





 This presentation covers some of the safety aspects of equipment used in large round bale packages such as: front-end loaders and bale handling and transport devices.







Large Round Bale Safety



- The key to safe and efficient systems for handling large round bales is an operator who knows the hazards involved and who follows safety practices that can prevent accidents.
- Operators must be constantly alert for situations that may cause injury to themselves or others. Besides pain and suffering, accidents contribute to higher costs in terms of unnecessary downtime or costly machine repairs.





- Whereas small square bales, weighing 35 to 85 pounds, are traditionally handled and stacked manually or with a bale loader, large round bales usually weigh between 500 and 2,500 pounds and must be handled mechanically.
 - Because of their weight, these bales can cause significant injury if they roll into or fall on an individual.
 - Many farmers use hauling equipment designed for small square bales to handle these larger packages (sometimes with minor modifications).
 - When done improperly, this can lead to injury or death due to overturning or crushing.







- Many people use front-end loaders to move and stack large round bales.
- Use caution when hauling large round bales or any heavy load on a front-end loader so that you avoid side overturns and being crushed from a bale rolling down upon the tractor.







• Side overturns result from the change in the tractor's center of gravity due to the additional weight of the bale.



This figure shows what happens to the center of gravity.

•The point marked "X" is the normal center of gravity with a front-end loader.

•When a large round bale is carried on the front-end loader close to the ground, the center of gravity moves forward, represented by point "Y."

•As a large bale is lifted, the center of gravity moves to a point marked "Z".

•When the load is raised, the shift in center of gravity increases the chance of overturning.

•The point marked "O" is the center of gravity for the round bale.







 Some operators will carry the load high for improved visibility while driving. However, when the loader is raised as shown, the center of gravity moves to the point marked "Z," which is both forward and higher than the original center of gravity, "X." In the raised position, the tractor is less stable and the potential for side overturn increases.



• Now visualize this tractor on a slope with two wheels on the downhill side and two wheels on uphill side. As the bale is lifted, the center of gravity gets higher and the potential for the tractor to roll down the hill increases.







- The chance of side overturns increases when carrying a load on the front-end loader, especially on slightly rough ground.
- A loss of traction occurs when weight is transferred from the rear tires during bale handling.
- Another dangerous situation occurs when the loader is raised too high.





Front-End Loader Safety Tips



- Never walk or work under a raised loader.
- Raise and lower loader arms slowly and steadily.
- Allow for the extra length of the loader when making turns.
- Be careful when handling loose or shiftable loads.
- Never move or swing a load as long as people are in the work area.
- Stay away from the outer edge when working along high banks and slopes.
- Watch for overhead wires and obstacles when you raise the loader.
- Carry the load low to the ground and watch for obstructions on the ground.
- Always use the recommended amount of counterweight to ensure good stability. Add recommended wheel ballast or rear weight.
- Operate the loader from the operator's seat only.
- Move the wheels to the widest recommended settings to increase stability.
- Do not lift or carry anyone on the loader, bucket or attachments.
- Lower the loader when parking or servicing.
- Assure all parked loaders are on a firm, level surface and all safety devices are engaged.
- Visually check for hydraulic leaks and broken, missing or malfunctioning parts, then make necessary repairs.
- Under pressure, escaping hydraulic oil can have sufficient force to penetrate the skin, causing serious personal injury. Injuries resulting from oil penetrating the skin are very difficult to treat. Use a piece of cardboard or paper to check for pinhole leaks.
- Before disconnecting hydraulic lines, relieve all hydraulic pressure.
- Be certain anyone operating the loader is aware of safe operating practices and potential hazards.
- Extending the tines of a loader may look like a good way to solve the loading problem, but when this is done the tractor's center of gravity is moved forward. Extra stress is placed on the loader, the hydraulic system and tractor front end.
- All tractors used to move bales should have roll-over protective structures (ROPS). ROPS can either be a protective enclosed cab or a roll bar with a canopy.
- Tractor operators should utilize the tractor seat belt at all times when operating the tractor, regardless of the task that is being done.





Bale Handling Devices



- A number of large bale handling devices have appeared on the market. Three-point hitch spears that are pushed through the bale and fingers that grasp the edges of the bale are available.
- Avoid lifting bales with a 3-point lift on the rear to a height where the front tractor wheels are barely in contact with the ground.
- Rear tires are better suited to carry the extra weight, and there is less chance of side overturns because the bale is not lifted as high.





Bale Handling Devices



• There is some increased possibility for rear overturns. However, the bale or carrying attachment may help prevent the tractor from having a rear overturn. Some operators use both a rear-mounted handler and frontend loaders.



Rear and front-end bale-handling devices





Bale Handling Devices



- If possible, try to operate bale handling devices on fairly level ground. When picking up a bale with a front- end loader, drive up the slope in order to spear the bale.
- When using a front-end loader to load round bales on a trailer, drive the trailer across the slope and load from the uphill or downhill side.



Rear and front-end bale-handling devices







- 43% of agricultural fatalities are transportation related (in TX)
- Special low clearance trailers that carry 4 to 10 bales and also load bales directly from the ground are available.
- Since these trailers can carry 4 to 10 bales, there can be a problem with stopping the load. At 1,500 pounds per bale, load size is between 3 to 7 tons. Add the weight of the bale trailer to this and the total transport weight approaches 9 tons. The tractor must be the proper size and weight to safely stop the entire bale and trailer weight.







Tractors







Tractor Safety Concerns

- Overturns
- Run-over incidents
- Highway accidents
- Falls
- Collision with other objects









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Tractor Overturns

- Occur when the tractor's center of gravity falls outside of it's
 "base of stability"
- Include both side and rear rollovers

Rollovers account for over 1/2 of all tractor fatalities































Tractor Rear Overturn





The "point of no return" during a rear turnover drawbar, may be reached in <u>only ³/4 of a second</u>!! causing the overturn. M

Source: Agriculture Safety, Deere & Company, Inc.





Tractor Side Overturn







Preventing Overturns

- Drive at appropriate speeds
- Set wheel tread as wide as possible
- Stay away from steep slopes
- Avoid driving on soft shoulders
- Keep front-end loader loads low to the ground







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Tractor Run-Over

Major Causes of Run-over Accidents

- Bypassing the ignition switch to start tractor
- Failure to set parking brake on slope
- Falling or jumping off tractor
- Failure to acknowledge bystanders







Preventing Run-Over Accidents



- Only start tractor while sitting in the seat
- Never disable safety switches
- Always set parking brake before dismounting
- Look for bystanders before starting tractor



TRACTORS HAVE ONE SEAT FOR A REASON! - NEVER CARRY A PASSENGER -







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Tractor Highway Accidents

- Most tractor highway accidents occur:
 - During planting and harvesting seasons
 - Between 3 pm and 6 pm
 - Where posted speed limits are greater than 50 mph
- Most accidents caused by excessive speed of other vehicles









Safe Highway Operation

- Make sure the tractor is safe to drive (steering, brakes, etc.)
- Make tractor visible to other drivers
 - Slow-Moving Vehicle [SMV] emblem
 - Flashers
 - Lights
- Drive at controllable speeds
- Lock brake pedals together on highway
- Wear seatbelt









SMV Emblem







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Falls on Tractors



How do falls occur?

- Being thrown off seat when hitting a hole, stump, or ditch
- Extra riders
- Slipping on steps and platforms when mounting or dismounting
- Leaving the deck cluttered with tools and other items
- Riding on the implement being towed









Preventing Tractor Falls

- Maintain all steps and hand-holds to prevent slips
- Keep platform clear of any excessive debris
- Do not allow extra riders on the tractor at any time
- Wear seat belt to avoid being thrown
- Never ride on implements







Tractor Safety Concerns

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Collision with Objects

- Collision with objects can occur in many different ways:
 - Occur while driving an open cab tractor and hitting overhanging limbs or obstacles
 - Running into other objects, such as trees, stumps, and even people
- To prevent collisions: Always be attentive to surroundings to avoid any obstacles







Trucks and Trailers





Trucks/Trailers

- Only authorized, licensed personnel operate vehicles
- Inspect vehicles on an annual basis
- Daily inspect trucks/trailers before and after use







- Keep people out of the area between the trailer and tractor during hitching. Hand signals should be used and understood by both the operator and those assisting
 - Hitch the trailer only to the drawbar; never attach to any other point on the tractor.
 - Assure the tractor drawbar is in the lowest, most centered and stationary position. This will keep the tractor's front wheels moving straight and provide extra steering control. Use a safety locking hitch-pin and secure the trailer with chains.









- A slow-moving vehicle (SMV) emblem should be clean and visible. Any worn or faded emblems should be replaced.
- Farm vehicles are subject to all traffic laws.
 - If a trailer moves large round bales, the bales should be secured with a strap that has tensile strength greater than 1.5 times the load it is holding.
 - If the transport has large round bales stacked side by side, you probably have a wide load.
 - Check with state and local police for additional requirements.









- Do not allow bales to rest against the trailer tires.
 - At transport speeds, the friction of the hay against the rotating tire can generate enough heat to ignite the hay.
- Remember that trailers pulled by a pickup have faster transport speeds than tractors and heat sufficient to cause a fire can occur in a short distance (1/2 mile).
 - Trailer fires are difficult to control and can lead to loss of hay, trailer and tractor (or pickup).









- While driving on the highway with any vehicle, assure that the driver can see and be seen.
- Use flashing lights and have an SMV emblem properly mounted.
- Allow time to pull into and across traffic. Avoid sudden, erratic, or unexpected maneuvers.
- Keep to the right, pull over at a safe place to let traffic pass.
 - Never wave vehicles to pass; let drivers pass at their own discretion.
- Signal all turns well in advance and make sure no one is passing when turning left.
- Pull completely off the road if something goes wrong.





Tractor Operation Safety Tips



- Most injuries and fatalities occur from bales rolling out of the loading forks or bucket onto the operator.
- Know the tractor, the implements and how they work. Be thoroughly familiar with both the operator's manual and the tractor before starting.
- Know the controls, where they're located and how they work. Practice stopping the tractor and PTO quickly in the event of an emergency.
- Use roll-over protective structure (ROPS) and seat belts. <u>Most tractor</u> <u>fatalities are caused by overturns.</u>
- Be familiar with the terrain and drive safely. Use caution on slopes, slow down for all turns.
- While on the highway, use appropriate lighting and follow all rules of the road.
- Never operate an engine in a closed shed or garage. <u>Carbon monoxide is</u> colorless and deadly.





Tractor Operation Safety Tips (cont.)



- Keep the PTO properly shielded.
- Keep hitches low and always tow or pull from the drawbar. The tractor is designed so that it will not overturn backwards if the load is hitched properly to the drawbar.
- Never chain the rear wheels with a piece of wood to prevent slipping. The tractor can be "torqued-over." The torque supplied by the transmission will lift the tractor (rather than turning the wheels) and flip it over backwards.
- Never jump off a moving tractor or leave it with the engine running. Never try to jump onto a runaway tractor; it is extremely dangerous.
- Never refuel while the engine is running. Never refuel an overheated engine. Do not add coolant or water to a radiator while the engine is hot; radiator coolant can erupt and scald.
- Keep children off and away from the tractor, implements and attachments at all times.
- Never be in a hurry. Take your time, take a break and do it right.
- Keep safety signs clean, readable and free from obstructing material. Replace damaged or missing safety emblems with new ones.
- Do not transport wide loads after daylight hours, in poor visibility or bad weather.





Awareness



- Fatigue often is an operator's most common physical problem.
- Long workdays can be tiring.
- Fatigue can slow reaction time, impair memory, and even cause hallucinations.
- Safety breaks, which include stretching, breathing deeply, and periodically walking around, can help prevent the effects of fatigue or boredom.
- If you feel drowsy, stop and have a cup of coffee, soda or soup. If you still feel drowsy, discontinue operations that need your full attention.





Conclusion



- Safety, in the final analysis, is largely a matter of common sense and patience.
- Most manufacturers have designed and built equipment with your safety in mind.
- The ultimate responsibility for safe and proper operation lies with the operator.









