This presentation is part of an educational modular program designed to provide new and beginning farmers and ranchers with relevant information to initiate, improve and run their agricultural operations.

This program is funded by the Beginning Farmer and Rancher Development Program (BFRDP)

USDA-NIFA-BFRDP 2010-03143
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This project is partly sponsored by USDA-NIFA BFRDP 2010-03143 and USDA-NIFA-BFRDP 2014-07424.
Farm Safety

Because of the vast amount of material that can be included in this topic, we have only included a general overview of farm safety concerns.

For each of these subjects there is much more information available from other resources that will go into more detail.
Farm Safety

Because there are many important topics to discuss related to farm safety, we have split this topic into 4 (four) different presentations:

- **Farm Safety 1** = Tractors, equipment, tools, electricity and lifting
- **Farm Safety 2** = Livestock, chemicals, toxic gases and dust
- **Farm Safety 3** = Weather and Fire
- **Farm Safety 4** = Slips/trips/falls, highway traffic, noise, enclosed spaces, manure pits, pond/water, wells

You can read the presentations in any order that you want but **we strongly recommend that you read them all**.
Farm Safety 1
- Tractors
- Machinery/equipment
- Hand tools
- Electricity
- Lifting

Farm Safety 2
- Livestock
- Chemicals
- Toxic gases
- Dust

Farm Safety 3
- Weather
- Fire

Farm Safety 4
- Slips/trips/falls
- Highway traffic
- Noise
- Enclosed spaces
- Manure pits
- Pond/water
- Wells
Why is it important to talk about Farm Safety?
We have all heard the stories of the retiree that wants to go into farming because it will be relaxing and easy.

The office employee that thinks that farming is stress-free.

The family that want to start a farm because they want to spend time outdoors.
However farming is not a hobby

- It is very physically demanding and is considered to be one of the most dangerous professions
- It has a very high injury rate
- Fatality rate of 25.1/100,000
- Most injuries can be permanent
List of most dangerous jobs (2009)

1. Fishers and related fishing workers
2. Logging workers
3. Farmers and ranchers
4. Structural iron and steel workers
5. Aircraft pilots and flight engineers
Farming can be more dangerous than:
It doesn’t make sense that being such an important element in our society and such a dangerous job, that there aren’t more training programs and support for new and beginning farmers
Farming is one of the few industries in which the whole family is at risk for fatal and non-fatal injuries.

http://www.chaffinfamilyorchards.com/about.php

http://www.ediblesadvocatealliance.org/sustainable-learning-journey-blog/
Alphabetical listing of recognized Safety and Physical hazards, Biological and Chemical Hazards and Diseases pertaining to agriculture

<table>
<thead>
<tr>
<th>Safety and Physical Agents:</th>
<th>Biological and Chemical Agents:</th>
<th>Agricultural Diseases:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commodity storage &amp; transfer</td>
<td>Asphyxiation/suffocation</td>
<td>Arthritis</td>
</tr>
<tr>
<td>Electricity</td>
<td>Confined space</td>
<td>Dermatoses - caused by</td>
</tr>
<tr>
<td>Ergonomics</td>
<td>Entrapment</td>
<td>• Heat</td>
</tr>
<tr>
<td></td>
<td>(see commodity s.&amp;.t.)</td>
<td>• Irritant chemicals</td>
</tr>
<tr>
<td></td>
<td>Fumigation</td>
<td>• Infectious microbes</td>
</tr>
<tr>
<td></td>
<td>Carbon Monoxide (combustion)</td>
<td>• Insects</td>
</tr>
<tr>
<td>Farm machinery</td>
<td>Silo gases</td>
<td>• Sensitizing chemicals</td>
</tr>
<tr>
<td></td>
<td>(NO₂ and CO₂)</td>
<td>• Sunlight</td>
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<tr>
<td></td>
<td>Detergents</td>
<td>Noise Induced Hearing Loss</td>
</tr>
<tr>
<td></td>
<td>Diesel exhaust</td>
<td>Immunologic diseases</td>
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<td></td>
<td>Disinfectants including</td>
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<tr>
<td></td>
<td>Chlorine</td>
<td>Allergic rhinitis</td>
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<tr>
<td></td>
<td>Quadrinary ammonia compounds</td>
<td>Asthma</td>
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<td></td>
<td>Organic iodides</td>
<td>Dermatoses</td>
</tr>
<tr>
<td></td>
<td>Cresol-based compounds</td>
<td>Noninfectious diseases</td>
</tr>
<tr>
<td></td>
<td>Formaldehyde emitters</td>
<td>• Cancer</td>
</tr>
<tr>
<td>Fire</td>
<td></td>
<td>(is actually a low risk)</td>
</tr>
<tr>
<td>Fuel storage</td>
<td></td>
<td>• Hypertension and heart</td>
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<tr>
<td></td>
<td>(leaks and fires)</td>
<td>• Respiratory diseases</td>
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<tr>
<td></td>
<td>Illumination</td>
<td>• Asthma</td>
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<tr>
<td></td>
<td>(poor lighting)</td>
<td>(also immunologic dis.)</td>
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<td></td>
<td>Lightning</td>
<td>• Bagassosis</td>
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<tr>
<td></td>
<td>(shock and fire)</td>
<td>(from sugar cane)</td>
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<tr>
<td></td>
<td>Liquefied Propane (LP) gas</td>
<td>• Bronchitis</td>
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<tr>
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<td>Liquefied anhydrous ammonia</td>
<td>• Byssinosis</td>
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<tr>
<td></td>
<td>Livestock handling injuries</td>
<td>(from cotton dust)</td>
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<td></td>
<td>Physical/environmental hazards</td>
<td>• Farmer’s Lung</td>
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<td>(see also HP below)</td>
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<tr>
<td></td>
<td>Noise</td>
<td>• Hypersensitivity pneumonitis</td>
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<td></td>
<td>Thermal</td>
<td>• Organic dust toxic syndrome (ODTS)</td>
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<td>(heat and cold)</td>
<td>• Pneumoconiosis</td>
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<td></td>
<td>Ultraviolet</td>
<td>(e.g. silicosis)</td>
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<td>(sun light)</td>
<td>• Silo filler’s disease</td>
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<td></td>
<td>Vibration</td>
<td>(see also NO₂)</td>
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<td>Psychological stress</td>
<td>Organophosphate poisoning and sequelae</td>
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<td>Sanitation</td>
<td>Silo unloader’s disease</td>
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<td>(field)</td>
<td>Zoonotic diseases</td>
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<td>Transportation</td>
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<td></td>
<td>(on &amp; off road)</td>
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<tr>
<td></td>
<td>Welding</td>
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http://www.osha.gov/SLTC/agriculturaloperations/tables.html#table1
Children safety

- Farm injuries are particularly high among children:
  - Between 100 to 300 youth die on farms annually
  - Children often work on the family farm
  - Children will play on equipment
  - Because children are always present, parents can become complacent

![Bar chart showing average number of deaths per year by age group](chart.png)
A good website to go for more information and details on farm safety is:

OSHA
Occupational safety and health administration
http://www.osha.gov/

The OSHA website has important free information and fact sheets on how to safely perform many common farm activities.
Farm Safety

- Always Call 911 if there is an emergency

- Owner/operators should take at a minimum a first aid course, which includes CPR
Livestock

PLEASE BE CAREFUL
FARM ANIMALS
CAN BE DANGEROUS
Livestock handling

- One out of six injuries on farms involve animals
- The majority of animal injuries are to farm family members
- Livestock can pose numerous safety risks particularly to children

Teach visitors and children to respect animals and how to treat them well

Horse bite
Animal handling

- Some general rules about animals are;
  - Larger animals pose a greater risk than smaller ones
  - Males are more dangerous than females
  - Mothers with young will attack if they perceive their young are in danger (this is true of all species including humans)
  - Never startle animals, always let them know when you approach by speaking in a calm voice
  - Animals that are cornered or feel threatened are more likely to cause injury
Farm pets

Kids 5 to 14 are the most often age group bitten by pets

Teach proper handling of pets to children so they do not injure the pet, who may then bit the child

- Make sure that all pets are properly vaccinated and neutered
- Never approach an animal that is acting hostile
  - Different diseases or injuries can make even family pets to be aggressive
Poultry

- Roosters will attack people with their spurs
- If they can roosters will try and peck at the eyes
- Little children are often the target of their aggression
- Mother hens sitting on eggs will often peck at the hands and arms of those collecting eggs

Geese can be very aggressive when nesting and can cause injury by biting and using their wings to hit people
Poultry

- Dust, ammonia and other gasses in chicken houses can also cause respiratory problems

- Working with poultry can also expose the handlers to serious pathogens such as *Salmonella*, *E. coli* and *Campylobacter*
Sheep

- It is common for sheep to jump at people if startled when approached from the front
  - They can hit with enough force to knock people down, and cause head and shoulder injuries. They can even break the legs of handlers

- Mothers with lambs can be very protective so care needs to be exercised when approaching them

- Rams will butt with they heads and can injure those that work with them

Children should never be allowed to access areas with rams
Goats

- Goats will butt with their heads
  - Don’t forget that horns can be very sharp!

Children should never be allowed to access areas with the billy (or buck) goat
Swine

- Pigs can bite hard enough to cause serious injury
- They can also hit you in the legs with enough force to break legs
- Pigs have been known to kill children that enter their pens. Children must be supervised when working with them
Cattle

- Cattle tend to kick forward more than backward so be careful when milking
- Bulls can be aggressive particularly when a cow is in heat. They can cause severe injuries with their heads and horns as well as by stepping on you
- Cows with calves can charge causing injury
- Care should be taken even when working with calves as they can still injure those working with them
Horses

- Every year many people are killed when working with horses
- They can bite, kick or stomp on workers
- Even a fall from a well trained horse can result in serious injury or death. Riders should always wear a safety helmet
- When riding watch out for low hanging branches
- Ride only horses that you are capable of handling

Teach children the proper way to work with and to respect horses

Horse bite
Wild animals

- Most farms are in rural areas so wild animals are often around
- Wild animals can bite and scratch
- They can spread diseases like rabies. Both to people, livestock and pets
- They can also transmit ticks and other parasites
Be prepared for anything when dealing with animals
In general,
if an animal has a mouth it can bite
and if it has nails or claws it can scratch

If it is bigger, heavier, angrier or more scared
than you, it can hurt you

**Always be careful around animals**
Chemicals
Chemicals/Pesticides

- Sources of farm chemicals include
  - Pesticides
    - Insecticides
    - Rodenticides
    - Herbicides
    - Fungicides
  - Fertilizers
  - Medication for livestock
  - Fuel/oil for farm equipment
  - Cleaning supplies
Chemicals/Pesticides

- Always read and follow the directions of use, safety and warning label instructions that accompany any chemical.
- Any application different from the instructions may be not only dangerous but ILLEGAL!!

- If you can’t understand them then call the help number.

Never use a chemical until you know the risks involved.
Chemicals/Pesticides

- Chemicals should be stored in their original containers, with labels and instructions still attached
- Keep chemicals in a separate building/location from feed, seeds or fertilizers
- Signs should be present where chemicals are stored to warn of the dangers
- Make sure storage location is not accessible by children

Half of all pesticide related deaths are children under 10 years old
Chemicals/Pesticides

- Always use proper personal protective equipment (PPE) when working with chemicals
  - Don’t leave any bear skin exposed to chemicals
    - Gloves
    - Goggles/face shield
    - Protective clothing
    - Breathing protection
Chemicals/Pesticides

- Don’t eat, drink or smoke while pouring, mixing or applying chemicals
  - Only prepare enough for immediate use

- Make sure to wash your hands and face after working with chemicals
  - Chemicals can enter your body through your skin

- Be sure to change clothing and wash up before playing with kids or pets as chemicals may be on your clothing
  - Wash work clothes separately
Chemicals/Pesticides

- Dispose of empty containers in an approved way
- Read the label for the approved disposal method
- Check local regulations on methods of disposal

Some counties have regular pesticide and chemical disposal programs.

Contact your extension agent
Organic and natural pesticides (Biopesticides)

- Even if a product is considered organic or natural, it is still a pesticide
- In some cases they may even be more toxic than synthetic pesticides for some people or some animal species

Always read label and warning signs and handle accordingly.
Learn how to read labels of pesticides, biologicals and other chemicals used in the farm.

NEVER REMOVE A LABEL FROM A CONTAINER

ALWAYS KEEP CHEMICALS IN THEIR ORIGINAL CONTAINER
Toxic gases
### Toxic Gases

Anhydrous ammonia is used as a nitrogen fertilizer.

Ammonia is also naturally produced as part of the decay of animal and vegetable matter and in urine.

<table>
<thead>
<tr>
<th>Ammonia exposure effects</th>
<th>ppm</th>
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</thead>
<tbody>
<tr>
<td>Readily detectable odor</td>
<td>20-50</td>
</tr>
<tr>
<td>Severe irritation of eyes, ears, nose and throat. No lasting effect with short-term exposure</td>
<td>400-700</td>
</tr>
<tr>
<td>Dangerous, less than 1/2 hour exposure may be fatal</td>
<td>2,000-3,000</td>
</tr>
<tr>
<td>Serious edema, strangulation, asphyxia, rapidly fatal</td>
<td>5,000-10,000</td>
</tr>
<tr>
<td>Immediately fatal</td>
<td>&gt;10,000</td>
</tr>
</tbody>
</table>
Toxic gases

- Toxic gases can be a problem anywhere you have a confined space with no ventilation
- Never leave equipment running in a barn or garage without providing ventilation
  - Exhaust and generator fumes can kill
- Install a circulating fan in your work space and barn
Silo gas is formed by the natural fermentation of chopped silage shortly after it is placed in the silo.

- Nitrogen dioxide levels peak about 3 days after harvesting.
- It leads to irritation to nose and throat and inflammation of the lungs.
- High concentrations can cause immediate problems but can cause death by fluid collecting in lungs (farmers can die in their sleep hours later).

- Don’t enter silos for 4-6 weeks after filling.

*Make sure silos are ventilated before entering.*
Toxic gases

**Low oxygen conditions** in confined spaces (such as silos, manure pits, storage areas) can be deadly

- At low levels (16-18% vs. the normal 21% in the atmosphere) there is an impairment of judgment and breathing without the victim realizing it
- A concentration to below 10% can result in death within minutes

**Silo gas (nitrogen dioxide)** is a well known danger associated with silos
Low levels of this gas can cause headache, eye, nose and throat irritation, but at higher levels it can cause pulmonary edema and possible death

**Methane (biogas)**
It is non-toxic, however it is highly flammable (at a concentration of 5-15% in the air). Anything that might create a spark – cell phones, radios, engines, clothing static or other non-explosion proof devices could initiate an explosion
Never mix chemicals

Some chemical reactions can explode and others can result in fumes that cause coughing, shortness of breath, chest pain, irritation to throat, nose and eyes

Storing chemicals

Flammable materials should be stored in an approved, dedicated, flammable materials storage cabinet

Chemicals should be stored no higher than eye level and never on the top shelf

Shelves should be firmly secured to the walls
Sources of dust include:

- Roads
- Fields
- Livestock
- Crop harvesting/storage
  - Moldy hay
  - Opening silage pits
DUST

The National Safety Council reports that almost 300 workers are incapacitated each year due to respiratory conditions, mainly caused by dust.

Dust in the lungs has both immediate and long-term effects:

**Short term**
- It can result in fatigue or shortness of breath but also congestion, frequent respiratory infections such as colds, bronchitis and pneumonia.

**Long term**
- Asthma, emphysema, chronic bronchitis and farmer’s lung.
What can you do?

- Make a list of jobs where you might need a respirator
- Determine proper respirator for the job
- Compare the cost of disposable and non-disposable respirators
- Ask a professional to fit-test your respirator
- Routinely clean and inspect all non-disposable respirators. Discards disposable ones when dirty

There is no such thing as an all-purpose respirator

Respirators are available from the manufacturer, mail-order catalog, local implement dealer and farm supply stores
This presentation was prepared by:

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USDA-ARS-Poultry Production and Product Safety Research Unit

Annie Donoghue
Jonathan Moyle

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<thead>
<tr>
<th>Organization</th>
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<tr>
<td>National Education Center for Agricultural Safety</td>
<td><a href="http://www.necasag.org">www.necasag.org</a></td>
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<tr>
<td>Northeast Iowa Community College</td>
<td><a href="http://www.nice.edu">www.nice.edu</a></td>
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<tr>
<td>National Safety Council</td>
<td><a href="http://www.nsc.org">www.nsc.org</a></td>
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<td>Dubuque County Emergency Responder Training Facility</td>
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<td>Progressive Ag Foundation</td>
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<td>Agricultural Safety &amp; Health Council of America (ASHCA)</td>
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<td>National Institute for Farm Safety (NIFS)</td>
<td><a href="http://www.nifsagsafety.org">www.nifsagsafety.org</a></td>
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<td>AgriSafe</td>
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<tr>
<td>Farm Safety 4 Just Kids</td>
<td><a href="http://www.fs4jk.org">www.fs4jk.org</a></td>
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<tr>
<td>Children’s Ag Safety Network (CASN)</td>
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<tr>
<td>North American Guidelines for Children’s Agricultural Tasks</td>
<td><a href="http://www.nagecat.org">www.nagecat.org</a></td>
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<td>National Farm Medicine Center</td>
<td><a href="http://www.marshfieldclinic.org/nfmc">www.marshfieldclinic.org/nfmc</a></td>
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<td>Iowa Fire Service Training Bureau</td>
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