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Safely Using Farm Tractors in the Woods

E50

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Harvesting timber, clearing land and fence rows, and cutting and transporting firewood are common tasks on farms and rural property. When done by trained loggers or foresters using machines designed for working in the woods, these tasks can be done with minimal risk. But when attempted by untrained or inexperienced farmers or rural property owners using machines designed for farming or property maintenance, the same tasks have an increased risk of a serious injury or fatality.

Obviously, not every use of the farm tractor in the woods results in a mishap or injury. Even so, Pennsylvania Farm Fatality Reports from recent years have identified numerous fatalities involving tractors that were being used for pulling down trees and limbs, pulling tree stumps, dragging logs, clearing saplings and brush from fence rows, or for collecting and hauling firewood. For example, one farmer was killed when the log he was dragging from the woodlot caught the edge of a field's dead furrow and pulled the tractor over backwards onto him. A little over one-half of these incidents involved tractor upsets while dragging trees, logs, tree tops, or brush. Nearly 40% of the incidents involved falling trees due to lodged trees, wind gusts, or falling limbs (widow makers) from overhead. The remaining incidents involved chain saw kick-back.

This Fact Sheet addresses hazards and safety recommendations that farm and rural landowners should consider when regularly using farm tractors to clear land and transport farm wood products. The purposes of this Fact Sheet are to: a) help tractor operators understand hazards and risks that are unique to using farm tractors in the woods, and b) to identify several best safety practices to use when the farm tractor is used in the woods.

Recognize Hazardous Trees

One way to increase safety is to be aware of hazardous situations associated with trees. For example, *danger trees* present a hazard to persons due to conditions of the tree such as deterioration or physical damage, and the direction of lean of the tree. Snags are standing dead trees. They are very unpredictable and can easily be caused to fall. Lightning and storm damaged trees may have broken limbs resting in the canopy. These are called widow makers and they can fall without warning. Trees with portions of disease or rot, such as a dead limb, or that are lodged or hung upon another tree can also drop unexpectedly (See Figure 1 on pg. 2). These overhead hazards can drop onto the operator, whether the operator is on the ground or on a tractor.

Spring poles are small trees or limbs bent under the weight of a larger tree which has fallen upon them (See Figure 2 on pg. 2). If these are improperly or mistakenly cut they can release with lightning speed and yield a fatal blow to bystanders. Recognize the dangers each situation can present and plan your cutting work accordingly. Workers should inspect trees along woods roads, skid trails, and fence rows plus work locations in woods to spot any danger trees. These trees should be removed or avoided because they pose risks during cutting operations.

Farm Tractors: Not Equipped for Woodlots

While farm tractors can be used safely for a variety of purposes, using them in woodlots can pose significant risk. Most farm tractors are not appropriately equipped for use in woodlots and this directly contributes to many fatal injury incidents. Farm tractors used for woodlot tasks often must fit through

Figure 1. Example of a lodged tree.

Figure 2. Example of spring pole trees.

narrow spaces between trees and stumps. This often means that the tractor being used is too small to do the job safely. A second problem is that many tractors taken into the woods lack a rollover protective structure (ROPS). This may happen because the tractor is an older model not originally equipped with a ROPS, an originally installed ROPS has been removed, or a tractor's fold-down ROPS is in the lowered position. A third major concern is that ROPS sunshade canopies and enclosed ROPS cabs are not designed to protect against heavy falling objects, such as major tree limbs. To ensure operator protection against heavy falling objects, the tractor needs to be equipped with an enclosed cab ROPS with a Falling Object Protective Structure (FOPS) for its roof.

The need for operator protection from falling objects is most commonly associated with construction, mining and logging operations. For example, bulldozers, log skidders, industrial pay loaders, and underground mining equipment are commonly equipped with FOPS protection. FOPS are designed and tested to withstand a 100 pound steel ball dropped from a height of 10 feet onto the top of the FOPS cover. The FOPS cannot show any intrusion into the operator zone from this test. A FOPS cover can be constructed of a solid material, or a grid or mesh. If a grid or mesh design is used, the largest permissible opening between the elements of the grid or mesh is 1.5 inches. Sunshade canopies and ROPS undergo no such tests. Figures 3 and 4 show examples of a non-FOPS canopy and a FOPS canopy. A 2-post or 4-post ROPS with a FOPS canopy, while providing sufficient overhead protection, may still leave the operator exposed to being struck by limbs and trees that break apart upon impact with the FOPS or that snap back underneath the canopy.

While FOPS are critical to safely using farm tractors in the woods, they are not readily available in the agricultural tractor market. Nevertheless, farmers and rural land owners who use tractors in woods should try to locate and have a FOPS canopy installed on the tractor by their tractor dealer or a company that specializes in equipping farm tractors for use in the woods.

In addition to ROPS with enclosed cab and FOPS, there are several tractor modifications needed to safely use tractors in woodlots. These modifications are to help protect the operator, the tractor and the environment as follows:

- A steel skid plate to protect the tractor's underside and allow it to "slide" over stumps or rocks.
- Protective grill for the radiator
- Engine side guards
- 10-12 ply tires with valve protection plates welded to the rims
- Tire chains for soft ground or snowy, icy conditions
- Front-end weights to improve stability during dragging of logs

Figure 3. A tractor with a 2-post ROPS outfitted with a molded plastic sunshade. The bracing under the sunshade is not designed to withstand an impact.

Figure 4. A tractor with a 2-post ROPS outfitted with a FOPS canopy. Horizontal steel supports and vertical steel posts provide additional structural support for the FOPS.

- A 10 lb. ABC fire extinguisher
- A spark arrester for the muffler
- A protective grill to replace the rear window of the ROPS cab to prevent winch cables and hooks from flying through the back of the cab. This rear grill should also be installed with 2-post or 4-post type ROPS.

Hazards of Dragging and Pulling Stumps, Logs and Limbs

In addition to farm tractors being ill-equipped to work safely in woodlots, descriptions of fatal injury incidents suggest many people engage in unsafe work practices with their tractors in the woods. As mentioned earlier, over 50% of the fatal incidents in Pennsylvania involved farm tractors overturning from dragging or pulling trees, logs, and limbs. If this task is not approached correctly, numerous hazards to the operator are created. For example, attaching a chain or cable to a point higher on the tractor than the drawbar increases the risks of a rear overturn if a log catches on a rock, stump, or ground depression (See Figures 5 and 6). Soft, muddy soil can increase the loading on the tractor and contribute to the overturn as well. The tractor can rear over backwards in less than a second. Running over a stump, rock or tree trunk with one rear tire, especially while already on sloped ground or turning, increases the risk of a side overturn (see Figure 7).

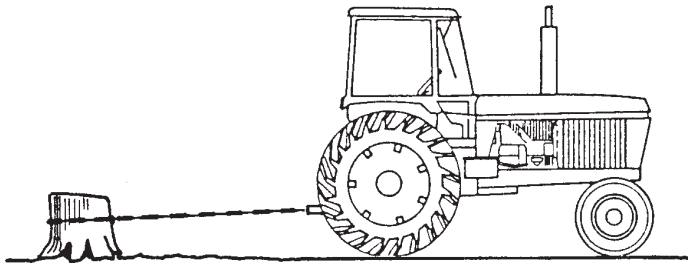

Figure 5. An example of safe hitching. The drawbar will lower if the front end rises. This reduces the risk of a rear overturn.

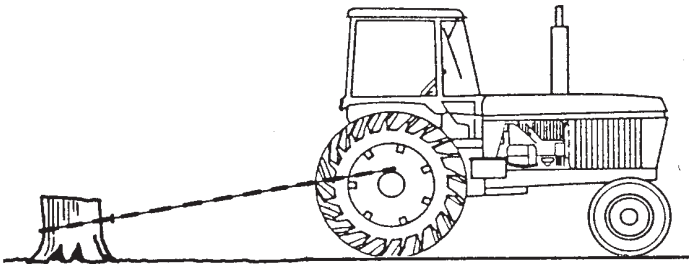

Figure 6. An example of unsafe hitching. The attachment point does not lower if the front end rises, increasing the risk of a rear overturn.

A tractor's **center of gravity** shifts outside the stability baseline when a wheel hits a high object or depressed area.

A tractor's **stability baseline** is an imaginary line between the front and rear tires.

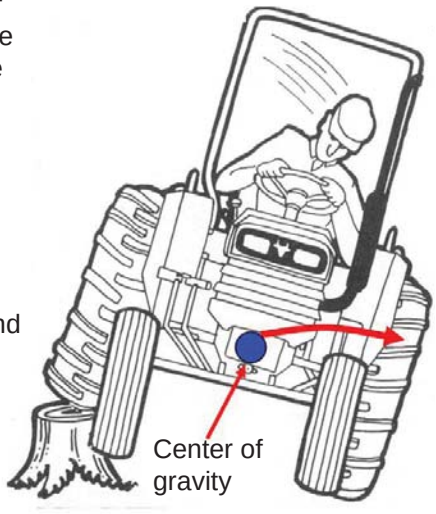

Figure 7. When the rear wheel runs over a stump, the center of gravity shifts toward the side stability baseline, increasing the risk of a side overturn.

Attempting to drag logs or to pull or push limbs down with a front-end loader can also be hazardous, especially if the bucket is raised high to accomplish the task. Raising the bucket raises the center of gravity of the tractor allowing the tractor to tip over sideways more quickly. A front end loader also moves the center of gravity forward. Raising a bucket and pushing on limbs or tree trunks applies elevated forces that readily overturn almost any farm tractor.

Review Penn State's Fact Sheet E 34, Tractor Overturn Hazards, for a full explanation of the principles regarding tractor overturn hazards.

Dragging and Pulling Best Safety Practices

Fortunately, there is equipment and practices that can significantly increase the safety of dragging and pulling logs and trees with farm tractors in wooded areas. In addition to safely equipping the tractor, there are skid cones,

Figure 8. A log arch, fetching arch or sulky lifts the end of the log being dragged to keep it from digging into the earth, rocks, roots, or stumps.

log arches, 3-pt. mounted grapples and 3-pt winch equipped skidding implements that can be reasonably purchased for use (See Figures 8 and 9). Any device which prevents the log from twisting or rolling out of control while being skidded will increase safety to the operator.

Log dragging practices that reduce risk are:

• Only use tractors with ROPS/FOPS protection. If the tractor has a ROPS cab, a protective grill should cover the rear window. If the tractor uses a 2-post or 4-post type of ROPS/FOPS, the rear opening should be covered with a grill (See Figure 9, right side tractor).

• Use chain or choker cables to attach to the log and place them within one foot of the end of the log.

• If only chains are used for skidding logs, the chain should be attached only to the drawbar.

• Chains being used for skidding should not be so long that they will catch on the rear tire when the tractor is turning.

• Use of arches, grapples and winches are much preferred for any dragging operation (See Figures 8 and 9).

• If log arches, grapples or winches are used, their size needs to match with the size and power of the tractor. Be sure to check manufacturers recommendations.

• With PTO driven winches, be sure to keep PTO guards in place.

• Operate winches only from the tractor seat to prevent winch cables and chokers from striking the operator.

• Lower all 3-pt mounted equipment and lock brakes before dismounting the tractor.

• Always wear a cutter's helmet with hearing and eye protection. If you don't have a cutter's helmet, wear a hard hat with separate hearing and eye protection. Steel-toed work boots should always be worn. During cutting operations also wear chain saw safety chaps. If handling steel cable, wear leather work gloves.

Figure 9. Examples of a 3-point mounted grapple and a 3-point mounted winch for safely moving logs. The tractor on the right is shown with a metal grill.

Summary

Farm tractors are often used by farmers and rural land owners to help manage wood lots, clear fence rows, and cut and gather firewood. The standard farm tractor is not normally equipped to minimize hazard exposures to the operator or damage to the tractor during timber work. Some operational practices by tractor operators with trees and logs adds risk of injury to them and to their tractor. Farm tractors can be modified to increase their safe use in the woods even though one of the most important modifications, a FOPS, is not readily available in the agricultural tractor marketplace. Several best safety practices for using farm tractors in the woods have been identified. Operators should carefully evaluate their tractor, and check for danger trees and other work site hazards before working in the woods with their regular farm tractor.

For more agricultural safety information, visit **www.agsafety.psu.edu**

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