Farmers are at an elevated risk for developing a respiratory impairment because of certain hazardous work environments they may face. Respiratory impairment is a generic term that refers to a medical condition that affects the respiratory system. Limitations associated with respiratory impairment include labored breathing, asthma attacks, fatigue, heightened sensitivity to ordinary substances and chemicals, and compromised immunity to infection. Certain exposures increase a person’s chances of developing a respiratory impairment or irritating a pre-existing condition. Listed below are respiratory diseases and specific lung exposures common in the agricultural industry. In some cases, a medical doctor will have to determine the diagnosis based on the amount of damage to the respiratory system.

**Respiratory Diseases**

**Farmer’s lung** is an allergic reaction specific to an individual, causing inflammation of the alveoli within the lungs after breathing organic or biologic dusts coming from agricultural products. This can cause an inflammatory response and progress to a potentially dangerous chronic condition by creating a hypersensitivity reaction when in dusty environments.

- Symptoms and recovery time can be mistaken for the flu and occur 4–8 hours after exposure lasting 2–5 days. Complete recovery takes 10–60 days.
- Caused by exposure to decayed grain, silage and hay bales.

**Organic dust toxic syndrome** is a one-time, nonallergic inflammatory reaction from breathing large concentrations of organic dust. This condition typically occurs after a worker (or multiple workers) has been exposed to a very dusty environment.

- Symptoms of cough, fever, chills, muscle pain, labored breathing and general discomfort occur 5–8 hours after exposure. Symptoms can last 2–5 days.
- Caused by exposure to moldy forage crops and decayed corn.

**Pulmonary edema** is fluid accumulation in the air spaces and parenchyma of the lungs leading to impaired gas exchange and may cause respiratory failure.

- Symptoms of shortness of breath, labored breathing, coughing, and bluing of the skin are life threatening because fluid is filling the lungs.
- Caused by inhaling large quantities of fumigants, hydrogen sulfide, anhydrous ammonia, and oxides of nitrogen.

**Irritation of mucous membranes** is inflammation and pain of the mucous membranes caused by ingestion or inhalation of mold, dust or chemical vapors.

- The eyes, nose, mouth and upper pathways of the lungs will be inflamed causing stuffy, runny nose and sore throat.
- Caused by grain dust, dust in livestock barns, chemicals, manure, and silo gases.
Acute bronchitis is inflammation of the bronchi that usually affects the upper portion of the respiratory system.

- Severe symptoms can develop quickly. Symptoms include shortness of breath, phlegm production, coughing, and chest tightness.
- Caused by grain dust or dust in livestock confinement buildings. Swine and poultry facilities present the highest exposure risk because of the small size of dust particles.

Occupational asthma is constriction of the bronchi that causes the airways of the lungs to swell and narrow.

- Severe symptoms are likely to develop a few hours after exposure. Symptoms include attacks of wheezing, shortness of breath, chest tightness, and coughing. Symptoms may remain even after the irritant source is removed.
- Caused by grain dust, dust associated with livestock, or chemical or vapor exposure.

Potential Agricultural Exposures to the Lungs

Hydrogen sulfide results from the bacterial breakdown of organic matter in the absence of oxygen. Agricultural exposure can come from partial or full manure pits in livestock confinement buildings.

- Low concentration—gas smells of rotten eggs.
- High concentration—can paralyze smell receptors. A few breaths can result in sudden collapse, unconsciousness and death.

Ammonia is a gas created when bacterial reactions occur with urine and feces of livestock. Ammonia has a very strong, pungent odor. Found near livestock facility floors and manure pits.

- Symptoms include extreme irritation to the eyes, nose and respiratory tract, usually causing individuals to exit the area immediately, resulting in minimal damage to the lungs.

Carbon dioxide is found in grain bins storing wet corn, airtight silos, and confinement buildings.

- Low concentration—hyperventilation and mental confusion can occur.
- High concentration—extreme increase in respiratory rate leading to respiratory failure and possible suffocation.

Carbon monoxide is typically exhaust from a combustion engine, heating source, or propane-fueled equipment.

- Symptoms include deep breathing, facial flushing, dizziness, and headaches. In high concentrations unconsciousness can lead to death.

Oxides of nitrogen are compounds from oxygen reacting with nitrogen in areas where plant material is stored. The reaction causes bleach-like odor and the silage will have a yellowish or reddish tint.

- Symptoms include itchy eyes, coughing, labored breathing, fatigue, nausea and sleepiness. In severe cases the individual can collapse and become unconscious.
- Dangerous levels of gases may last up to three weeks after filling the storage area. The highest levels will be 24 hours to 10 days after.

Organic dusts are found in all agricultural environments. Organic dusts include molds, pollens, bacteria, pesticides, chemicals, feed particles, bedding particles, insect parts, and fecal material. Heavy concentrations of organic dust are common in grain dryers, livestock facilities, or other enclosed spaces.

- Accumulation of agricultural dusts restricts lungs from functioning.

Pesticides are products intended for preventing, destroying, repelling or mitigating pests in agricultural production.

- For specific symptoms for each chemical, refer to the manufacturer’s label or Material Safety Data Sheet (MSDS). Pesticide exposures can disrupt the central nervous system.
- Exposure results from not using proper personal protective equipment when applying and handling the chemical or entering the field before the incubation time has passed.
- Read the chemical precautions to know the specific time to avoid entering the field after application and the required protective measurements.

Anhydrous ammonia is a common fertilizer injected into the soil for agricultural production. It is stored under pressure as a liquid and turns to a gas with a pungent odor when released.

- Exposure causes upper airway injuries, potentially damaging tissue severely and causing the lungs to fill with fluid. Suffocation can result from the tissues swelling.
Reducing Respiratory Hazards

It is important to limit exposure to these dangers by utilizing the proper precautions. A basic rule of thumb is if a task causes difficulty breathing, abandon the task and immediately get fresh air. The task needs to be assessed to determine safety precautions and the proper protective equipment for completing the task. Taking the time to assess the situation can safely allow control methods to be introduced to reduce exposure.

Common control methods include:

- engineering controls (such as exhaust ventilation)
- work practice controls (such as spray application in minimal wind)
- administrative controls (such as a policy to always monitor air quality before entry)

Using a Respirator to Prevent Respiratory Injuries

When individuals cannot be adequately protected from respiratory hazards through use of control methods, an appropriate respirator must be used to protect against respiratory hazards. Respiratory protection must be selected based on the hazard an individual will be exposed to on the job. It is important to select the correct respirator because not every respirator will protect against every hazard. Types of respirators include mechanical filter respirators (N95), chemical cartridge respirators, and supplied air (oxygen) respirators.

Respiratory protection should be used when:

- working in dusty field and buildings
- handling moldy hay
- feeding or working with finely ground feedstuffs
- working in or uncapping silos
- cleaning grain bins
- working with or applying agricultural chemicals (fertilizers, pesticides, fumigants)
- applying paints or solvents
- working in areas where bird droppings or dust from animal debris is present
- working in areas where dust containing old paint, rust, or wood particles is present

By using a combination of control methods and a respirator, exposures to a respiratory hazard can be minimized, allowing for a safe work environment.

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References


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