellow, or orange flag at least 16 inches square at the extreme end of the load. During hours when

How to Reduce Your Accident Potential

Many people can help reduce accidents involving movement of farm machinery over public roads—lawmakers and law enforcement people, motorists, and especially manufacturers and farm operators transporting or towing farm machinery. Each has a responsibility to contribute to adequate lighting, proper marking, obeying the law, and using proper operating techniques while on public roads.



ASAE-recommended lighting standards increase the visibility of farm machinery.

KNOW YOUR LIGHTING NEEDS

The importance of adequate lighting, especially during hours when lighting is legally required, is a major safety factor. Every state has minimal lighting requirements. In Minnesota, where tractors and other self-propelled equipment are classified as implements of husbandry, at least one white or amber light is required to the front and one red light and two red reflectors to the rear of a vehicle.

The American Society of Agricultural Engineers (ASAE) has recommended additional standards to increase the visibility of tractors and other self-propelled equipment on public roads. These standards, which greatly improve the identification of slow-moving vehicles during both day and night hours, are:

- at least two white headlights mounted at the same level and as far apart as possible
- two flashing amber lights, visible from the front and rear and at least 42 inches high, which may be used as turning indicators
- at least one red taillight mounted as far left as possible (If two red taillights are used, the second one should be as far right as possible.)
- two red reflectors visible from the rear

When towing equipment that extends more than 4 feet to the right and left of center of the self-



Older tractors may need to be modified but must meet state minimal lighting requirements to be used on public roads.



Safety specialists recommend using flashing amber lights during day and night driving, except where prohibited by law.

propelled vehicle, two red reflectors visible from the rear should be mounted on the extreme left and right. Also, an amber reflector visible from the front should be mounted on the extreme left projection.

The ASAE also recommends that if the towed or mounted equipment obscures the flashing lights on a self-propelled vehicle, then at least two amber flashing lights should be mounted as far left and right as possible on the trailing equipment.

When you have older pieces of equipment, it is often difficult to modify to meet minimum standards. However, if the equipment is used on the highway it must be updated to meet state minimal requirements.

White lights always must be directed to the front of the vehicle and red lights to the rear, so other drivers know the equipment's direction of travel. If you use a white work light to the rear in the field, it must be turned off before entering the roadway.

- Make your intentions known when you're turning by using signal lights or the appropriate hand signal at least 100 feet in advance of the corner.
- Know the route you are going to travel. Be aware of blind intersections, sharp turns, and narrow bridges. Tall crops at intersections of roadways should be cut back so approaching drivers have good vision.
- A driveway that intersects a road near the top of a hill is a special problem and may need to be relocated, since you and motorists coming over the hill have little time to react to each other. Clear the shrubbery and other obstructions from your driveway so you can clearly see approaching traffic.
- Before pulling a heavy load down a steep hill with a tractor, stop and shift to a lower gear. This will help maintain control of the load by reducing the descent speed. A rule of thumb is to use the same gear going down a hill as you would use to pull that load up a hill.
- Recognize that your tractor may not have sufficient braking power when pulling a heavy load on a highway. If you frequently travel with heavy trailing equipment, such as a large manure slurry tank, the trailing equipment should have brakes.
- Equipment with articulated steering requires special precautions. Because this equipment bends in the middle, it can sway back and forth into the other traffic lane when driving down a road or turning corners and create a serious hazard for oncoming traffic.
- Anhydrous ammonia nurse tanks are classified as implements of husbandry. Because this equipment is designed with low-speed bearings and implement tires rated not to exceed 25 mph, transportation of this dangerous chemical should be maintained at or under the designated speed. The drawbar must be equipped with a safety chain, to avoid separation during transport if the hitch fails.
- Be aware of posts near the roadway, such as those that support mail boxes and road signs, when driving or pulling wide equipment. Other hazards to watch for are potholes, brush, and weeds growing up on the roadside that may cover broken edges of the road.
- Help reduce the accident potential on roads in your area by notifying local highway officials if road signs are missing, damaged, or if a new one needs to be erected.
- Stay off public roads with farm machinery after dark unless absolutely necessary, and then only when your machinery is adequately lighted and marked.

Summary

The responsibilities of the machinery operator are great while using public roads for transportation of farm equipment. Many factors contribute to the accident potential when moving machinery, but the chances of having an accident can be dramatically reduced by:

- providing adequate lighting and marking for easy recognition of your machinery
- preparing the equipment for transportation or towing
- performing a pre-road check
- practicing safe operating procedures

Make traveling on public roads safe—for you and others.

REFERENCES

- American Society of Agricultural Engineers. *Agricultural Engineers Yearbook*. 1981-82.
- Deere and Company. *Fundamentals of Machine Operation—Agricultural Machinery Safety*. Moline, Illinois. 1974.
- Minnesota Department of Public Safety. *Slow-Moving Vehicles—Implements of Husbandry*. 1979.
- National Safety Council. *Safe Movement of Farm Machinery on Public Roads*. 1978.
- Pfister, Richard G. *Farm Equipment Accidents on Public Roads*. Michigan State University. East Lansing, Michigan. 1974.

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