

Alternatives to Natural Ventilation

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Many livestock producers appreciate the benefits of opening their buildings to allow wind to blow through for natural summer ventilation. Removing sidewalls of existing livestock buildings has improved animal comfort in cases where prevailing summer winds can reach the buildings. But buildings located on older farmsteads are surrounded by obstructions such as other buildings, tower silos, feed rooms, and barn hills that block prevailing winds and prevent natural ventilation.

Wind tunnel ventilation systems have proven effective in narrow barns that have ceilings and short walls and are a possible alternative to natural ventilation. In wind tunnel systems, large capacity fans exhaust air from one end of the barn while air is drawn in through large openings at the opposite end. All other openings remain closed. This system might not be practical in barns that have doors that must be left open to allow animal access to an outside yard; have natural ventilation openings that must remain open or are difficult to close; or are very wide, have tall sidewalls, and/or have no horizontal ceiling. For a wind tunnel ventilation system in an 80-foot wide barn with 10-foot sidewalls and a 3/12 roof pitch, the fan capacity needed for the desired 2.5 mph air velocity is 264,000 cfm (cubic feet per minute). A typical 48-inch diameter fan can deliver about 20,000 cfm, so 13 such fans are needed to obtain 264,000 cfm. These 13 fans, at an installed width of 5-foot each, occupy 65 feet of the 80-foot barn width.

Another alternative to natural ventilation uses a system of smaller fans distributed on the sidewalls that blow toward the barn center. With this system, 30- to 36-inch diameter fans are placed about 30 feet apart along the barn walls. If the 80-foot wide barn in our previous example housed 120 cows in four rows of freestalls, the barn would be about 120 feet long. Four fans would be required on each long wall for a total of eight fans. Air would be drawn directly from outside and delivered to the cows at a high velocity. In barns wider than 60 feet, supplemental circulation fans might be needed in the center of the barn, especially if that is where the feed bunk is located. All windows and doors and ridge and eave openings are left open to capture wind effects and to allow fan-delivered air to exit the barn. This system is most effective if solid interior partitions (for example, walled freestall fronts) perpendicular to air flow are removed or opened.

This ventilation system of sidewall fans has proven effective in several barns where feed rooms have interfered with the ability to open the sidewall for natural ventilation. Sidewall fans can also eliminate areas of dead air within an existing natural ventilation building which is otherwise working. Cow comfort can be improved by adding sidewall fans in holding areas where cows are held for extended periods in air-restricted conditions.

Use of sidewall fan ventilation systems is limited by low outside air temperatures. Blowing cold outside air at a high velocity onto the animals results in a draft. To extend the use of fans during cooler periods, mount the fans on a swivel so they can be easily switched to exhaust fans. Make sure they don't send exhaust into a closed space such as a feed room where condensation will occur. When fans are operated in exhaust mode, it is important to manage the inlet system to achieve uniform air distribution.

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