



# Extension FactSheet

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## Providing Livestock Comfort at the County Fair

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Most Ohio county fairs have days that are hot and miserable for livestock, exhibitors, and fairgoers. When temperatures rise above 80 degrees and the relative humidity is above 65 percent, comfort for both livestock and people is compromised. Heat stress can predispose livestock to illness and even death. Organizers of county fairs should provide the most comfortable environment possible to prevent undue stress on exhibition animals.

At the fair, livestock and exhibitors spend most of their time in buildings. Fairgoers also spend considerable time viewing the exhibits and shows in these same buildings. Therefore, the buildings need to be properly ventilated to minimize the heat stress on the occupants.

Fair buildings need good air exchange to keep the inside temperatures as close to outside temperatures as possible. When the temperature and humidity cannot be lowered, more air movement across the people and animals removes heat, which reduces the heat stress. Fair managers should evaluate existing buildings for good air exchange and air movement and make building modifications, when needed, to improve the environmental conditions.

Fair buildings do not lend themselves to be ventilated like some commercial livestock facilities. Some commercial facilities utilize tunnel ventilation during hot summer months. County fair buildings cannot easily be converted to tunnel ventilation as they are designed for animals and people to be continuously entering and exiting the facility. Also, the cost of the fans needed to create a 3 to 4 mile per hour flow rate would be cost prohibitive. Mechanical ventilation systems using negative pressure do not work because the intake openings cannot be controlled, causing the air to short circuit, which makes the system ineffective. Commercial swine facilities also

utilize water to cool pigs during periods of hot weather. Drip coolers and mist systems work well in commercial facilities but are difficult to adapt to fair buildings.

### Common Building Problems Found on Fairgrounds

Building ventilation brings outdoor fresh and cool air indoors to keep inside temperature, humidity, and airflow at comfortable levels. However, one common problem in county fair buildings is that the buildings are not properly ventilated. The reasons are:

**1. Buildings originally were built for cool weather:** Many fairgrounds have older buildings that were constructed when the county fair was held during cooler autumn weather. For whatever reason, the fair dates changed and the county fair is now held during much warmer weather. The older block and mortar buildings do not lend themselves to being remodeled or opened to allow summer breezes to blow through.



Building with solid walls built for an autumn fair.



Older building with openings near the ridge to allow heat to exit the building.

**2. Buildings primarily are used for storage:** Many county fair buildings are used for storage during the non-fair season to generate income. A building that can be easily secured is more attractive for storage, so fair boards may not have an incentive to open buildings for the one week of the year during the fair when they house livestock.

**3. Newer buildings interfere with the airflow through older buildings:** Many fairgrounds are hemmed in by residential housing or industrial developments and cannot expand. Thus new buildings are constructed close to existing ones and can interfere with natural airflow. In Ohio, summer winds blow primarily from the southwest. So, when possible, plan new buildings to take advantage of the wind. Allowing as much space as possible between livestock buildings on fairgrounds can help prevent heat from building up.

**4. Older buildings are not managed as the builders intended:** Many older fair buildings are cavernous compared to newer, more recently constructed ones. These older buildings were likely built with ridge or gable openings near the ridge (possibly windows) that were eventually painted shut or boarded up. Closing these openings can trap heat in the building that would normally have escaped. This can be especially true if the building has no insulation under the roof.

**5. The electricity supply available to run fans often is limited:** Electrical updates are expensive and sometimes not within the means of the fair board's budget. Fans to provide air movement across larger fair animals have been common for many years and are also gaining popularity with exhibitors of smaller animals. This increase in electrical usage can easily overload the existing electrical system and can cause power outages. In some instances, overhead electrical wires can overheat and sag creating a dangerous situation.

To overcome the electrical problems, generators are often added. Electrical generators at county fairs can be noisy and distracting for fairgoers. They can create a dangerous situation because they can drown out the sound of approaching vehicles, runaway livestock, and public service announcements about inclement weather. If fair boards allow the use of electrical generators to supplement the available electrical supply, they need to provide a location where the generators can be isolated from the general fair population and their noise can be muffled with a barrier of some kind, such as plywood or shrubs.

## Means to Provide Animal-Friendly Facilities

**1. Renovate and build animal-friendly facilities:** When new naturally ventilated livestock facilities are constructed on fairgrounds it would be helpful to follow design recommendations of the Midwest Plan Service. Midwest Plan Service Bulletin MWPS-33 *Natural Ventilating Systems for Livestock Housing* has suggestions for ridge openings, gable openings, sidewall openings, and spacings between buildings that can assure that new naturally ventilated facilities are properly designed.

Existing naturally ventilated livestock buildings on fairgrounds can be modified to provide improved environments for animals. Fair boards can often improve environments in older buildings by opening the “long-closed” openings that the original builders intended to be open. Ridge openings can be installed to allow hot air to escape upward through the building and be replaced by cooler air from outside the building.

Properly sized ridge openings are sized for 2 inches of opening for each 10 feet of building width. Thus a 30-foot-wide building would need a 6-inch ridge opening. Ridge opening designs can incorporate continuous ridges or waterproof structures at proper intervals. As



Open-sided fair building where tarps may be hung to provide shade for swine.



an alternative to open ridges, copulas are an attractive means of ridge ventilation without the problems of rain and snow entering an open ridge. Design the copulas with at least 1 square foot of net opening for every 100 square feet of floor area.

Ridge openings are more effective in the fall, winter, and spring. The very small temperature difference between the inside and outside air makes them less effective in the summer. And, when the temperature and humidity outside the building is stressful to livestock, the temperature and humidity inside will be no better. Properly designed and installed ridge openings will extend the life of a building by delaying premature rust on truss plates and fasteners.

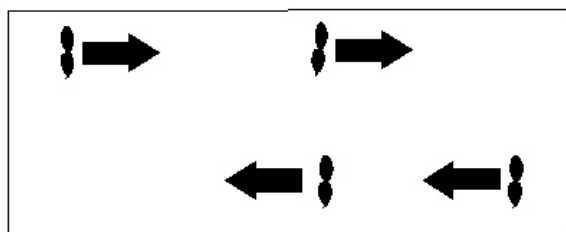
If an existing livestock building has solid walls, then it may be possible to create openings to aid in natural ventilation. Great care must be taken not to weaken the structure, so it's important to involve a structural engineer in designing the openings. Place sidewall openings at animal height if possible.

When replacing roofs on fair buildings, **consider adding insulation under the new roof** to assist in preventing heat buildup in the building. When building new livestock buildings, **make them as narrow and open as possible** to allow heat to escape from the building. Buildings under 40 feet wide with plenty of sidewall openings have better environments.

**2. Proper management of shade devices:** Many fair buildings utilize tarps to provide shade for animals when the sun is positioned to shine into the facility and stress the animals located along the outer walls. This can happen in swine buildings built with open walls. Often a tarp is lowered to prevent the morning sun from shining into a building and left in place for the remainder of the day where it helps to trap heat in the building. Using the tarp to block the sun is a sound strategy. However, the tarp should be raised during the hours it is not providing shade to prevent it from trapping heat.

**3. Supplemental air mixing fans:** Individual fans in the aisles at people level can pose a safety concern for fairgoers and exhibitors. Safety should always be considered before installing any fans.

**Have all fans in a building blowing in the same direction or in a racetrack fashion:** Ventilation fans are



Air circulation fans create a circular air movement.



Ceiling fans can safely move air across animals.

commonly used at county fairs to move air, especially around large livestock. A growing trend at county fairs is to have all of the ventilation fans in a livestock building blowing air in the same direction or to blow air around the inside of a large building in a circular fashion similar to a racetrack. While not as effective as true tunnel ventilation used with many modern commercial livestock facilities, this method does tend to move air more effectively than having all the fans functioning independently. If possible, take advantage of prevailing winds.

**Consider ceiling fans:** Ceiling fans are gaining popularity at county fairs as a method to create moving air to cool animals. Ceiling fans can be located above livestock and can provide air movement while being out of reach of visitors and exhibitors. In recent years, ceiling fans have evolved in size and can now measure up to 30 feet in diameter. Ceiling fans that are 5 feet in diameter can be purchased for less than \$100 per fan and operate on approximately 100 watts per hour. A 60-inch ceiling fan can produce approximately 25,000 to 45,000 cubic feet per minute airflow. They can provide good air movement for approximately 1,000 square feet.

The Morrow County Fair (Ohio) installed 60-inch ceiling fans in their junior fair horse barn and main show arenas before the 2003 fair. In an 80 x 270 foot horse barn, 60-inch fans were installed at 20-foot intervals down the aisles. The 70 x 130 foot show arena had twelve 60-inch ceiling fans installed. The spacing was one fan per 750 square feet. Fair exhibitors and fairgoers thought these were excellent additions to increase the comfort zone for animals and people. These fans were installed to be a permanent fixture. Storage of the ceiling fans can present a problem during the off-season for fair boards where security concerns will not permit them to remain installed. Ceiling fans designed for agricultural or industrial uses should be used to allow a long service period.

## Other Things Fair Boards and Exhibitors Can Do to Improve Comfort

**Timing of livestock movement:** Hauling livestock to the county fair can add to the stress on animals. Hauling livestock early in the morning or late evening creates the least amount of heat stress, as these are the coolest times of the day. Arrival times for livestock to the county fair should allow owners to avoid the hottest time of the day. When loaded, trucks and trailers should keep moving because heat rapidly builds up in a stationary vehicle. The checking of livestock registration papers and inspection of the animals as they enter the fairgrounds should be as coordinated as possible so livestock trailers do not wait in line longer than absolutely necessary.

During hot weather, hogs should be wetted down immediately after loading, and sand or wet wood shavings should be used for bedding. Fair activities such as weighing, showing, and showmanship should also be done during the cooler times of the day.

**Grouping of animals:** The lower the animal density within a building, the less heat will be created. Perhaps the least heat-tolerant animal species commonly found at county fairs are chickens. Grouping chickens in buildings with larger animals (i.e., cattle) tends to increase heat stress on the poultry, resulting in possible deaths. Decreasing animal density when hauling will also help to keep animals cooler.

**Availability of cool drinking water:** Cool water should be available to county fair livestock at frequent intervals and especially when heat stress conditions exist. Consider the use of waterers to allow animal access to water at all times without creating messy pens.

While commercial swine facilities often use drippers or misters to cool pigs during hot weather, most county fair buildings are not designed to utilize water in this manner. Most fair livestock buildings have flat concrete

floors or dirt floors that can become messy because they don't permit excess water to leave the building.

**Tying animals to lie down comfortably:** Tying animals outside at night can also help cool larger fair animals. Always be sure tethered animals can lie down comfortably. Discomfort to animals can be caused by overactivity and/or placing them in a poor environment.

## For Fairs in Colder Weather

In colder weather, the biggest problem can be providing sufficient ventilation to maintain a healthy environment inside the building. Under colder conditions, the buildings do not require as many total openings as for hot weather. However, **they do require some openings for good air exchange.** Poor air exchange can increase the risk of respiratory problems. At a minimum, they should have ridge openings to provide the equivalent of 2 inches of width for each 10 feet of building width and the same amount of opening at the eave or sidewall. Additional sidewall openings keep the building from getting too hot during a sunny fall day. Problems develop when the building is closed too tightly at night to keep the temperature warmer for the exhibitors staying with the animals. **Remember, the first priority is to animal comfort and health.**

## Summary

Fair boards, building superintendents, volunteers, and livestock exhibitors can all work together to provide the best environment possible for animals at county fairs. Proper building design, proper building management, and keeping plenty of cool, fresh water in front of animals can create a more positive fair experience for animals and exhibitors.

Safety must be a high priority at county fairs. When fans or other building modifications are made to provide improved environments for animals and fairgoers, be sure safety is the highest priority.

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