

DUSTS

Dust is encountered in many farm activities such as loading and unloading grain, grinding feed, shoveling grain, removing the top layer of silage from a silo, handling bales and feed, feeding animals, and working in animal confinement buildings.



There are two classes of dust: organic and inorganic. Most often dust on the farm is organic, meaning that its source is or was alive. The health effects of organic dust are of greater concern because of the many ways that they affect the lungs and other body systems. Exposure to organic dust is associated with illnesses such as asthma, nose and eye infections, Farmer's Lung, Organic Dust Toxic Syndrome, and chronic bronchitis.

This fact sheet will discuss fungi as well as grain and animal confinement dust.

Fungi

There are thousands of types of molds and yeast that are groups of plants belonging to the fungus family.

The Risk:

Over 100 fungi that grow on standing crops or stored feeds produce harmful toxic substances. Molds and fungi typically produce a white, sharp smelling dust. Spores are so tiny, they evade the body's defence mechanisms and reach the lungs causing health concerns such as allergic reactions, skin irritations, poor appetite, headache, vomiting, or Organic Dust Toxic Syndrome (ODTS). Chronic conditions include

emphysema, chronic bronchitis, lung fibrosis, skin inflammation, and Farmer's Lung.

Fungi grow on crops prior to harvest and do not thrive in stored grain with a moisture content less than 24%. Fungal growth varies depending on many factors. Drought or insect damage on standing crops and warm, humid conditions with nighttime temperatures above 21°C enhance fungal growth and toxin formation. Mold growth occurs between 20°C and 30°C but fungi can grow in temperatures as low as 5°C. In North America, major fungi are *Penicillium* and *Aspergillus* species that grow in stored grain.

Exposure to fungi is especially high during:

- ◆ cleaning of hay/grain storage areas
- ◆ opening and shredding/chopping moldy bales
- ◆ tending cattle
- ◆ crushing grain

Elimination

Since fungi are distributed widely in nature, it is not feasible to rid our environment of them.

Substitution

- ◆ If possible, hay with high risk of spoilage should be stored in silage instead of bales.
- ◆ Substitute mechanical handling for manual handling.

Safe Work Practices

- ◆ Ventilate areas where bales are being opened.
- ◆ Before opening bales, dust can be reduced by as much as 80% by adding small quantities of water to hay and straw. Sprinkle one half to one litre (1 to 2 pints) of water onto the cut side of the bale immediately before opening or chopping. Antifungal agents such as 1% propionic acid or other organic acids may be applied to fresh material and hypochlorite solution may be used for grain. Note that in using these to prevent fungal growth, a different risk is being created; chemical fume inhalation.
- ◆ Using proper respiratory protection, old caked or molded grains should be removed from storage buildings and the buildings should be kept dry and ventilated.
- ◆ Grain or hay stored with a moisture content of greater than 14% increases the likelihood of fungal growth, therefore wet hay or grain should be dried at harvest. Unfortunately this solution may be expensive.
- ◆ Humidity indoors should be maintained below 80% to reduce airborne organisms.
- ◆ Crop rotation to decrease fungal growth.

Grain and Animal Confinement Dust

Along with fungi, dusts from grain and animal confinement are also organic and have the capability to cause health effects.

Grain Dust....The Risk:

For every ton of grain handled, 12 kilograms (27 pounds) of dust are emitted! Approximately 40% of the dust particles are tiny enough to be inhaled into the lungs.



Grain dust may contain:

grain particles	molds
bacteria (endotoxins)	leaf
insect particles	stem
inorganic matter (from soil)	fungi
chemical residues	pollen
storage mites	
excreta from birds, rodents, insects	

Working with grain dust can cause short and long term respiratory symptoms of cough, phlegm, wheeze, and shortness of breath.

Animal Confinement...The Risk:

Eighty to 90% of the dust inside hog/poultry barns can be inhaled into the lungs. The highest dust levels are created during feeding, feed grinding, and moving/handling animals and birds. Barn dust may consist of:

*feed components (includes undigested feed, gut cells)	*dried waste material
skin cells	feather particles
insect parts	molds
bacteria (endotoxins)	viruses
mineral ash	hair
fungi	pollen

***These make up most of the dust material.**

Cough, phlegm, and wheezing are two to three times more frequent in hog farmers than in other farmers.



Chronic bronchitis becomes a greater threat as more time is spent in the barn. Hog farmers experience declines in lung function test results, comparable to the effects of smoking. Therefore workers who smoke are increasing their risks.

The cell walls of some bacteria contain **endotoxin**, that may be the cause of immediate or delayed reactions in the respiratory system. Exposure to bacteria is high in warm, humid animal confinement barns for poultry and hogs and during harvesting and grinding grain.

Elimination:

Elimination is not a realistic option because there will always be some dust present in the farm environment due to the nature of the materials handled. A specific crop or animal may have to be eliminated if the farmer or family member has a serious related respiratory condition.

Substitution:

- ◆ Use pellet feed rather than dusty chopped feed.
- ◆ Dust level exposure is lower when driving a tractor with an enclosed cab as compared to an open tractor.
- ◆ Silage contains fewer tiny, inhalable particles than hay.

Engineering:

- ◆ Unit manufactured cabs keep out more dust than farm-installed cabs.
- ◆ The design of confinement buildings should allow for easy, effective cleaning.
- ◆ Ventilation systems should be inspected regularly.

When moving dusty products:

- ◆ Minimize the height that dusty products fall. Extend spouts into covered feeders to lower dust levels.

- ◆ Enclose crushers, grinders, and mixers.
- ◆ Feed can be moved via belts, screws, buckets, chains and pneumatic systems. Belts and buckets that are not enclosed emit the most dust. Pneumatic systems are totally enclosed so dust levels are lowered.

Safe Work Practices

- ◆ Use a wet, rather than dry process when cleaning.
- ◆ Use a fork to spread open bales, rather than doing it manually.
- ◆ Ventilate areas where bales are being opened.
- ◆ Moisten the top layer of silage before removing it.
- ◆ In the field, lower the speed of equipment to reduce the release of fine dust particles.
- ◆ Organize equipment and work practices so that any prevailing wind can carry the dust away from your face.
- ◆ Spray unpaved roads frequently with water, chemicals, oils or other stabilizers to lower dust.

Safe Work Practices....Indoors:

Pressure Washing

Regular pressure washing is the single, most effective means of dust control. Cold water is as effective as hot water. It costs less and prevents steaming. Recommendations for pressure washings:

<u>Type of Barn</u>	<u>Frequency of Washing</u>
Farrowing	Before each new group arrives
Nurseries and grower units	Monthly to Bimonthly or at least whenever emptied.
Finishing	Preferably every month or two

Wetting agents

Wetting agents help to “keep the dust down” by increasing the weight of the dust so it settles.

You can use:

- ◆ Water. Disadvantages include:
 - water’s high surface tension - it does not always mix well.
 - most fine dust has an electric charge but to inject a charged fog of water into the dust is costly.
 - an increase in humidity level.
- ◆ Water with additives.
- ◆ Other agents such as oils.

A study conducted at the Prairie Swine Centre shows that sprinkling canola oil greatly reduces dust in swine confinement buildings.

Vegetable Oil Dust Control Method

- ◆ Vegetable oils such as crude canola, purified canola, flax, corn, sunflower, and soybean are readily available, economical, and biologically safe for animals.



- ◆ Sprinkling of crude canola oil has been shown to not only reduce dust levels but also to reduce hydrogen sulfide and ammonia concentrations.
- ◆ Sprinkling means to apply the liquid under low pressures for a shower-like effect as compared to spraying which involves high pressure for a fog-like effect.
- ◆ Application should cover the entire floor, the pigs, and operator walkways.

Safe Work Practices...Feeding:

Dust increases during periods when activity is high such as weighing, transporting animals, and feeding.

- ◆ Control feed rates. Fast dumping of large amounts of material creates greater amounts of dust.
- ◆ Feeding should be done just before leaving a room to limit worker exposure.
- ◆ Avoid floor feeding in hog barns.

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