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Air Quality in Fair and Exhibition Barns

Best Practices for Reducing Dusts in Livestock Barns

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Rationale



Why should we be concerned about air quality in barns?

- A well-ventilated facility is essential for the health and well-being of animals housed in the barn, exhibitors and their families, and the public that visits the fair each day.
- Assuring adequate ventilation will help to reduce the risk of exposure to airborne virus and bacteria particles that are dispersed into the air.
- Minimizing the dispersion of dusts, virus and bacteria in air will help improve the respiratory health of exhibitors, fair attendees and the animals.

While design, age, and building construction differ among exhibition barns, cost-effective and readily implementable tools and techniques will improve air quality in barns. Taking effective steps to improve air quality requires planning and knowledge of the barn's normal daytime and nighttime temperatures, availability of electrical outlets for fans, and knowledge of prevailing winds with respect to sources of natural dilution ventilation (window and doors).

The following recommendations, if implemented properly, can result in; 1) Improved comfort of animals and humans alike, 2) Minimization of the adverse effects of a 'dusty' environment on the respiratory system of exhibitors and fair goers, and 3) A possible reduction in the transmission of disease amongst animals and between animals and humans.

Moving Air in Barns

'Stale air' is that which is essentially stagnant within a space and is comprised of a build-up of gasses such as carbon dioxide (normal respiration) and ammonia from animal urine, and airborne pollutants such as dusts and mold spores. Optimizing air quality within a barn requires moving clean outdoor air into the space while moving 'stale air' out.

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Ventilation systems are designed to maintain ‘creature comforts’ such as warmth during cool seasons and cooling during the warm summer months. Windows and large sliding doors are used as sources of natural dilution ventilation, with fans as tools to help bring-in and direct air within the facility, generally in a uni-directional flow.

Understanding the way a barn was designed will help occupants optimize air quality within the space. Tips to maximize fresh air in barns include:

- Keep doors and windows open, particularly on the side of prevailing winds.
- Avoid blocking windows with tack or other equipment as this can reduce the size of the opening (window or door) and in turn reduce the volume of fresh air drawn into the space.
- If temperature control is desired, this can be done by utilizing overhangs or shade cloths on the outside of the barn.
- Identify sources of ‘fresh air’ (from outdoors) to draw into the building using fans. If possible, minimize the potential of contaminating a space with air from connected spaces with contaminated (stale) air, including heavily used/dusty roadways, show pens, attached livestock barns and manure pits. Maintaining unidirectional flow of air (fans or blowers all pointing the same direction) help to ensure fresh air is pulled through the entire space while pushing contaminated air out (through windows and doors).



Fans

To increase fresh airflow within a facility:

- Airflow needs to move in one direction throughout a facility. Placing fans at varying heights and angles can create a tornado effect which will keep contaminants suspended within the space.
- Place fans in predetermined locations so that they may draw in air from outdoors and blow fresh air into an unobstructed area. Multiple fans in open spaces must be placed so that they are not opposing (facing each other) and all push air in the same direction, ultimately forcing stale air outside through a door or window.
- To avoid fire hazards, use fans rated for agricultural environments. This means that they are multispeed fans with an enclosed motor (prevents fire due to combustible dust) and thermal switch, shutting off the fan if the motor gets too hot. These fans can be cleaned with water after use.
- Floor fans should not be set directly on the ground, as dusts and other contaminants are picked up and dispersed into the air. Instead, set the base of the fan on cinderblocks or table so that the fan moves air at the height of a pig’s breathing zone. This will allow for improved air quality in the breathing zone of the pig as well as provide cooling if desired.

When using fans to cool individual animals within a facility: Place the fan on a lower speed and closer to the animal. Fans on a high-speed setting have the potential to create a ‘jet’ of air that bounces off surfaces and the ground and disperse settled material (dusts) back into the air.

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Bedding Materials

The type and size of shaving or sawdust materials used for bedding vary widely and contribute significantly to the dust concentrations within a barn. To optimize air quality, consider the following when sourcing bedding material:

- Medium-sized shavings are ideal for absorbency, do not contain particles in a size that become easily airborne, and help with manure and urine management.
- Sawdust or other smaller particle-sized bedding should be avoided, as the smaller the shaving size, the more small diameter particles are present, resulting in a greater chance they will be suspended in air as the animal(s) move around or as the pen is cleaned.
- Large-sized shavings do not effectively absorb urine, causing potential for issues with ammonia.
- Bedding in the aisles is unnecessary and will increase concentrations of dusts in air as animals, exhibitors and guests travel through the aisles.



Moisture



Increasing the moisture concentration in an area 'binds' small particles (dusts) together, minimizing their ability to be dispersed in air. Simply wetting or misting down the penning area, aisles, and common areas (holding areas, show ring, photo background) can significantly improve air quality. You can also reduce the amount of dust in your barns by developing and implementing dust control strategies for the walkways, roadways, and areas outside of your barns, so that dust from outside isn't blown in or pulled-in from using fans. How and when you apply moisture will change and requires that a needs assessment be performed daily. Need will depend on weather (wind speed, temperature, and other variables) and level of activity (animals, exhibitors and fair goers). Consider the following methods when applying

moisture to control dust:

- Dust control methods should be used for pens, walkways, and roadways outside of the barn.
- Hot weather, dry and windy conditions, and the use of fans may increase the frequency for moisture application.
- Efforts should be increased on dry days and when foot and vehicle traffic is high.
- When adding moisture to the pen area handheld watering device such as a watering can, mister, or sprayer is an easy way to apply water without saturating bedding or making a dry surface slippery.
- When adding moisture to the aisles:
 - Apply water lightly to the aisles to help reduce dust particles prior to sweeping or cleaning.
 - When sweeping and to prevent dust particles from becoming airborne, imagine pushing the debris (e.g. with a push broom) rather than 'flicking' or sweeping vigorously.

Other Best Practices

- Avoid consuming food and drinks within a livestock facility to minimize the spread of zoonotic diseases (between humans and animals).



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- Barns should also be free from areas where food preparation take place. Microwaves, toaster ovens and other small appliances used to prepare food have the potential for electrical issues including fire due to combustible dust when found in the barn environment.
- Establish methods for good hygiene practices for fair families and visitors.
 - Make hand sanitizer stations, hand washing stations, or hand wipe stations available outside of main entry points into the barn.
 - Fair leadership should devise a schedule throughout the week to make sure that these areas are stocked with supplies for use.
- Post clear, concise signage encouraging good hygiene practices.
 - Find suggestions for proper signage on the [MSU Extension Fair and Exhibition Animal Health webpage](#).

Additional Resources

Find additional resources for fairs and exhibitions on the [MSU Extension Website](#) or visit:

- [4-H Animal Science](#)
- [Avian Influenza](#)
- [Fair and Exhibition Animal Health](#)
- [Swine Influenza](#)

Questions

To find out more about improving air quality or to discuss options for your county fair, show or exhibition, contact:



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