

Dairy Cattle Need Ventilation To Prevent Heat Stress

LEXINGTON, KY.

Historically, dairy barns were constructed like houses, striving to keep barns closed-in to protect cows from winter weather. But, building them that way ignored the fact that cows have a different temperature comfort range than people.

"Cows are much more cold tolerant than we are and much less heat tolerant than we are," said Jeffrey Bewley, University of Kentucky College of Agriculture assistant extension professor in the Department of Animal and Food Sciences. "Of course, even in the Southeast, we experience winter days where cold stress is a concern. But, interestingly in Kentucky, the number of days cows experience heat stress is much higher than the number of days cows experience cold stress."

Bewley said cows begin to experience heat stress when the temperature humidity index exceeds 72 degrees Fahrenheit. Bewley and UK undergraduate student Curtis Coombs, looked at historical temperature data from nine different weather stations in Kentucky. While the average number of days where the temperature humidity index exceeds 72 degrees varies within the state, the average across Kentucky is 125 days.

"Perhaps more surprisingly, these locations averaged at least one day with heat stress conditions in every month of the year except December and January," Bewley said. "Yes, that means heat stress can be an issue even in February, March, October and November. The take-home message from this information is that dairy barns in Kentucky should be built or renovated to help cows deal with heat stress first with consideration of cold stress second."

During warmer temperatures, poor ventilation may result in cows expressing obvious signs of heat stress, such as breathing heavily or panting. Research has illustrated that average lying-down time decreased from 10.9 to 7.9 hours per day as temperature increased. Thus, cows may alter stall usage if barns are not adequately ventilated.

When temperatures are cooler, poor ventilation can result in increased respiratory problems and increased transmission of diseases. Lack of proper ventilation can lead to high moisture levels, manure gases, pathogens and dust concentrations which create an adverse environment for dairy cows.

"For optimal production and well-being, producers should provide dairy cows with a constant supply of fresh, clean air," Bewley said. "Frequently exchanging air removes or reduces the concentrations of dust, gases, odors, airborne disease organisms and moisture."

Bewley stressed that maximizing natural ven-

tilation is the first step toward improving overall ventilation. Natural ventilation relies on barn openings and orientation to remove heat and humidity from the animal's environment. Exhausted air generally leaves the barn through sidewalls and ridge openings. Although old barn designs suggested closed-in barns, current recommendations are to open the barns up to allow for better air exchange. Sidewalls allow for air, heat and humidity to be easily and continuously removed from the barn.

"All of this is particularly critical during the summer," Bewley emphasized. "If producers are concerned about the potential negative effects of open sidewalls during the winter, sidewall curtains, which can be raised in the summer and lowered during the winter, may be added to eliminate this concern. A ridge opening should also be provided at the top of the building to facilitate air removal through the top of the barn."

Warm, moist air rises and exits through the ridge opening even on calm days. The steeper the roof slope, the better the movement of the warm, moist air out of the ridge vent. Bewley recommends the roof slope to be at least 3 inches of rise for every 12 inches of run. A slope of 4 inches for every 12 inches of run is preferred.

The ridge opening should be at least 2 inches for each 10 feet of building width. With overshot roofs, this opening should be at least 3 inches per 10 feet of building width.

"Producers are often resistant to this change because of fears of precipitation entering the barn through the ridge opening," Bewley said. "Although this is generally not a major problem, a ridge cap may be added to eliminate this concern. A few weeks ago, I visited a producer in Western Kentucky who had constructed a new barn with an open ridge vent. He said he was considering opening the ridge vent in his older freestall barn, because he was so pleased with how the cows responded to the new barn. He recognized that he could see dramatic improvements in cow comfort in his old barn without spending a lot of money. Many Kentucky barns and cows could benefit from this type of renovation."

For many older barns with ventilation issues, the main opportunity for improvement is removing tin or wood sidewalls that block natural winds from entering the barn. Before removing these obstructions, consider how this change might affect the structural integrity of the building, Bewley explained. Producers may also supplement natural ventilation with mechanical ventilation by adding fans.

"Adding fans to an existing freestall barn is one of the highest return investments a dairy producer can make," he added. Δ