FARM MACHINERY EMERGENCIES

2013 Virginia EMS Symposium

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EMT-I

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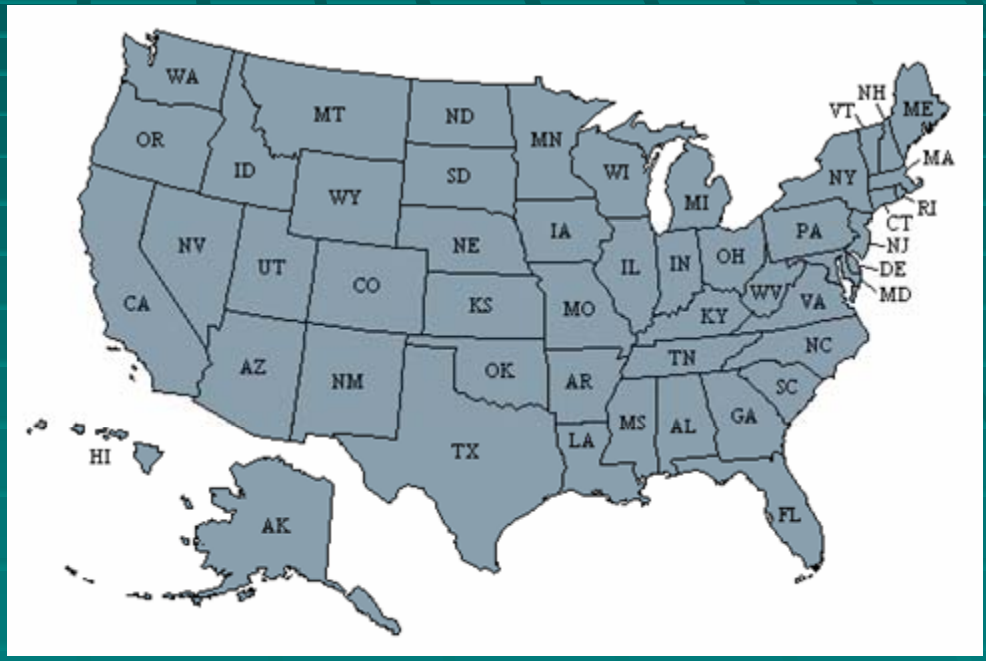
In the U.S., there are:

- 2.2 Million farms
- 1.2 Million farm operators
- 1.2 Million hired workers
- 3.0 Million migrant workers



Causes of Adult Deaths on Farms

- Machinery (mainly tractors)
- Being struck by objects
- Falls
- Drowning
- Animals

Causes of Youth Deaths on Farms

- Machinery
- Drowning
- Firearms
- Falling
- Asphyxiation
- Suffocation

Farm Deaths in Virginia

Source: Virginia Farm Bureau

Cause	2001	2003	2012	TOTAL 1994-2012
Tractor Overturn	10	5	1	107
Tractor or Equipment Run Over	1	3	4	49
Equipment on public road	0	1	0	16
Misc. tractor or equip related	5	2	0	58
Animal	0	0	2	8
Other (electrocution, chainsaw, etc.	3	1	0	34
ATV (farm)	0	1	1	8
Total	**19**	**13**	**8**	**280**

Farm Injuries in Virginia

Source: Virginia Farm Bureau

Cause	2001	2003	2012	TOTAL 1994-2012
Tractor Overturn	2	5	3	73
Tractor or Equipment Run Over	3	0	3	61
Equipment on public road	3	1	3	75
Misc. tractor or equip related	13	12	19	215
Animal	1	0	12	75
Other (electrocution, chainsaw, etc.	4	2	15	114
ATV (farm)	1	1	4	32
Total	**27**	**21**	**59**	**645**

AGRICULTURAL TRAUMA

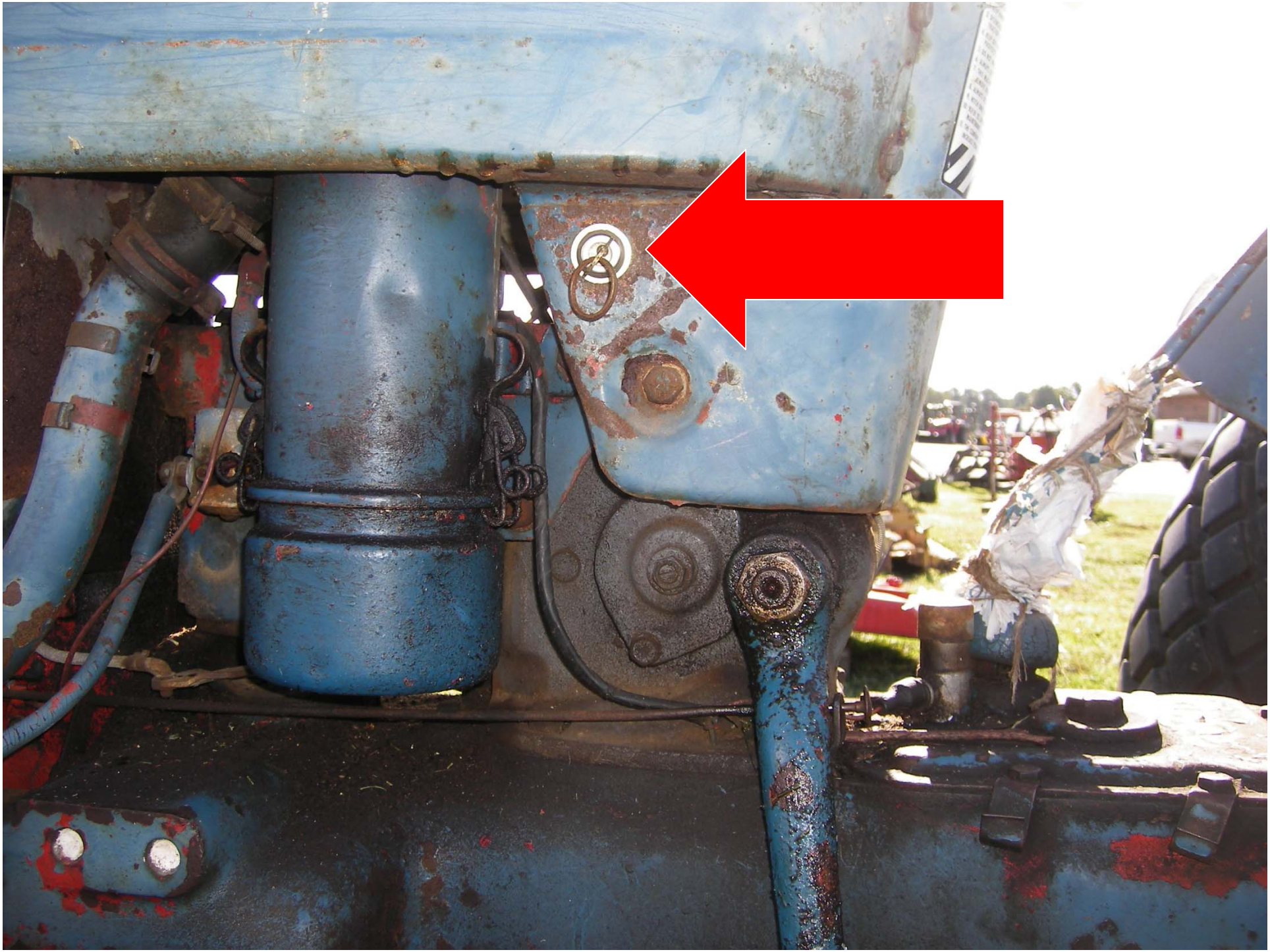
- 550 farmers die per year/US
  - 8 times the occupational average
- 140,000 disabling injuries per year

AGRICULTURAL TRAUMA

- Why?
  - Stress
  - Long hours
  - Solitude – Work alone
  - Weather
  - Hazardous situations
  - Familiarity – Don’t realize risks
  - Tradition – This is how it has always been done

EMS CONSIDERATIONS

- SAFETY FIRST
  - Cut off Machinery
  - Don’t attempt to operate unfamiliar equipment
  - Establish a hazard zone
    - No bystanders
    - Only necessary personnel
  - Don’t remove or disable safety guards




REEL
OUT
IN
REVERSER
ON
OFF
RAISE
LOWER
RAISE
LOWER
ON
OFF

EMS CONSIDERATIONS

- CALL IN EXPERTS
  - Other farmers
  - Farm Equipment Dealers
  - Fire Department
  - HAZMAT Team
- GIVE PSYCHOLOGICAL CARE
  - To patient
  - To family members

EMS CONSIDERATIONS

- FOR EXTENDED EXTRICATIONS:
  - Assess the situation
    - Plan
    - Organize
  - Consider air transport stand-by
  - Consider surgeon or doctor brought to scene
  - Maintain scene safety

Mechanics of Agricultural Trauma

- Tractors = 50% of farm fatalities
  - Overturns
    - High center of gravity/rough terrain
    - Tires often filled with water/anti-freeze
    - 50% of tractor fatalities
    - 97% male
    - Side overturns = 85% of all overturns
    - Rear overturns, 85% of these are fatal
    - If the tractor is large (15K to 30K lbs) need another tractor or tow truck to lift off. Most new tractors weight 10K to 20K.

Mechanics of Agricultural Trauma

- Tractors (cont.)
  - Runovers
    - 50% of these fall from tractor
      - Children and other extra riders
    - 27% are bystanders
    - Bypass starting
  - Injuries
    - Spinal injuries
    - Crushing injuries
    - Long bone fractures

Mechanics of Agricultural Trauma

- Tractors (cont.)
  - Roadway incidents
    - 13% of tractor fatalities
    - Wide loads – vehicles try to pass
    - Slow speed – vehicle drivers get impatient
    - Inadequate lighting or marking
      - Slow Moving Vehicle (SMV) signs
      - Reflective tape
    - Left turns

Tractor Rollovers

The main killer on farms today…

- Older tractors without ROPS and seatbelts.
- ROPS - rollover protective structure

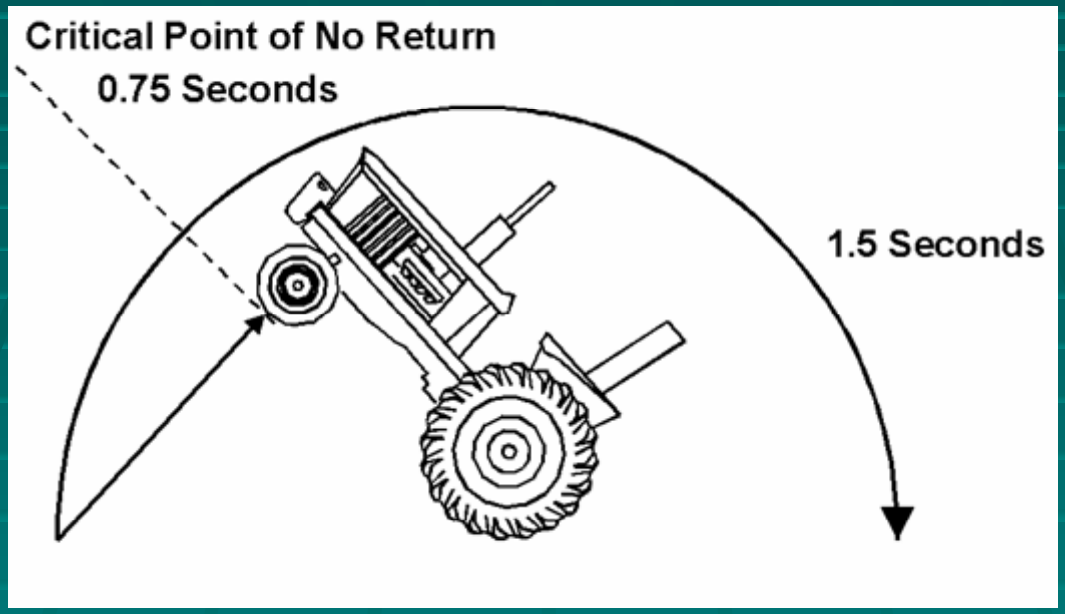
Tractor Rollovers

- Around 50% of farm tractors currently in use don't have a certified ROPS

National Safety Council – Farm Factsheet

Why do tractors overturn?

Tractor Rollovers



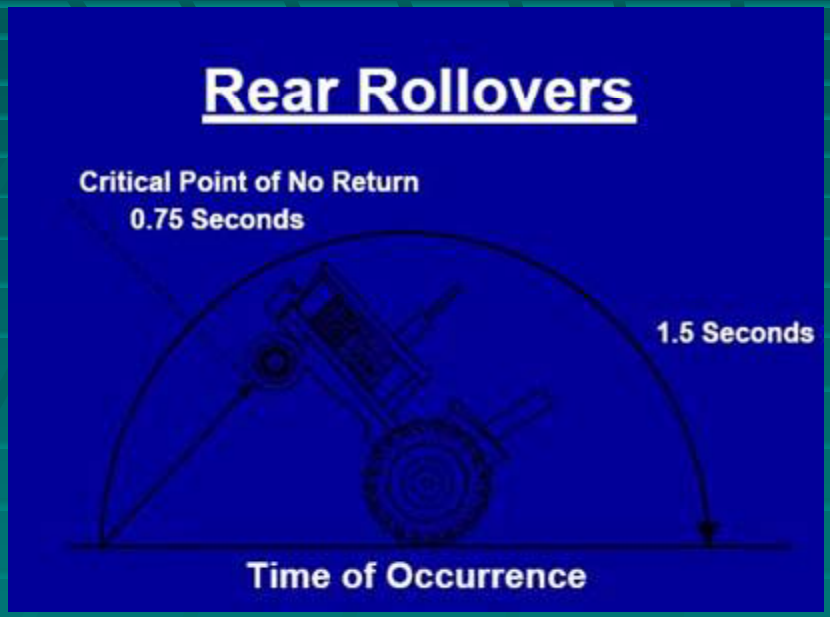
- Tractors have a high center of gravity and can overturn (sideways or backwards) in less than two seconds.

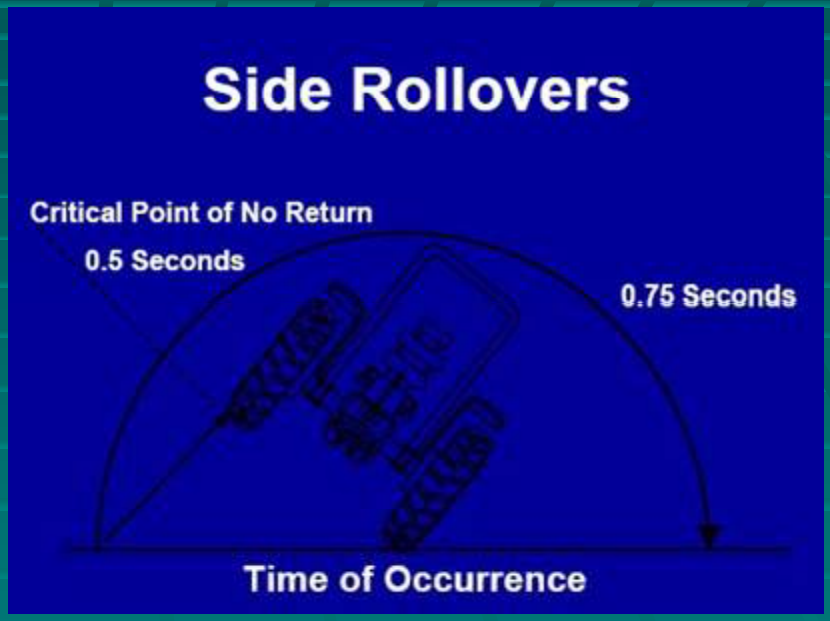
Tractor Rollovers

When do Tractors Rollover?

- On slopes or uneven terrain
- At speeds that render them unstable.
- With improper hitching of trailing equipment to axles
- Other tractor components that disrupt the tractor's center of gravity.

Which type of Rollover occurs most frequently?





- **Side Rollovers account for approximately 75% of the rollovers.**

Tractor Rollovers

- A tractor with ROPS and seatbelts provide a protected area for the operator in the event of an overturn.

Tractor Overturns

- No protection for the operator without ROPS.
- Remember, the momentum usually carries the tractor all the way over.

What do you think happened?

What do you think happened?

Tractor Rollovers

- Retrofitting older tractors with ROPS and a seatbelt will significantly reduce the risk of being fatally injured in a tractor overturn.
- Reduces rollover deaths to nearly zero.

Runovers

- Most occur when an operator or extra-rider falls from the tractor (50% of runovers.)
- 27 percent of runovers occur to bystanders.
- The other cause of runovers is starting a tractor while standing on the ground (the tractor starts in gear).

http://www.clemson.edu/farmsafetyandhealth/tractor.htm

Bypass Starting -Warning Sticker

Runovers

- What could go wrong?

Avoid Runovers

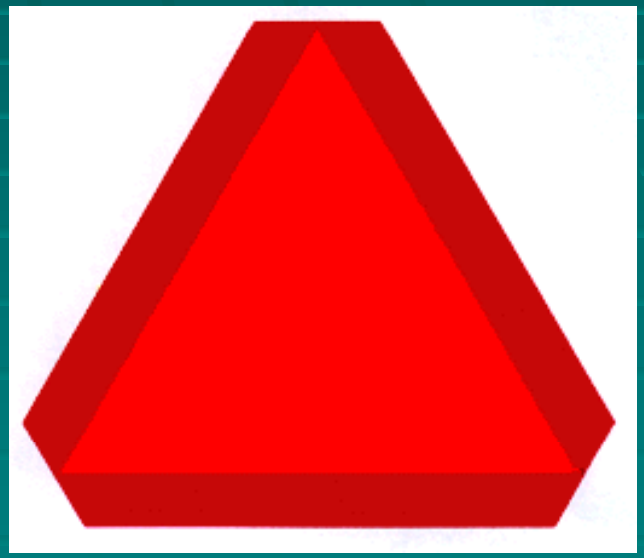
1. DO NOT ALLOW EXTRA RIDERS.
2. On ROPS tractors, Wear Your Seatbelt.
3. Pay Attention to Your Surroundings. Watch for bystanders and small children
4. Start from the Drivers Seat, Not the Ground - No Bypass Starting.

Highway Incidents

Highway incidents involve farm machinery and highway vehicles.

The most common incidents are:

- Left Turn Collision
- Rear End Collision
- Passing Collision



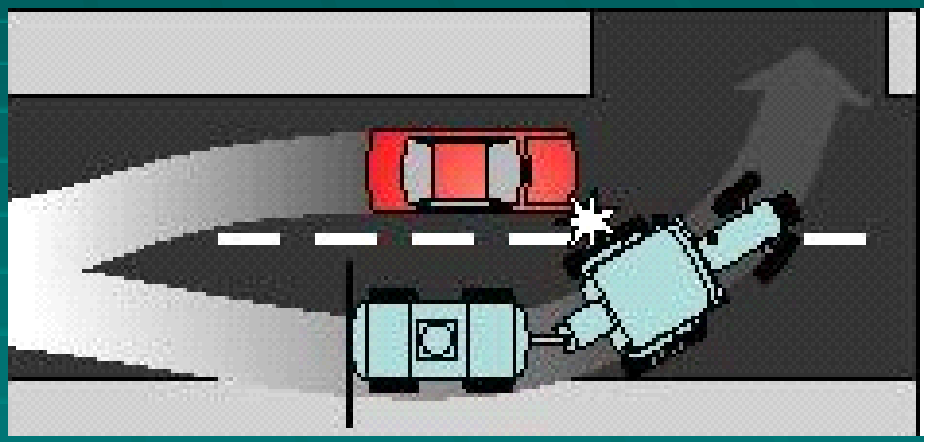
Slow **M**oving **V**ehicle sign

Highway Incidents

Left Turn Collision

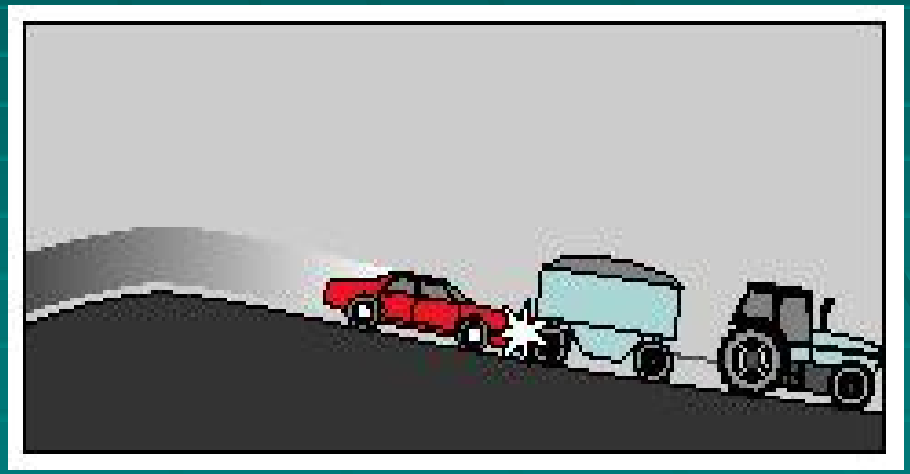
- An auto driver decides to pass when a farm vehicle is making a left turn.
- This is the most common type of highway incident.

http://www.cdc.gov/nasd/docs



Highway Incidents

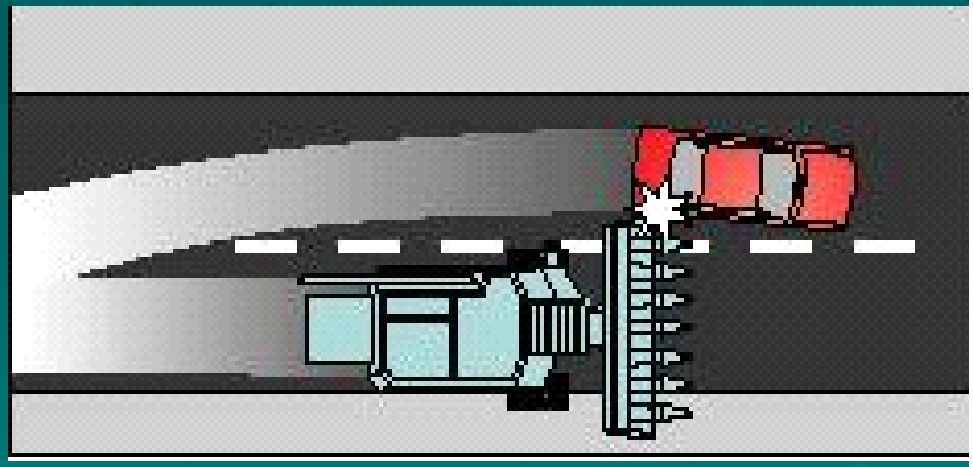
- Rear End Collision
- Auto drivers misjudge speed
  - Think about the difference in speed between a car going 55mph and a tractor going 20mph.



Highway Incidents

Passing Collision

- Motorists don’t think about the size of farm equipment when they are passing.



What happened?

What happened?

NOTE: The mailbox survives without a scratch.

Preventing Highway Incidents

- Use SMV signs on tractors and trailing implements and wagons.

What could happen?

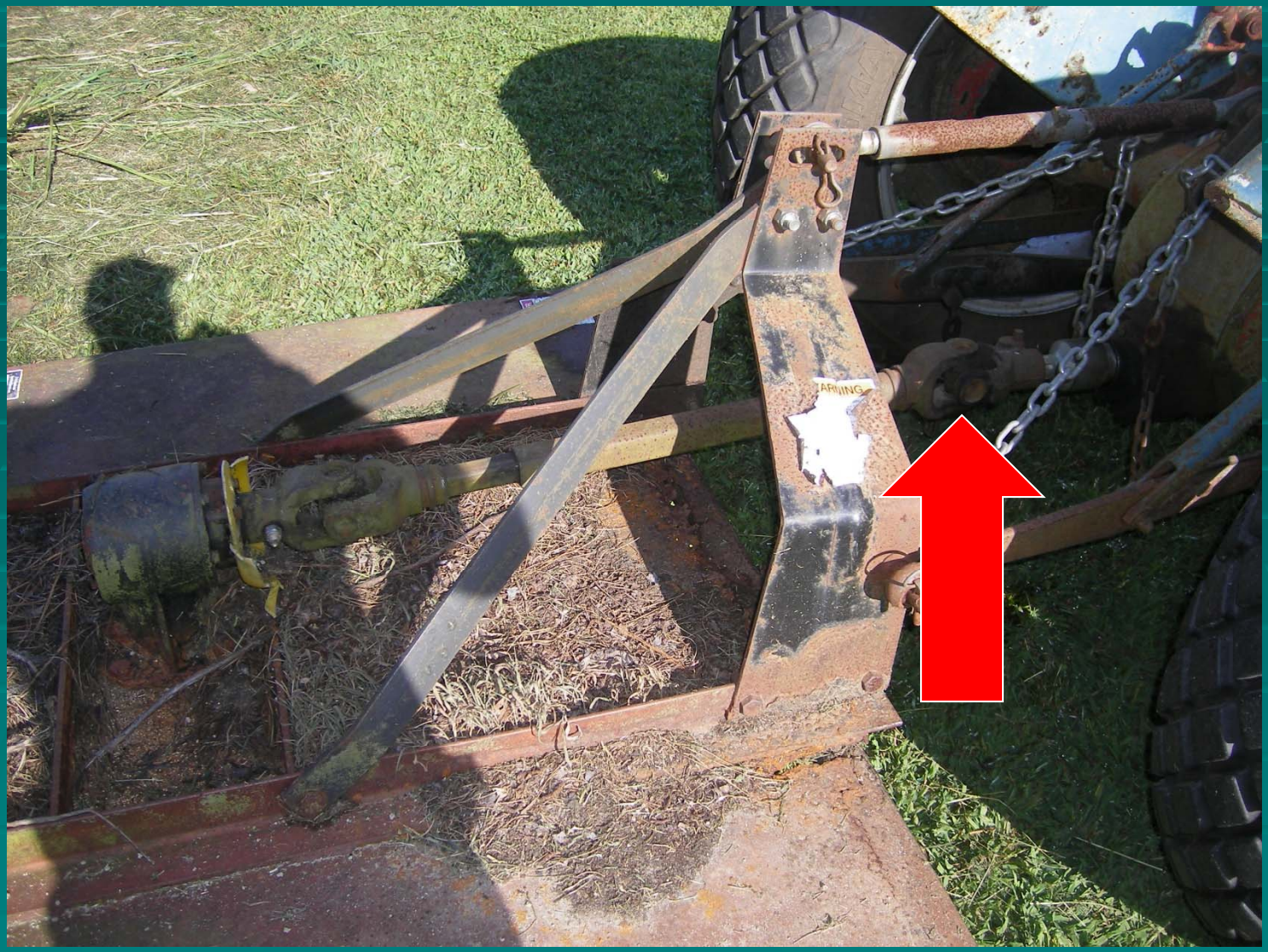
- No SMV sign.
- Consider ‘escort’ vehicles when transporting farm equipment on public highways.

Escort Vehicle

Escort vehicle follows SMV with caution lights flashing.

PTO

- The Power Take Off - or PTO - transfers power from the tractor to another implement such as a grain auger, manure spreader, mower or feed grinder
- This power transfer system helped to revolutionize North American agriculture during the 1930s.
- It is also one of the oldest and most persistent hazards associated with farm machinery.



PTO

- The PTO supplies power from the tractor to operate farm equipment implements via a drive shaft


BUSH HOG

PTOs on the Farm
PTOs Drive…

- **Pull behind equipment**
  - Bush Hog
  - Baler
  - Spreaders
  - Planters
  - Harvesting equipment
- **Stationary equipment**
  - Generator
  - Irrigation pump
  - Wood splitter
  - Augers to fill grain bins and silos
  - Feed Grinder

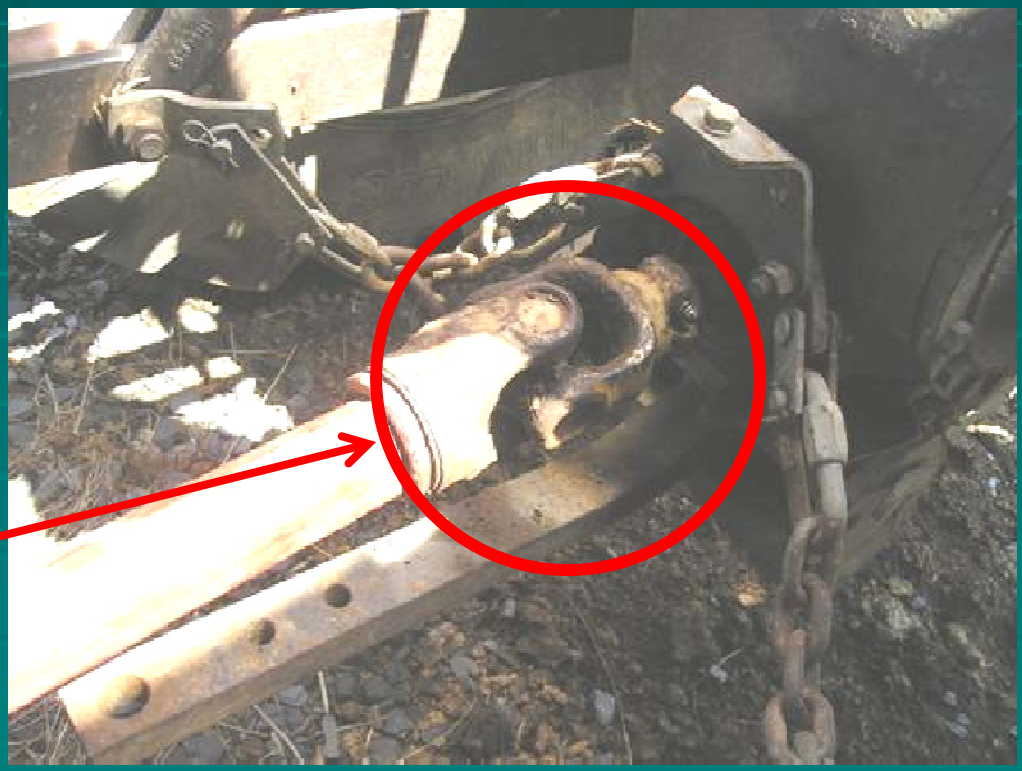
PTO Info

- **PTOs operate by turning at speeds of 9 - 16 rotations per second.**
- **This speed and the device make the PTO very dangerous.**

PTO Stub

IID

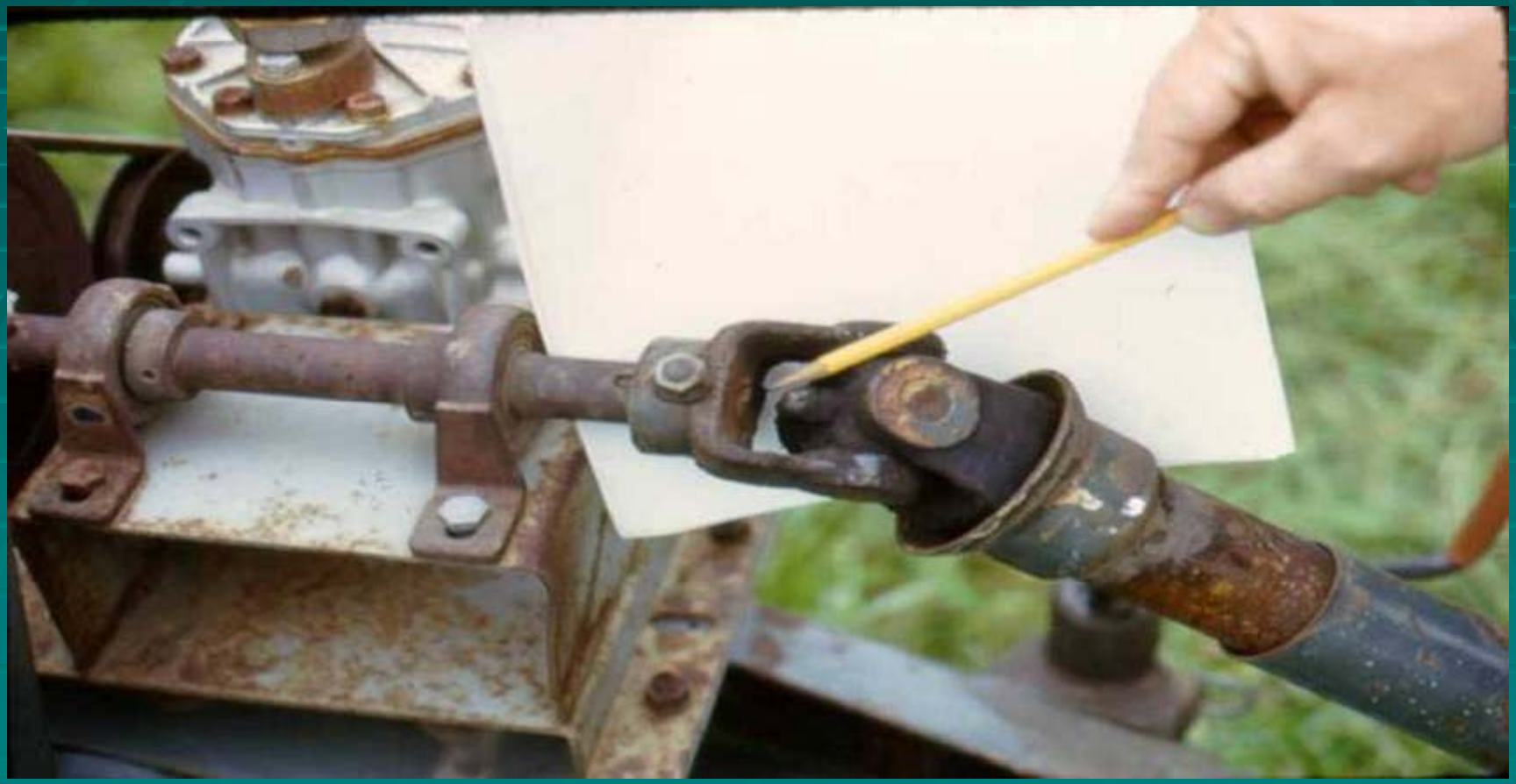
- Implement Input Driveline (IID) connects to the PTO Stub



IID

- The IID connects the PTO Stub to an implement or other devise.

PTO Coupling



PTO – Stationary Use

Mechanics of Agricultural Trauma

- Machinery
  - Combines and corn pickers
    - Slips and falls – 10 feet or more off ground.
    - Snapping rolls
      - 23 feet per second
    - Belts and pulleys
      - Entanglement
    - Augers
    - Spinal injuries
    - Lacerations


AGCO
R-62
GLEANER

Mechanics of Agricultural Trauma

- Machinery (cont.)
  - Augers
    - Hand/finger amputations
    - Massive lacerations


DANGER

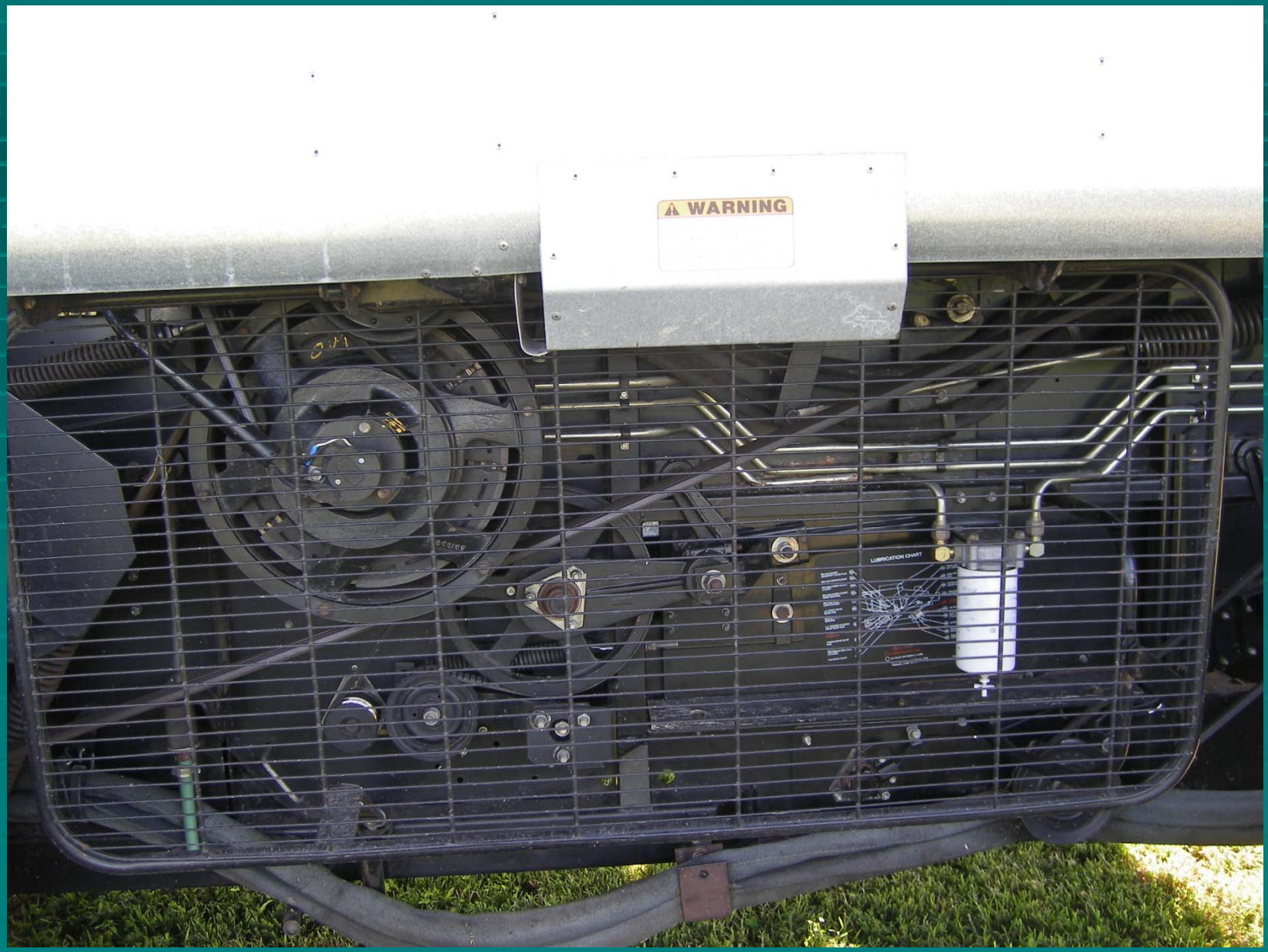
Mechanics of Agricultural Trauma

- Machinery (cont.)
  - Balers
    - Drawn into equipment
    - Amputations
    - Lacerations


EANER
S67

Mechanics of Agricultural Trauma

- Machinery (cont.)
  - Hydraulic injection
    - Pressure
    - Temperature
  - Pinch points


WARNING
LUBRICATION CHART

Mechanics of Agricultural Trauma

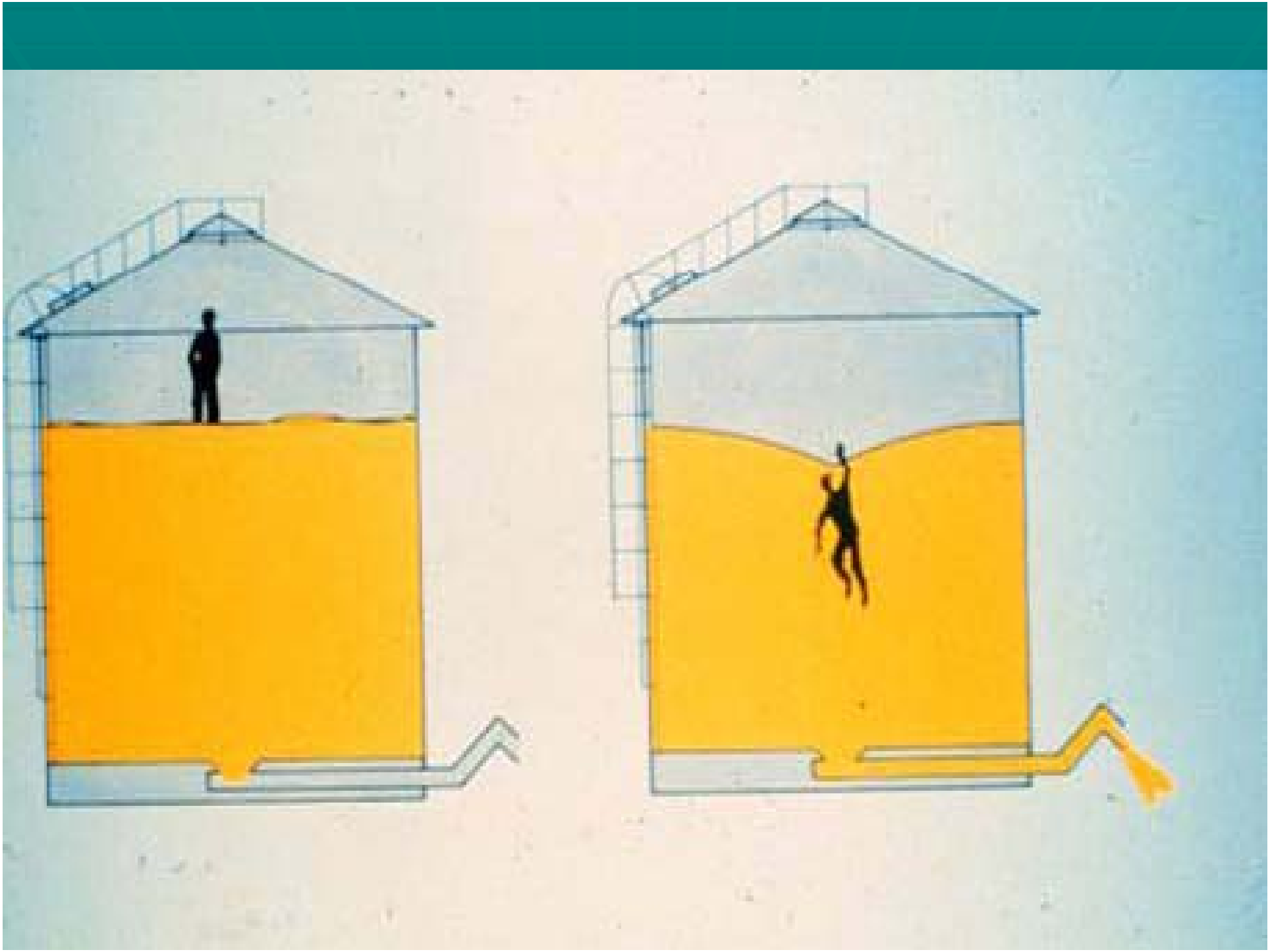
- Animal injuries
  - Aggressive animals
    - New mothers
    - Adolescent males
    - Adult males
      - Size difference
        - 2500 pound bull
        - 75 pound child

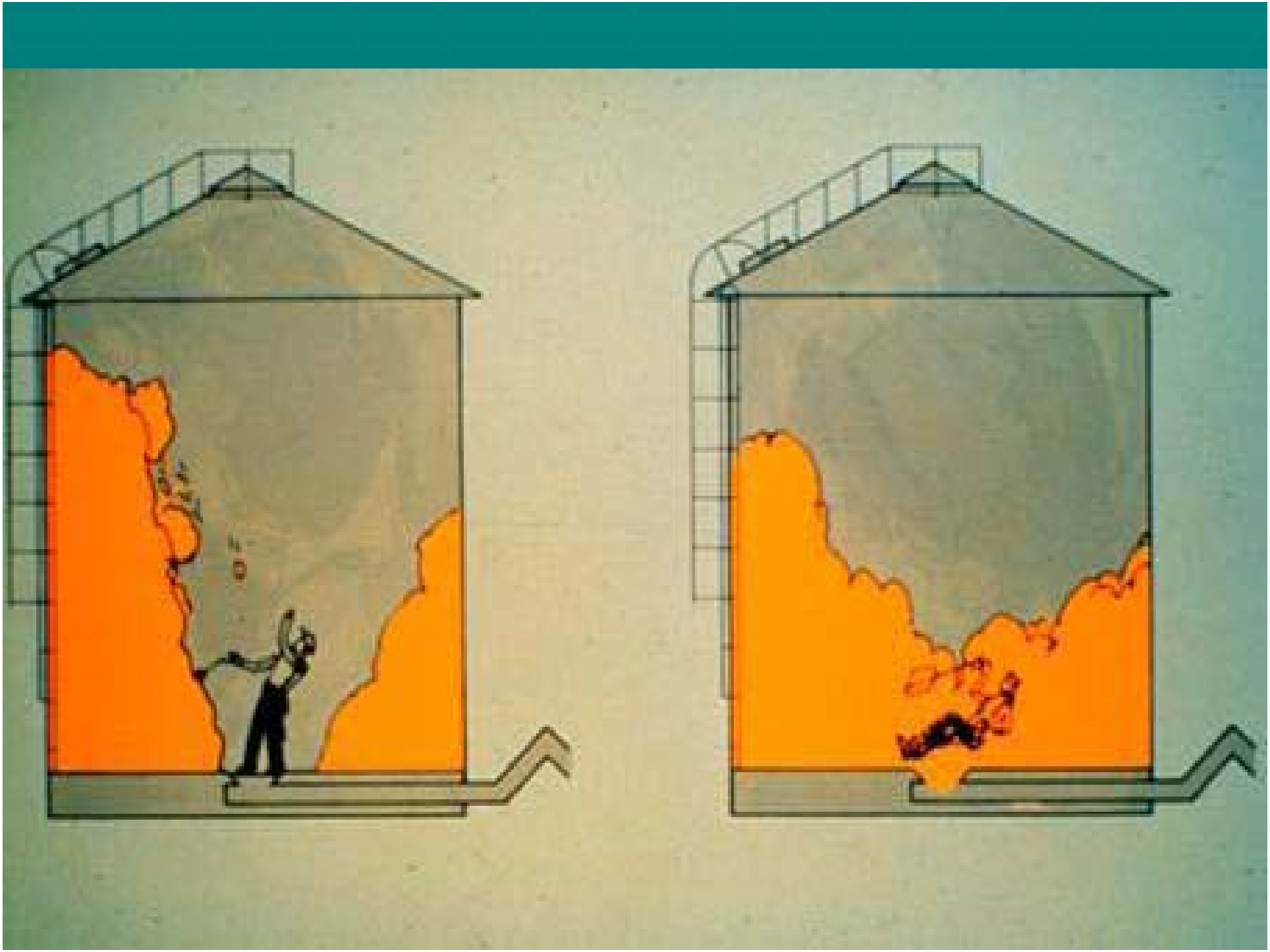
Mechanics of Agricultural Trauma

- Animal injuries (cont.)
  - Spooked animals
    - Wild animals
    - Startled animals
  - Other
    - Working/processing animals
      - Needle sticks
      - Rabies
    - Stupid tricks
      - “Hey, watch this!”

Mechanics of Agricultural Trauma

- Confined spaces
  - Grain bins
    - Engulfment hazards
      - Quicksand
      - Bridging
      - Avalanche
      - Grain vacuum
    - Suffocation
    - Hypothermia





Mechanics of Agricultural Trauma

- Confined spaces (cont.)
  - Silos
    - Conventional
      - Mechanical hazards
      - Nitrogen dioxide (silo gas)
      - Falls
    - Oxygen limiting
      - Reduced oxygen
      - Mechanical hazards
      - Falls

Mechanics of Agricultural Trauma

- Confined spaces (cont.)
  - Manure pits
    - Hydrogen sulfide (H_2S)
    - Drowning
  - Tanks
    - Assorted hazards

Mechanics of Agricultural Trauma

- Agricultural chemicals
  - Pesticides
    - Herbicides
    - Insecticides
    - Rodenticides
    - Fumigants
  - Suspect Organophosphate/Carbamate insecticide poisoning

Mechanics of Agricultural Trauma

- Agricultural chemicals (cont.)
  - Fertilizers
    - Anhydrous ammonia (NH_3)
      - Hydroscopic
      - -28°F
      - Methamphetamine manufacture
    - Ammonium Nitrate
      - Explosive when mixed with diesel fuel
        - Oklahoma City

Mechanics of Agricultural Trauma

- Agricultural chemicals (cont.)
  - Fuels
    - Diesel fuel
    - Gasoline
    - Kerosene
    - Liquid petroleum (LP)
  - “Hey, get me some gas so I can start this brush fire.”

Mechanics of Agricultural Trauma

- Agricultural chemicals (cont.)
  - Other chemicals
    - Antifreeze
    - Brake fluid
    - Cleaning fluids
    - Paints
    - Solvents

Causes of Farm Machinery Accidents

Improper Maintenance of Machinery

- With even the most careful inspection of machinery, machine failure can occur. It is less likely to occur if the operator checks the conditions of the machine seasonally and again before each day's work.

Improper Use of Machinery

- When human judgment (or error) forces a machine beyond its designed capability limits, a machine operator is in a hazardous position, because the machine does not function efficiently.

Causes of Farm Machinery Accidents

Lack or Misuse of Safety Devices

- If fire extinguishers, guards, shields, or other safety devices are removed and not replaced, or if a machine is operated carelessly, the operator has set the stage for an accident.

Lack of Training

- No one should be allowed to operate a machine without first being instructed in operational procedures and possible hazards.

Response Delays

- Patient location
  - Delayed rescue activation due to:
    - Distance
    - Weather
    - Barriers
    - Entrapment

Response Delays

- EMT location
  - Delayed due to:
    - Distance
      - From town
      - From roadway
    - Physical access
      - Barriers
      - Cattle gate
      - Scene safety issues

Response Delays

- Entrapment
  - Under
    - Tractors, machinery
  - Inside
    - Grain bins, silos, manure pits, tanks, animal pens
  - Around
    - PTO shafts

Extrication Concerns

- Training
  - Time for training
    - Volunteers
  - Cost of training
  - Extrication problems
    - Specialized techniques

Extrication Concerns

- Training (cont.)
  - Specialized tools
    - Air bags
    - Hydraulic cutters/spreaders
    - Saws
      - Reciprocating
      - Abrasive disc
    - Air chisels

Extrication Concerns

- Hazardous situations
  - Unstable equipment
  - Confined spaces
  - Chemicals
  - Animals
  - Distraught family

Human Concerns

- Severe trauma
- Acquaintance with victim
  - Relative/friend
    - Critical Incidence Stress Debriefing (CISD)

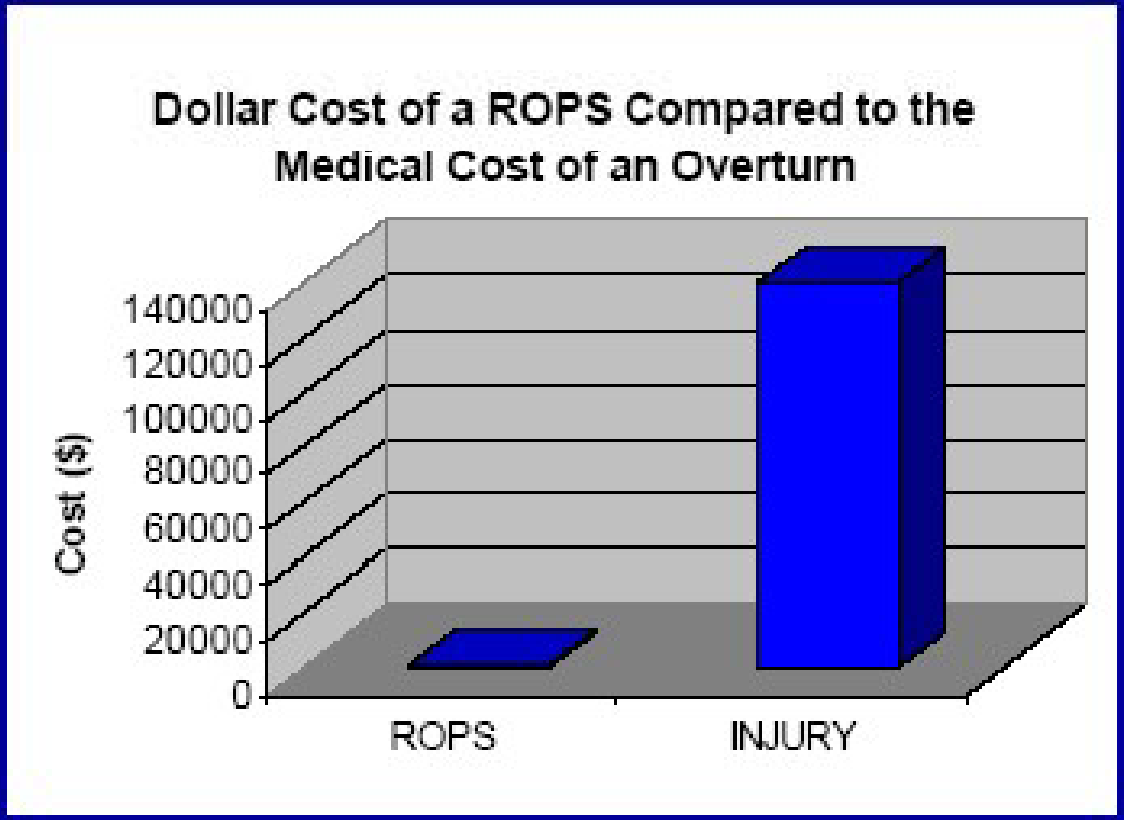
What Can You Do?

- Pre-Plan
  - Rare occurrences
  - Contact local farmers to use as a resource
  - Identify Fire/EMS members with farm experience
  - Contact local farm machinery dealers
  - Train on basic extrication
- Don’t panic

Photos for Discussion (as time allows)


TRITON
MAERSK

Cost of ROPS vs Medical Costs of an Overturn



Questions?