Save Your Breath:

Respiratory Health in Agriculture

DVD AVAILABLE ONLINE AT:
http://aghealth.usask.ca

Dust • Gases • Chemicals • Animal Diseases

University of Saskatchewan | aghealth.usask.ca

An average person can go. . . .
Weeks without food
Days without water
But only seconds without breathing.

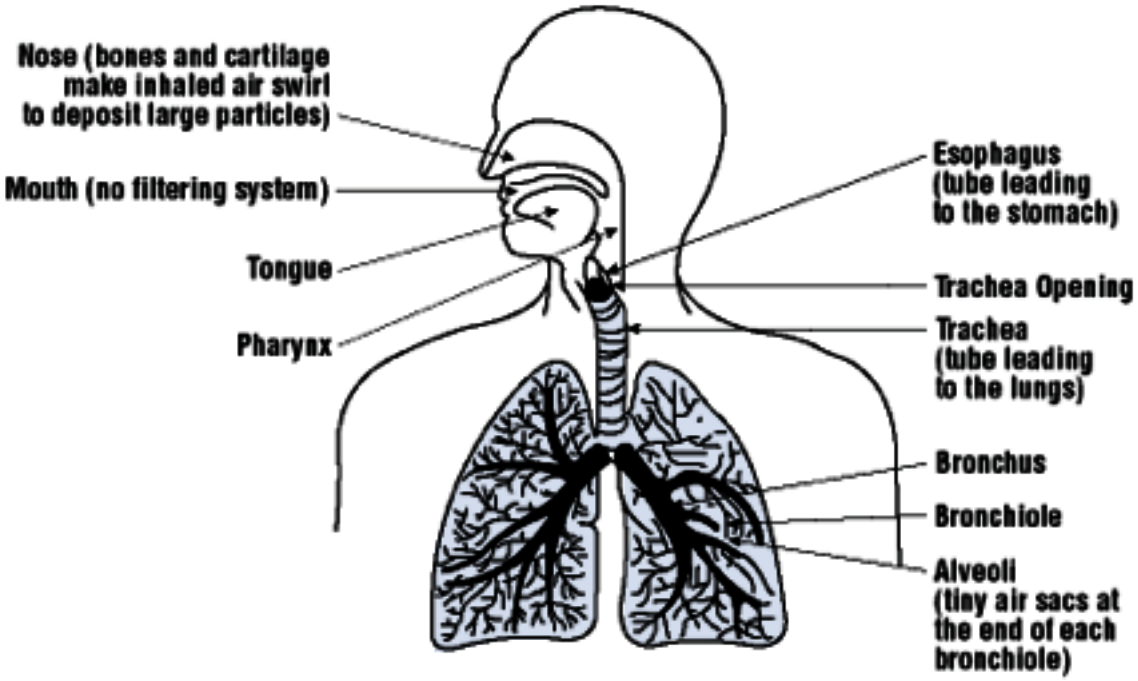
TAKE CARE OF YOUR RESPIRATORY HEALTH!

Farmers and agricultural workers are exposed to
dusts, gases, fumes, and chemicals
at work that can affect their breathing.

Respiratory health is important in the agricultural industry
as the exposures to hazards can be very high.

Many respiratory diseases take years to develop and
the symptoms are not immediately apparent.

The goal of CCHSA (The Canadian Centre for Health and Safety in Agriculture) is to carry out research, training, service and prevention for the farmers and rural people of Saskatchewan and Canada.



The Respiratory System

You inhale about 20,000 litres of air every 24 hours. If you are doing hard strenuous physical work you can inhale up to 10,000 litres of air within 8 hours. Your lungs work hard every day! There are defense mechanisms in place to clean the air you breathe but some of these may be bypassed when you work strenuously.

What happens when you breathe?

- Air is breathed in through the nose.
- Small bones and cartilage cause the air to swirl.
- Air enters the throat which then divides into 2 tubes, the esophagus and the windpipe (trachea). The esophagus carries food and drink to the stomach.
- The windpipe divides into 2 tubes called bronchi. The bronchi each enter the lungs and divide into smaller tubes called bronchioles. These bronchioles end in tiny little air sacs (approximately 300 million!) with walls thin enough to allow gases to be absorbed and released from the blood stream.

Your normal defense mechanisms:

- Nasal hairs filter out large particles.
- Mucus traps some of the particles found in dust, fumes and smoke.
- Some vapours and mists may be dissolved in the mucus.
- A sneeze is a reflex action that rids your nose of irritating substances.
- Tiny hair like structures sweep mucus to the back of the throat where you swallow it and any substances dissolved in it.
- A cough is a reflex action that rids your windpipe and bronchi of mucus and dissolved or attached substances.
- It is important to note that tiny particles of dust, not visible to the human eye, may bypass normal defenses and end up in the lungs. Inhaled chemical vapors, gases and mists enter the bloodstream also, and are carried to all parts of your body.

What are the Respiratory Hazards that agricultural workers face?

- Molds and dust from grain and animal confinement.
- Gases that are produced during many routine agricultural operations. Examples are silos (which produce nitrogen oxide) and manure pits (hydrogen sulfide).
- Carbon monoxide, from gas heaters, pressure washers and vehicles.
- Ammonia from livestock buildings.
- Hydrogen sulfide from manure decomposition.
- Farm chemicals, such as pesticides, fertilizers and sanitizers.
- Welding fumes.
- Animal diseases that are risks to people (Zoonosis) such as Hantavirus, Anthrax, Brucellosis and certain types of Influenza.

Numerous studies have demonstrated a significantly increased risk of respiratory health concerns among farmers and farm workers. Respiratory diseases due to agricultural exposures are preventable.

The hazard multiplies significantly when you combine smoking with grain dusts and chemical exposures

How Can I Manage these Hazards to my Respiratory Health?

Identify the hazard.

Follow the hierarchy of control to see if you can reduce the hazardous exposure.

If it is not possible to eliminate, substitute, change the design or change how you do the job, then you must wear personal protective equipment.

Hierarchy of Control: Reducing Exposure to Hazards

The "Hierarchy of Control" outlines a series of control measures ranking them in order of effectiveness. Remember controlling hazards can include a combination of the following measures.

1. **Elimination:** Can the hazard be eliminated? Making the decision to eliminate an exposure such as not growing a specific crop on your farm, not using a certain herbicide, or not raising hogs are all examples of eliminating a specific hazard to your health.

2. **Substitution:** Is there a different product or process that I can do on my farm to decrease the risk to my health? Substitution is about making choices to control hazards but choosing an alternate product. For example, a less toxic chemical may be used rather than one with a high hazard rating.

3. **Engineering/Design:** Consider how a process, building, or machine can be altered to reduce the hazard. This can be as simple as standing in a different location when unloading grain or extending a spout on a feed shoot to reduce dust exposure to the farmer.

4. **Safe Work Practices:** Is there a different way you can perform a task to reduce the health hazard? For example, there is better ventilation for most farmerswhen they are able to weld outdoors.

5. **Personal Protective Equipment (PPE):** PPE is the last line of defense. All other controls should be attempted, and PPE when possible should be used in combination with the above controls. For example, use a P100 respirator in combination with good ventilation (engineering/design) when in an area where you suspect mouse droppings and there is a risk of Hantavirus.

It is important that producers ask themselves these questions when exposed to hazards on the farm.

How Do I Know Which Respirator To Use?

What's Available?

There are two types of respirators available:

1. Air Purifying Respirators
2. Air Supplying Respirators

Use certified masks and filters only. These masks will display the NIOSH emblem. Do not use masks without this emblem or with efficiency ratings less than N95.

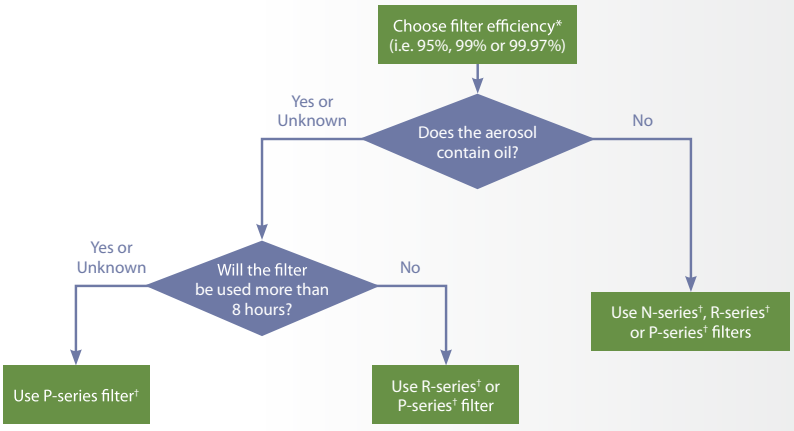
- Check the respirator to make sure it fits properly. Some face piece materials are more comfortable than others. Remember that everyone has a different face and the respirators come in different sizes so ensure that you have the correct size to fit you!
- Be sure to get masks properly fitted. Contact the supplier or CCHSA for this.
- Cost can be a factor in the purchase. Inexpensive pre-filters may extend the service life of chemical cartridges.
- Think about any other equipment you may have to wear, will it interfere?
- Will it be easy to clean and maintain? Are the replacement parts readily available.

What do the letters N, R and P mean on a respirator rating?

N series = Not resistant to oil

R series = Resistant to oil (can be used once with oil based exposures)

P series = Oil Proof (can be used more than once with oil based exposures)



There are 3 levels of filter efficiency: 95%, 99% and 99.97%

The higher the number, the larger percentage of particulates the filter will remove.

Ensure that you know how to put on and take off a respirator as well as how to conduct a seal check. You should fit check a respirator every time you use it, as well as inspect it for damage or worn parts.

In order to select the appropriate respirator, you must:

Identify the Respiratory Hazard

1. Dust – There are many sources of dust on a farm, such as loading and unloading grain, grinding feed, shoveling grain, handling bales and feeding animals.
2. Gases – Sources of gas hazards for farmers are silos (nitrogen dioxide), running motors in confined areas (carbon monoxide), animals and manure pits (ammonia, hydrogen sulfide and methane), and welding fumes.
3. Chemicals – The main respiratory hazard for chemicals is inhalation during preparation or application of herbicides, insecticides, fumigants and anhydrous ammonia for the grain farmers, and disinfectants used during power washing in animal confinement barns.
4. Animal Disease (Zoonosis) – Sources of diseases are viruses and bacteria ie. Hantavirus, Anthrax, Brucellosis, Influenza.

Understand the Health Effects

1. Dust
Dusts such as grain dust can cause symptoms such as cough, wheeze, phlegm and shortness of breath, and allergies/asthma, and have also been linked with lowered breathing capacity.

2. Molds and Fungi
These can be associated with allergic reaction, asthma, airway or throat irritation, and non-specific symptoms like headache and poor appetite. Rarer conditions from mold include Organic Dust Toxic Syndrome and Farmer's Lung.

3. Gases
Gases can cause immediate and delayed reactions, and sometimes both. The specific types of symptoms and health effects depend on the gas.

4. Metal Fumes
Welding and other metal fumes are associated with respiratory, eye and throat irritation, cough, wheeze, and asthma, as well as a flu-like condition known as metal fume fever in some circumstances. Toxicity specific to the metal or alloy being welded can also occur (Cadmium, zinc or chromium exposure). Long term exposure to welding fumes is associated with respiratory decline, bronchitis, and loss of smell.

5. Chemicals
Symptoms vary with the type of chemical. They can be mild (eye irritation) to severe (suffocation from swelling of the airways).

6. Zoonotic Disease
- Hantavirus causes flu like symptoms with a fever that lasts 3-4 days and is fatal in about 50% of cases.
- Anthrax causes upper respiratory tract irritation, fever, general discomfort, sore muscles and cough.
- Brucellosis symptoms occur 1-15 days after exposure and may last for months. They include fever, chills, sweating, weakness, loss of appetite, weight loss and bronchitis.
- Influenza from swine and poultry usually appears in late fall and winter.

Know Which Mask or Respirator to use for Protection

HAZARD	TYPE OF MASK	
Grain Dust	N95 or better (eg.N100)	check with supplier or qualified person
Molds and Fungi	N95 or better(eg.N100)	check with supplier or qualified person
Animal Dust	R95 or P95	check with supplier or qualified person
Gases	Depends on the circumstances.	May need an air supplying respirator especially if the gases may be in high concentration, for example in a silo or manure pit.
Welding Fumes	N100	This depends on the type of material being welded.
Chemicals	Manufacturer's recommendation usually on the container	This will depend entirely on the type of chemical being used.
Animal Related Diseases	Hantavirus – Respirator with 100 filter (N/R/P) Brucellosis – Respirator with 100 filter (N/R/P) Influenza – N95 or better	Contact public health, occupational health or The Network for more information

Always check with the manufacturer of the masks/ respirators regarding their recommendations for cleaning/storing/replacing your equipment.

The Proper Use and Maintenance of Respirators

Ensure that you are trying to fit the correct size of respirator for your face. Everyone's face structure is a bit different, just because you wear a size XL t-shirt doesn't mean your face size is XL.

Fit Checking a Half-face Respirator

Whenever you wear a respirator it is important that you inspect it for damage or worn parts and perform a fit check. If the respirator does not seal snug against your face, you will be exposed to respiratory hazards.

Positive Pressure Fit Check

- Put the respirator on and adjust straps to a comfortable position.
- Place hand over exhalation valve.
- Gently breathe out and hold for 10 seconds.
- If the seal is good, respirator should bulge out from face and not leak.

Negative Pressure Fit Check

- Put the respirator on and adjust straps to a comfortable position.
- Place hands over cartridges.
- Breathe in and hold your breath. If there is a good seal the respirator should suck into your face and stay there for 10 seconds. If there is a leak, re-adjust the respirator on your face and tighten up the straps. Try the fit check again. If there is still a leak try a new respirator and you may need a different size.

Cleaning and Storing a Half Face Respirator

- Wash the face-piece (but not the pre-filters or cartridges) periodically with soap and water.
- Store the respirator in a dry, sealed container, such as a Zip Lock bag or a two-pound coffee can with a tight lid. Avoid direct sunlight since light and heat cause deterioration of the face-piece and straps.

Replacing Personal Protective Equipment

- Replace a mask or filter when it is visibly dirty or damaged or when you experience difficulty breathing through it.
- Replace respirator cartridges whe you can smell or taste chemical while or after using the respirator, or according to the manufacturer's recommendations.

Purchasing Personal Protective Equipment

- Purchase disposable masks in bulk as it is more cost effective than buying one or two at a time.
- When purchasing a half mask respirator, ask for assistance so you get a good fit. One size does not fit all.
- Some farm supply centres stock half mask respirators but a safety supply store will have the best selection of models and sizes.

Factors which affect lung function

1. **Height – Tall people have larger lung volumes than shorter people. This does not mean shorter people have less efficient lungs.**
2. **Age – It is normal aging process to have a slight, gradual reduction in lung function as you grow older.**
3. **Head/Chest cold – This may cause a temporary reduction in test results.**
4. **Smoking – Smokers, in general, have lower lung function that non-smokers.**
5. **Effort – It is important for you to make your maximum effort when inhaling and exhaling during the test. Less than your best effort could result in inaccurate test values.**

If farmers have concerns about their health or exposures on the farm an agricultural health nurse can assist. She or he can help the farmer determine what the exposure is, how to reduce it and how to select the right personal protective equipment for the job

Respiratory Diseases that can result from agricultural exposures:

- Acute inflammation
- Allergies
- Chronic Sinusitis
- Bronchitis
- Increased Airways Reactivity
- Asthma
- Occupational Asthma
- Organic Dust Toxic Syndrome
- Farmer's Lung

Respiratory Health Clinics for Farmers

There are many hazards on the farm that may affect the respiratory health of farmers or their family members. These hazards may result in minor, short term illness or may progress to chronic symptoms, permanent disability or death. With awareness of the risks these illnesses are preventable.

The Agricultural Health and Safety Network can provide testing to farmers during clinics held in their own RMs along with other health information related to the industry.

Goals of the Clinic:

- Increase awareness of the health and safety risks associated with respiratory hazards on the farm.
- Establish a baseline health profile of the farmer to understand current health status.
- Identify effective methods of reducing exposure to respiratory hazards on the farm such alternate work practices and selection of respiratory.
- Identify farmers who have or are at risk for developing respiratory diseases associated with exposure to respiratory hazards.
- Refer farmers who have an abnormal respiratory test to their family physician.

At the Clinic Participants Will:

- Complete a respiratory health questionnaire.
- Have a measurement of height, weight and blood pressure.
- Review appropriate respiratory personal protection for use on their farm.
- Perform a lung function (spirometry) test with results interpreted and receive a copy of test results.
- Receive personalized health teaching and if necessary, a referral for follow-up to their physician.

It's important to know that this test is only a screening tool and that a diagnosis cannot be made on the basis of this test alone.

If the results fall outside the normal values, we may recommend that you see your doctor for follow-up, which would include a chest x-ray and more breathing tests similar to this one.

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CASA·ACSA
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