

Safety on the Farm: Can You Live Without It?

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Safety Topics

- Tractors and farm machinery
- All-terrain vehicles (ATVs)
- Chain saws
- **Animals**
- Grain storage
- Hand and power tools
- Respiratory hazards
- Pesticides
- Water supply
- Ergonomics

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Types of Agricultural Risk

1. Production risk
 - Weather, pests, equipment breakdowns, etc.
2. Marketing risk
 - Uncertainty in the market for your product
3. Financial risk
 - Ability to pay the farm's cash obligations in a timely manner (liquidity) and protect or grow your equity (solvency)
4. Legal risk
 - Possibility of being sued, fined or penalized
5. People risk (a.k.a. human resources risk)
 - The four D's – death, divorce, disability & disagreement

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Responsibilities Under OSHA Act

- A farmer who employs one or more persons has....
 - To comply with the agricultural safety standards;
 - To comply with record keeping and other reporting responsibilities, such as reporting accidents, posting of a citation, etc.; and
 - To comply with the general duty clause
 - which states that every employer must furnish each employee a place of employment free from all recognized hazards causing or likely to cause death or serious injury
- Immediate family members are not covered by the act
- Does not prevent personal injury lawsuit from being filed against farmer on behalf of the injured

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What is a Hazard?

- A hazard is anything that could hurt you or make you sick

			
Cut you	Trip you	Burn you	Crush you
			
Hurt your hearing	Hurt your eyes	Cause you pain	Make you sick

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Common Agricultural Hazards

- Equipment (tractors, machinery, ATVs, mowers)
- Terrain (slips & falls)
- Ergonomics (lifting, repetitive trauma)
- Noise (tractors, chain saws, shop equipment)
- Respiratory (dusts, molds, toxic gasses)
- Chemicals (pesticides, fertilizers, fuels)
- Animals (temperment, handling facilities)
- Biologicals (vet medicines, zoonoses)
- Stress & fatigue (lose concentration & focus)
- Skin exposures (sun, heat, chemicals, microbes)

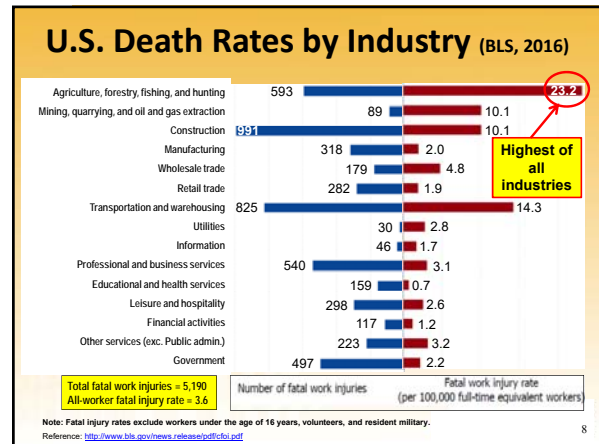
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U.S. Statistics - Agriculture

- 1,202,000 full-time + 1,978,000 part-time workers employed in production agriculture (U.S. Ag Census, 2012)
- One U.S. farmer produces food and fiber for 165 people (American Farm Bureau, 2017)
- Each day, 243 agricultural workers suffer lost-work-time-injuries; 5% result in permanent impairment
- Slips and falls are the leading cause of farm-related injuries
- Unlike most industries, farm family members are also at risk for injuries, illnesses & deaths

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Reference: www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_1_USLiv1.pdf



Why So High in Agriculture ?

- High % of women, children & over-65 workers
- Long hours
- Poor working conditions
- Slower medical access (golden hour)
- Education (no organized training)
- Skills (seasonal)
- Legislation (exemptions)

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U.S. Annual Statistics - Agriculture

- 590+ farmers & ranchers die in work-related accidents
- 88,700+ ag workers suffer disabling injuries from work-related accidents (under-reported)
- 115+ youth die on farms (34% are age 16-19), most as
 - Innocent bystanders
 - Passengers on farm equipment
- 17% of all farm injuries are caused by animals
- Over one-third of farm tractors have no ROPS with seat belts

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Did You Know That....

- The fatality rate for farmers is **644% higher** than for other American workers? (2016)
- Tractors are the leading cause of death on farms?
- The most frequent causes of tractor-related deaths are side and rear overturns?
- 80% of deaths caused by rollovers happen to experienced farmers?

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Did You Know That....


- 1 in 7 farmers involved in a tractor overturn is permanently disabled?
- 7 out of 10 farms will go out of business within 5 years of a tractor overturn fatality?
- When used with a seatbelt, rollover protective structures (ROPS) are **99% effective** in preventing injury or death in the event of an overturn?

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Farmers' Perceptions


- Inconvenience
- "Never happen to me"
- Independence
- No reward
- Added cost
- Number of hazards
- Habits
- Self-image






Errors = Accidents

- Forgot something
- Took a shortcut
- Took a calculated risk
- Ignored a warning
- Used unsafe practices
- Was preoccupied
- Didn't see hazard






Farm Hazard Assessment 1

Farm buildings and shop


	Hazards present		Target correction date	Hazard fixed
	Yes	No		
1. Are all buildings free of trash, junk or tools in walkways and work areas?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>
2. Are wood floors free of rotten or broken floor boards, exposed nails and other defects?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>
3. Are concrete floors free from badly broken sections, raised areas, slippery spots or other defects?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>
4. Are stairs and ladders in good condition? Are handrails and stairs secure and free of objects and slippery substances?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>



Farm Hazard Assessment 2

Tractors

	Hazards present		Target correction date	Hazard fixed
	Yes	No		
1. Do tractors have a rollover protective structure (ROPS) or a ROPS equipped cab?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>
2. Do tractors with a ROPS also have seat belts?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>
3. Is the PTO master shield in place and in good condition?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>
4. Are the fuel, oil and hydraulic systems free of leaks and maintained at recommended levels?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>
5. Are the operator's platforms free of grease, mud and tools?	<input type="checkbox"/>	<input type="checkbox"/>	/ /	<input type="checkbox"/>




Youth Learning to Drive

Tractor Accidents

Age	Tractor Accidents
1-4	3%
5-14	16%
15-24	19%
25-44	29%
45-64	28%
65+	5%

Tractor Accident Rate (Michigan & Ohio)

Operator Age	Frequency (Accidents per Million Hours of Use)
10-14	43.0
15-24	9.6
25-44	4.5
45-64	5.6
65+	29.7



Child Farm Safety




- Children can be exposed to dangerous situations 24 hours a day on the farm
- The farm is both a work and home environment for many families
- Without a separation between the two environments, children can be exposed to tremendous risks





Set Up Safety Rules


1. Designate safe play areas
2. Determine other areas that might attract children
3. Identify dangers with children
4. Be a role model for safe practices

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Prepare Yourself

- Read the operator's manual
- Learn location & use of tractor controls, gauges & dials
- Understand speeds, slope capabilities, braking & steering characteristics, and tractor-equipment clearances
- Observe & question a skilled operator until comfortable with procedures
- Good physical & mental condition
 - No medications or alcohol
- Proper protective gear



Protective Gear

- Sturdy shoes, not tennis shoes
- Long pants (flying debris, skin irritants, exhaust burns)
- Gloves (cuts, abrasions, chemicals, skin irritants)
- Hearing protection (noise)
- Safety glasses or goggles for eyes (flying debris)
- Dust mask (dust, mold & pollen inhalation)
- Sunscreen
- First-aid kit close by

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Protect from Skin Cancer

- Sunscreen with SPF 15 or higher
- Clothing that is sun-protective
- Hat with a wide brim all the way around
- Eyeglasses that block both UVA & UVB rays
- Shade, especially between 10 a.m. & 4 p.m.





Photo credits: www.gempliers.com
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Know Your Equipment



Read the owner's manual
prior to equipment use

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Heed "Signal Words"

CAUTION

1. Never start tractor at low speeds.
2. Carry loader arms at a low position during transport.
3. Lower loader arms when parking or servicing.
4. Add extra weight when lifting or rear weight for pulling.
5. Check wheels to insure recommended settings to increase stability.
6. Do not stand or work under raised loader.
7. Observe safety recommendations in operator's manual.

WARNING

Before dismounting and transmission into neutral, lock brakes, disengage PTO.

DANGER

to prevent personal injury pull only from drawbar except when pulling implements designed for and properly fastened by three point hitch.

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Learn Basic Hand Signals 1

Start the engine
Move arm in a circle at waist level, as though you were cranking an engine.

Stop the engine
Move your right arm across your neck from left to right in a "throat-cutting" motion.

Stop
Raise hand upward, arm fully extended, palm to the front. Hold that position until the signal is understood.

Move toward me - follow me
Look toward person or vehicle you want moved. Hold one hand in front of you, palm facing you, and move your fore arm back and forth.

Move out - take off
Face desired direction of movement. Extend arm straight out behind you, then swing it overhead and forward until it's straight out in front of you with palm down.

Come to me - (May mean "Come help me" in an emergency)
Raise arm vertically overhead, palm to the front, and circle in large horizontal circles.

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Learn Basic Hand Signals 2

Speed it up - increase speed
Raise hand to shoulder, fist closed. Thrust fist upward to full extent of arm and back to shoulder rapidly several times.

Slow it down - decrease speed
Extend arm horizontally sideward, palm down, and wave arm downward 45° minimum several times, keeping arm straight. Don't move arm above horizontal.

Raise equipment
Point upward with fore finger, making a circle at head level with your hand.

This far to go
Put hands in front of face, palms facing each other. Move hands together or further apart to indicate how far to go.

Lower equipment
Point toward the ground with forefinger of one hand while moving the hand in a circular motion.

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Prepare Your Equipment

- Check that all guards are in place & operating
- Make all necessary adjustments before turning on the machine
- Be sure the tractor is equipped with a roll-over protective structure (ROPS) & seat belt. If not, have it retrofitted for one
- Fuel tractor outdoors with engine stopped and cool. Do not smoke while fueling
- Be sure the slow-moving-vehicle (SMV) emblem is in place. Check that the warning lights are present & working

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Make Sure Fire Extinguisher Works

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Dangers of Used Equipment

- Are operating manuals included?
- Are shield and guards in place?
 - PTO master shield, starter solenoid cover, steering components
- Is the equipment in decent condition?
 - No narrow front end
 - Slow-moving vehicle (SMV) emblems, working lights
- Is tractor equipped with a Roll-Over Protective Structure (ROPS) and seat belt
 - Required since Oct. 1976

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Missouri Fatal Farm Accidents

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“Weather Cab” – Not a ROPS



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Roll-Over Protective Structures



2-Post ROPS



4-Post ROPS

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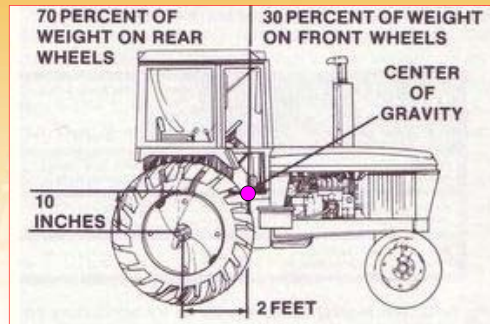
Stay in the ROPS “Zone of Protection”



Use of ROPS and seatbelt are 99% effective in preventing deaths due to tractor overturns.

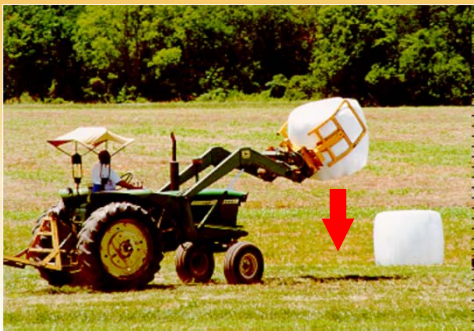
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Center of Gravity Affects Stability



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Carry Loads as Low as Possible



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Improper Front and Rear Loads




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Ballast According to Load

Check owner's manual for recommended ballast weights and locations



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Inattention / Preoccupation



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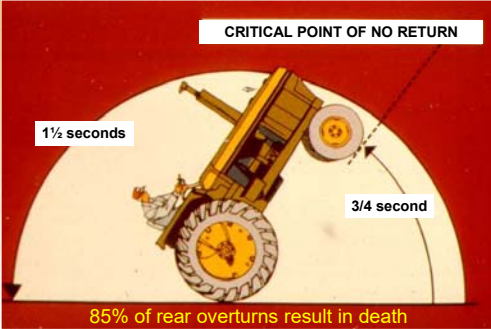
NO Riders!!



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Rear Overturns



CRITICAL POINT OF NO RETURN

1 1/2 seconds

3/4 second

85% of rear overturns result in death

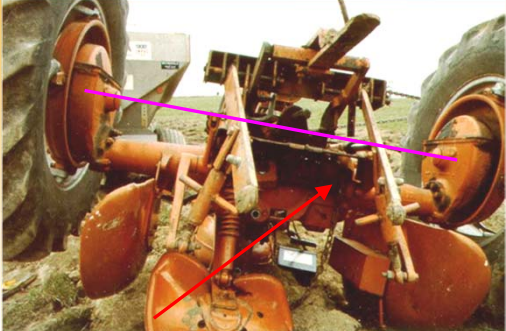
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Anatomy of a Rear Overturn 1

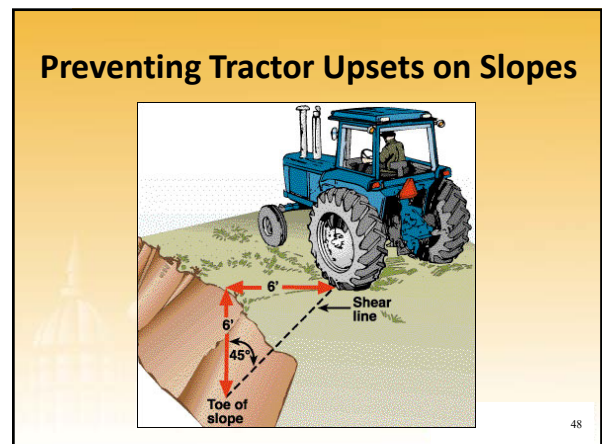
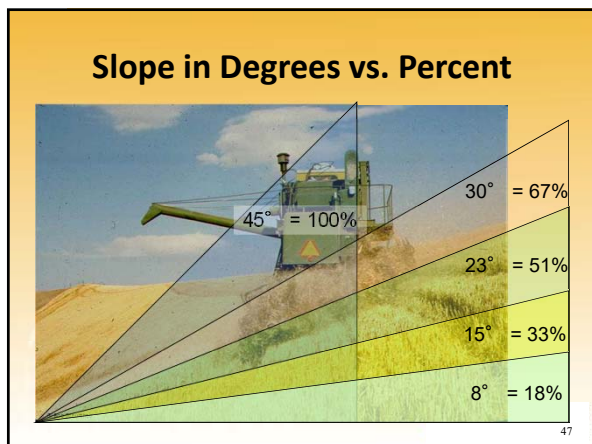
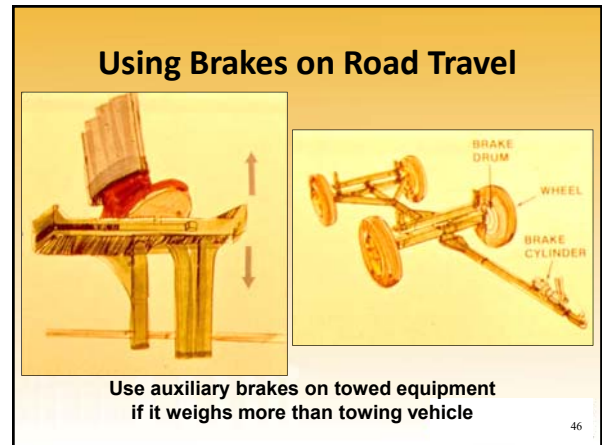
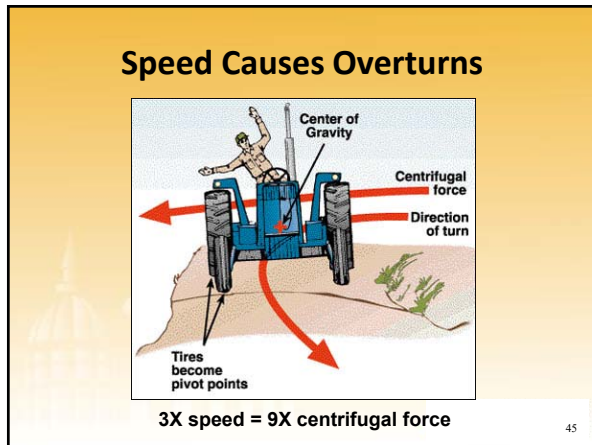


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Anatomy of a Rear Overturn 2



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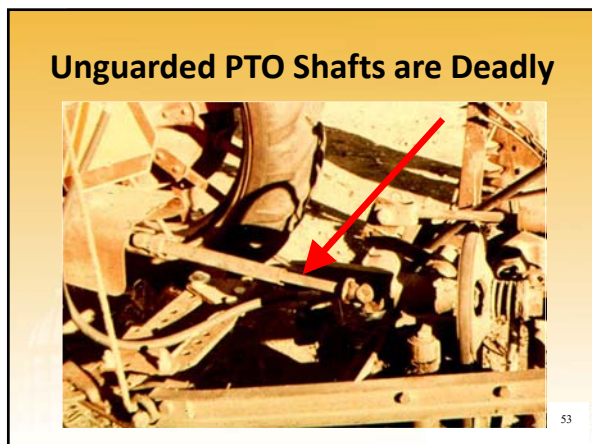




What is a Power-Take-Off (PTO)?

- The PTO provides a means of transmitting power between a tractor and another piece of farm machinery
- A few examples of PTO-driven equipment:
 - Hay balers
 - Rotary cutters
 - Sickle mowers
 - Forage blowers
 - Irrigation pumps
 - Generators

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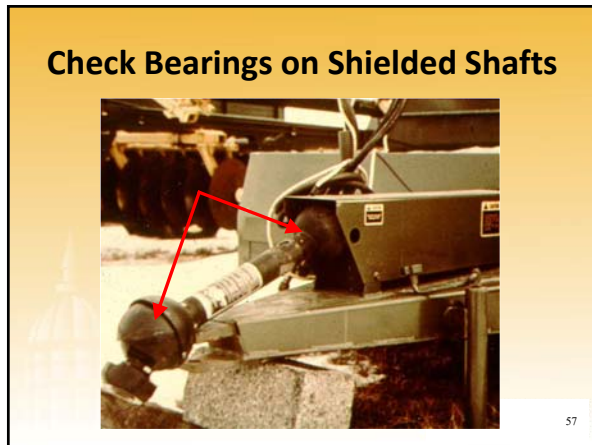
Reaction Time vs. Distance

Chain moves at 40-55 MPH
(60-80 feet per second = 600 teeth per sec.)

Distance Traveled in Feet

Time (sec.)	PTO @ 540 rpm	PTO @ 1000 rpm	Tractor @ 20 mph	Object Thrown by 21" Mower	Chain Saw @ full throttle
0.3	2.1	3.9	9	89	20
0.5	3.5	6.5	15	156	33
0.7	4.9	9.2	21	218	46
1.0	7.1	13.1	29	312	66

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PTO Safety Rules

- Keep all PTO guards and shields in place
- Wear snug-fitting clothes; tie back long hair
- Never hook 540-rpm equipment to a 1,000-rpm PTO or vice versa
- Never engage the PTO with the machine engine shut off
- Never operate PTO shafts at extreme angles
- Be sure that PTO spinner shields rotate freely at all times
- Be sure PTO is disengaged before starting power source
- Do not step over an operating PTO
- Disengage all power and shut off equipment before servicing

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Beware Pressure of Hydraulics

Pressure can exceed 10,000 psi. It only takes 1,200 psi to inject oil through skin

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Checking Hydraulics for Leaks

Pass cardboard along hoses to locate oil leaks



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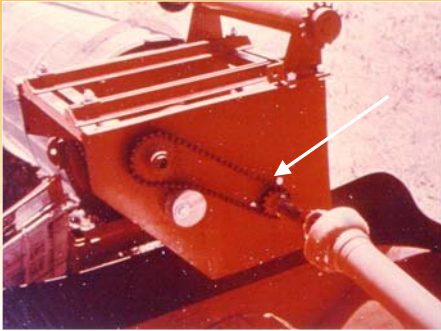
Balers Have Many Danger Zones



Turn off equipment before service or repair

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Install Guards on Exposed Drives



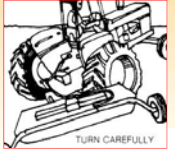
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Main Causes of Mower Accidents

- Driving too fast
- Operating unsafely on uneven ground
- Operating a mower that has not been mechanically maintained
- Pushing the mower beyond safe operating limits



WATCH FOR THROWN OBJECTS



TURN CAREFULLY

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Operating the Tractor Mower

Mow across slopes with side-mount, offset & sicklebar mowers




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Operating the Tractor Mower

Mow up and down slopes with rear-mount, pull-type & wing-type mowers

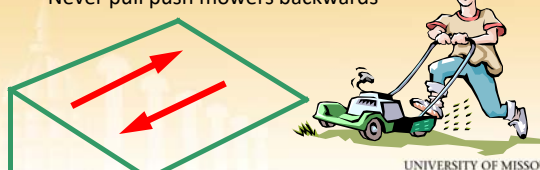


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Push Mowers

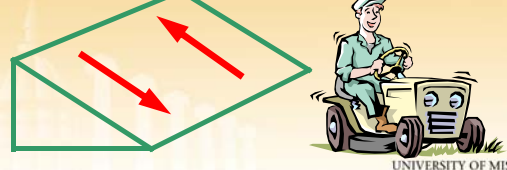
- U. S. Consumer Product Safety Commission estimates that 57,000 operators & bystanders are injured each year in mower-related accidents
- Mow across slopes, never up and down
- Never pull push mowers backwards



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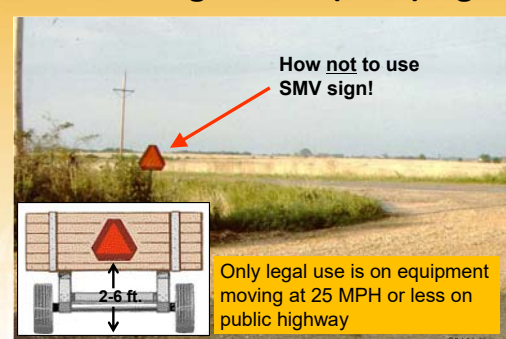
Riding Mowers

- Mow up and down slopes, never across
- Look behind you before backing up
- **No extra riders!!**

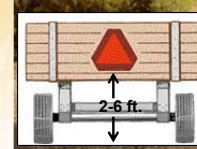


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Slow-Moving Vehicle (SMV) Signs



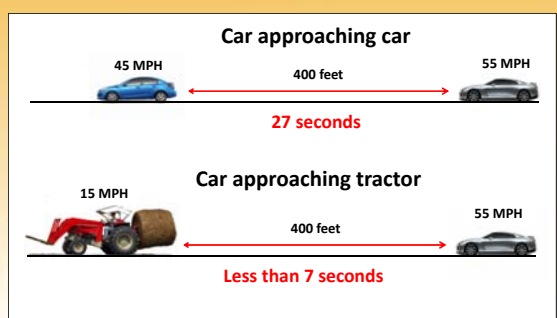
How not to use SMV sign!



Only legal use is on equipment moving at 25 MPH or less on public highway

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Be Aware of Reduced Closure Times



Car approaching car

45 MPH 400 feet 55 MPH

27 seconds

Car approaching tractor

15 MPH 400 feet 55 MPH

Less than 7 seconds

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Keep SMV Signs in Good Repair

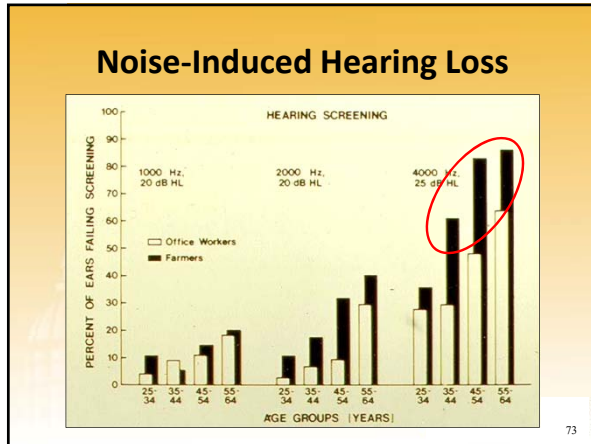


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Keep Lights On During Road Travel



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Tractor = 85-100 dB Sound Level

Duration (hours/day)	Sound Level (dBA)
8	90
4	95
2	100
1	105
1/2	110
1/4 or less	115

Source: OSHA Noise Standard

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- ### Hearing Loss Indicators
- Do you have trouble hearing when two or more people are talking?
 - Do you have trouble hearing over the telephone?
 - Do others complain you turn the TV volume up too high?
 - Do you strain to understand conversations?
 - Do you have trouble hearing if the background is noisy?
 - Do you frequently ask people to repeat themselves?
 - Do you think people mumble frequently?
- Rule of Thumb:**
If you need to raise your voice to be heard an arm's length away, the noise is loud enough to damage your hearing.
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- ### Animal Stress Can....
- Lower conception rates
 - Reduce immune function
 - Impair rumen function
 - Generally lower production
 - Reduces the ability to fight disease or gain weight
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- ### Cattle Psychology
- Cattle experience....
 - Hunger
 - Thirst
 - Fear
 - Illness
 - Injury
-
- Penn State
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Cattle Psychology ²

- Each animal has its own personality
 - Respond well to routine; work best in groups
 - Be calm and deliberate
- Remember painful experiences
 - A.I. & squeeze chute should not be the same
 - Excited cattle may take 20-30 minutes to calm down
- Natural tendency to circle
 - In order to see other herd members
 - In order to see what is behind them
- Very sensitive hearing
 - Avoid loud noises

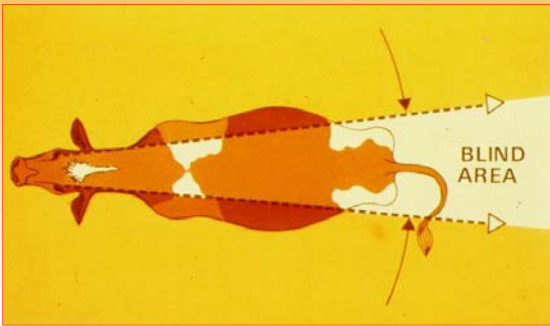
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Cattle Psychology ³

- Can't judge distances well
 - Keep wire fences visible
- See in black & white, limited color
- Balk at sudden light changes
 - Avoid bright spots & shadows
- Need the security of solid walls
 - Avoid pipe fences to move them
- Can see almost all the way around them
 - Use "flight zone" to move them

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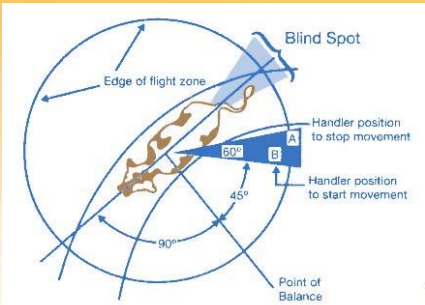
Stay Out of Blind Spot



The diagram shows a top-down view of a cow. A dashed line extends from the cow's head to the rear, with arrows pointing to the rear. The area behind the rear is labeled "BLIND AREA".

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"Flight Zone" An Animal's Personal Space ¹



The diagram shows a circle representing an animal's flight zone. A shaded area behind the animal is labeled "Blind Spot". The "Edge of flight zone" is indicated by a dashed line. Two handler positions are shown: "A" at a 60° angle from the animal's head, labeled "Handler position to stop movement", and "B" at a 45° angle, labeled "Handler position to start movement". A 90° angle is also marked. The "Point of Balance" is indicated at the center of the circle.

Diagram courtesy of Dr. Temple Grandin

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"Flight Zone" An Animal's Personal Space ²



Cattle face handler outside flight zone




Cattle turn away when handler enters flight zone

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Photo credits: grandin.com/behavior/principles/flightzone.html

Cattle Warning Signs

- Raised or laid-back ears
- Raised tail or hair on the back
- Bared teeth
- Pawing the ground or snorting



Reduce Distractions 1

- Chains that jiggle
- Clanging or banging metal
- Air hissing; high-pitched noises
- Barking dogs
- Changes in flooring and texture
 - Grates, shadows of pipe fences, etc.
- Reflections on metal or puddles
- Cracking whips
- Air drafts blowing towards approaching animals

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Reduce Distractions 2

- Unusual movement
 - Fan blades, piece of plastic, people ahead
- Clothing hung on the fence
- Small object on the floor
 - Coffee cup, trash
- Sudden changes in the color of equipment
- Bright light such as blinding sun
- Entrance too dark

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Reduce Distractions 3

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Reduce Distractions 4

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Rules for Working Cattle

- Move calmly & slowly around them
 - Animals respond to routine
 - Use "flight zone" to move them
- Be patient; never prod an animal when it has nowhere to go
- Gently touch them instead of shoving or bumping
- Respect livestock--don't fear them
- Always have an escape route from them

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AgrAbility National Resources

- National AgrAbility Project
www.agrability.org
- Assistive Technology Database
www.agrability.org/toolbox

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Summary

- **You** are the “safety director” for your farm
- Learn CPR and first aid
- Read & follow your owner’s manuals
- Do a regular safety hazard walk-around
- Get safety guides from your county University of Missouri Extension Center or on the Web at <https://extension2.missouri.edu/publications>



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Resources on the Web


- This presentation and related resources extension.missouri.edu/webster/presentations.aspx
- Missouri AgrAbility Project agrability.missouri.edu
- eXtension (access all the land-grant universities in the U.S.) <https://www.extension.org>



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Questions??

<p>Robert A. (Bob) Schultheis Natural Resource Engineering Specialist Webster County Extension Center 800 S. Marshall St. Marshfield, MO 65706 Voice: 417-859-2044 Fax: 417-468-2086 E-mail: schultheisr@missouri.edu Web: extension.missouri.edu/webster</p>	<p>Program Complaint Information To file a program complaint you may contact any of the following:</p> <p>University of Missouri</p> <ul style="list-style-type: none">▪ MU Extension AA/EEO Office 109 F. Whitten Hall, Columbia, MO 65211▪ MU Human Resources Office 130 Heinkel Bldg, Columbia, MO 65211 <p>USDA</p> <ul style="list-style-type: none">▪ Office of Civil Rights, Director Room 326-W, Whitten Building 14th and Independence Ave., SW Washington, DC 20250-9410
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