Safety on the Farm: Can You Live Without It?

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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

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

What is a Hazard?
• A hazard is anything that could hurt you or make you sick

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 (temperament, handling facilities)
• Biologicals (vet medicines, zoonoses)
• Stress & fatigue (lose concentration & focus)
• Skin exposures (sun, heat, chemicals, microbes)
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


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)

U.S. Death Rates by Industry (BLS, 2016)

<table>
<thead>
<tr>
<th>Industry</th>
<th>Fatality Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture, forestry, fishing, and hunting</td>
<td>14.3</td>
</tr>
<tr>
<td>Mining, quarrying, and oil and gas extraction</td>
<td>10.1</td>
</tr>
<tr>
<td>Construction</td>
<td>6.3</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>5.0</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>4.8</td>
</tr>
<tr>
<td>Retail trade</td>
<td>4.7</td>
</tr>
<tr>
<td>Transportation and warehousing</td>
<td>4.1</td>
</tr>
<tr>
<td>Utilities</td>
<td>2.8</td>
</tr>
<tr>
<td>Information</td>
<td>2.8</td>
</tr>
<tr>
<td>Professional and business services</td>
<td>1.4</td>
</tr>
<tr>
<td>Educational and health services</td>
<td>1.3</td>
</tr>
<tr>
<td>Leisure and hospitality</td>
<td>1.0</td>
</tr>
<tr>
<td>Financial activities</td>
<td>1.2</td>
</tr>
<tr>
<td>Other services (exc. Public admin.)</td>
<td>1.2</td>
</tr>
<tr>
<td>Government</td>
<td>1.8</td>
</tr>
</tbody>
</table>

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

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?

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?
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

- Tractors
  1. Do tractors have a rollover protective structure (ROPS) or a ROPS equipped cab?
  2. Do tractors with a ROPS also have seat belts?
  3. Is the PTO guard in place and in good condition?
  4. Are the fuel, oil and hydraulic systems free of leaks and maintained at recommended levels?
  5. Are the operator’s levers free of grease, mud and oils?

Youth Learning to Drive

<table>
<thead>
<tr>
<th>Age</th>
<th>Tractor Accidents</th>
<th>Tractor Accident Rate (Michigan &amp; Ohio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>3%</td>
<td>Operator Age (Million Hours of Use)</td>
</tr>
<tr>
<td>5-14</td>
<td>16%</td>
<td>10-14 42.0</td>
</tr>
<tr>
<td>15-24</td>
<td>19%</td>
<td>15-24 9.6</td>
</tr>
<tr>
<td>25-44</td>
<td>29%</td>
<td>25-44 4.5</td>
</tr>
<tr>
<td>45-64</td>
<td>28%</td>
<td>45-64 5.6</td>
</tr>
<tr>
<td>65+</td>
<td>5%</td>
<td>65+ 29.7</td>
</tr>
</tbody>
</table>

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

Photo credit: Nikki Fox - AP
**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

**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

**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.

**Know Your Equipment**

Read the owner’s manual prior to equipment use

**Heed “Signal Words”**

Read the owner’s manual
Learn Basic Hand Signals

1. Check the engine
2. Slow the engine
3. Stop
4. Move down - slow down
5. Move up - increase speed
6. Slow the tractor, making rounds

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

Make Sure Fire Extinguisher Works

Univ. of MO Tractor Clinic found 50% were not working

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

Missouri Fatal Farm Accidents

Farm Machinery
- 80%

Tractors
- 75%

Overturns
- 60%
Weather Cab” – Not a ROPS

Roll-Over Protective Structures

Stay in the ROPS “Zone of Protection”

Center of Gravity Affects Stability

Carry Loads as Low as Possible

Improper Front and Rear Loads
Ballast According to Load

Check owner’s manual for recommended ballast weights and locations.

Inattention / Preoccupation

Rear Overturns

Anatomy of a Rear Overturn

Anatomy of a Rear Overturn

NO Riders!!

85% of rear overturns result in death

1 1/2 seconds

3/4 second

CRITICAL POINT OF NO RETURN

85% of rear overturns result in death

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Anatomy of a Rear Overturn

Hitch It Low...Pull It Slow

Always hitch below axle of towing tractor

Speed Causes Overturns

3X speed = 9X centrifugal force

Using Brakes on Road Travel

Use auxiliary brakes on towed equipment if it weighs more than towing vehicle

Slope in Degrees vs. Percent

Preventing Tractor Upsets on Slopes

© Bob Schultheis
Even Large Tractors Can Overturn

Keep Weight on Uphill Side

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

Unguarded PTO Shafts are Deadly

Reaction Time vs. Distance

<table>
<thead>
<tr>
<th>Time (sec.)</th>
<th>PTO @ 540 rpm</th>
<th>PTO @ 1000 rpm</th>
<th>Tractor @ 20 mph</th>
<th>Object Thrown by 21&quot; Mower</th>
<th>Chain Saw @ full throttle</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>2.1</td>
<td>3.9</td>
<td>9</td>
<td>89</td>
<td>20</td>
</tr>
<tr>
<td>0.5</td>
<td>3.5</td>
<td>6.5</td>
<td>15</td>
<td>156</td>
<td>33</td>
</tr>
<tr>
<td>0.7</td>
<td>4.9</td>
<td>9.2</td>
<td>21</td>
<td>218</td>
<td>46</td>
</tr>
<tr>
<td>1.0</td>
<td>7.1</td>
<td>13.1</td>
<td>29</td>
<td>312</td>
<td>66</td>
</tr>
</tbody>
</table>

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

Beware Pressure of Hydraulics

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

Pass cardboard along hoses to locate oil leaks

Balers Have Many Danger Zones

Turn off equipment before service or repair

Install Guards on Exposed Drives

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

Operating the Tractor Mower

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

Operating the Tractor Mower

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

Riding Mowers

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

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

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

Keep SMV Signs in Good Repair

- Keep Lights On During Road Travel

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Noise-Induced Hearing Loss

Tractor = 85-100 dB Sound Level

<table>
<thead>
<tr>
<th>Duration (hours/day)</th>
<th>Sound Level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>95</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>105</td>
</tr>
<tr>
<td>1/2</td>
<td>110</td>
</tr>
<tr>
<td>1/4 or less</td>
<td>115</td>
</tr>
</tbody>
</table>

Source: OSHA Noise Standard

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.

Wear Appropriate Hearing Protection

Animal Stress Can....

- Lower conception rates
- Reduce immune function
- Impair rumen function
- Generally lower production
- Reduces the ability to fight disease or gain weight

Cattle Psychology

- Cattle experience....
  - Hunger
  - Thirst
  - Fear
  - Illness
  - Injury

Penn State
Cattle Psychology

- 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

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 jingle
- 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

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

Reduce Distractions 3
- 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

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

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

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

Questions??