Avoid overventilation this winter

Farm Energy

By **DANA PETERSEN**

IOWA State University Extension and Outreach held swine ventilation workshops in northern Iowa this month with Jay Harmon, Iowa State University professor in ag and biosystems engineering, and ISU Extension livestock specialists. The workshops, open to the public, were Jan. 9 near Cresco in northeast Iowa and Jan. 13-14 at the Northwest ISU Research and Demonstration Farm, north of Cherokee. Program topics included management of ventilations systems, animal health and welfare, and energy use in livestock buildings.

Participants reported that their knowledge of measuring air speed, velocity and humidity improved during the hands-on workshop activities. They also gained a better understanding of proper settings for inlets and adjustments to fan belt tension. One participant reported that, after attending a local workshop, he was able to reduce his annual energy expenses even though retail energy prices had increased.

Regarding energy consumption, Harmon notes that winter is an especially critical time of year for managing minimum ventilation to avoid costly heating bills in wean-to-finish buildings. Specifically, overventilating by as little as 10% can increase estimated annual liquefied petroleum, or LP, consumption by 27%. Overventilating by 40% can double estimated annual LP consumption, Harmon explains.

"Wean-to-finish buildings present one of the greatest challenges to efficient winter heating," Harmon says. Facility management records show that a reasonable target for annual LP consumption is 2 gallons per pig space per year. However, actual consumption is directly affected by the time of year the weaned pigs are placed in the building. In addition, overventilation is more likely to occur during the wintertime.

Major cause of heat loss

"Overventilation is responsible for 80% to 90% of heat loss in swine housing during the winter months," Harmon says. "Overventilating is more common than expected because it's difficult to gauge exactly how much air is actually being exchanged by the ventilation system."

In Harmon's example, a 1,000-head wean-to-finish building with newly placed pigs should be ventilated at 1,500 cubic feet per minute during the coldest weather. As pigs grow larger, this rate is adjusted. In order to meet the changing needs of the pigs and to minimize the total number of fans, a controller is used to slow fan speed and reduce air delivery. These are commonly known, too, as "variable-speed" fans.

Variable-speed fans should be used to fine-tune the ventilation rate especially during cold weather, Harmon explains. This optimizes a building's minimum ventilation and its overall energy efficiency.

Variable-speed fans

When selecting variable-speed fans, don't expect them to deliver less than half their rated airflow at 0.10 inches of water, Harmon says. From the example above, if 1,500 cfm is needed, pick a fan rated at 3,000 cfm, which can be used with a variable-speed controller to deliver half its rated amount. An extra fan is needed to meet the air requirements when pigs grow larger than 75 pounds. In most cases, electricity costs to operate variable-speed fans are less than heating costs for heated air forced out of the building due to overventilation.

There are limits to how much a fan can be slowed down using variable speed and still be effective. Fans at low speed cannot operate against much pressure. Fans facing prevailing winds should be protected with diverter cones or wind hoods. Also, fan motors receiving less than half voltage may become chronically overheated.

For more information about managing ventilation systems, download the fact sheets "Sizing minimum ventilation to save heating energy in swine housing," PM 2089J, and "Managing swine ventilation controller settings to save energy," PM 2089T, from ISU Farm Energy at *farmenergy.exnet.iastate.edu*. You can also follow @*ISU_Farm_Energy* on Twitter for tips about energy efficiency all around the farm.

Petersen is program coordinator for ISU Farm Energy.