

HVLS Fans Catching On in Wisconsin Freestalls

By Jane Fyksen
Crops Editor

A new type of fan – high volume, low speed (HVLS) – is starting to appear in freestall facilities in Wisconsin and elsewhere. Operating on the same principle as a ceiling fan for home use, the blades are horizontal and push air downward. The vertical air column hits the floor, moving out horizontally along the floor. Cows dining at the feed alley or laying in their stalls are cooled by the increase in the velocity of the air.

UW-Madison ag engineer Dave Kammel says HVLS fans have been used in industry to keep workers in large areas cool by increasing air velocity. They're quickly catching on in the dairy industry in newer freestall barns. These large diameter paddle fans can range from 8 to 24 feet in diameter. They run on a three-quarters-horse motor and rotate up to about 60 rpm. Kammel says energy savings is just one of the benefits.

Due to their size and unique airfoil blade design, these fans provide more air movement for more space. One 20-foot diameter HVLS fan can circulate air over 15,000 to 20,000 square feet. They move a massive column of air at relatively slow speed. They revolve slowly and are a rare combination of size and economy. The average operating cost is less than 5 cents per hour, according to the manufacturer.

"One fan mounted in the middle of the barn over the feed driveway can potentially 'influence' the entire barn width," says Kammel. "The impact of these or of any velocity fans on cows is hard to determine or measure, but certainly many farmers have installed the traditional 3 to 4-foot diameter high-speed axial fans to increase cow comfort in the hot humid summer. This system may be an alternative."

This ag engineer admits there's a lot to learn about these new fans, in terms of spacing and mounting height. However, he says he's been on two farms in Wisconsin with installed HVLS fans, measuring velocities. In both a four-row barn with head-to-head stalls and a six-

row barn, fans were spaced at 60 feet on center.

"During both visits, there was a 500 to 600 fpm (feet per minute) wind velocity impacting the barn. The velocities measured were similar in both barns. You can feel the influence of the fans walking down the feed alley," says Kammel. "It is similar to a light breeze hitting your face."

"As you walk toward a fan you feel the velocity hitting you in the face. As you walk under the fan, it is a very turbulent velocity. As you walk away from the fan, the velocity hits your back until you are between two fans where it becomes turbulent again," he describes.

"Wind does have some effect on the velocities measured depending on where you are in the barn, but I tried to discount the wind velocity in the measurements," Kammel admits, noting that his reported velocities assume little or no wind velocity effect. He recorded 15-second average velocities with a wind anemometer at several locations and averaged the readings. In one barn, they closed the curtains and doors to measure velocities only from the fans' horizontal velocity.

Past the cow's face at the bunk ranged from 200 to 350 fpm in a direction perpendicular to the length of the bunk. Kammel says it's highest at the centerline of the fan at the bunk and decreases to 200 fpm at the bunk between two fans. The velocity is highest at the floor (300 to 400 fpm) at the center of the feed lane and decreases at face height (200 to 300 fpm). In the feed/scrape alley, the horizontal velocity was about 250 fpm and usually perpendicular to the length of the alley.

At the middle of the head-to-head stall row, the horizontal velocity was about 150 fpm. In the back alley next to the outside wall, the velocity diminished to 50 fpm or the outside wind velocity overpowered the fan-induced velocity.

Kammel estimates the cost of these fans between \$3,500 and \$4,000 each, depending on diameter, plus the cost of controls and installation. He says there were three fans in the four-row barn.

Each fan uses about 300 watts, making them very energy efficient.



More Air Movement

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Kammel says as far as he knows, the only firm making these fans is HVLS Fan Co., Lexington, Ky. web (www.hvls.com or 877-BIGFANS).

Kammel says he'd be happy to discuss the pros and cons of these fans in detail with any dairy producers thinking about installing the system (dwkammel@facstaff.wisc.edu or 608-262-976). The only distributor reportedly in Wisconsin for this equipment is Ederer Dairy in Plain,

Kammel reports. The two dairies studied by Kammel were Bruce Paull's at Ridgeway and Bob Thelen's at LaFarge.

Agri-View talked to Paull about his three HVLS fans.

Paull and his wife, Donna, and their silent partners, his folks, Tom and Susie Paull, milk 140 Holsteins at Hy-Vista Dairy Farm LLC in Iowa County. The Paulls have four children: Heidi, 21, and Jenny, 20, both of whom live away from the farm; 15-year-old Joey; and 14-year-old

Stephanie.

They have a four-row barn that's 96 feet wide, with 172 stalls with mattresses and rice hulls. This past July, they installed three HVLS fans. They housed cows in that barn a full year before putting in the fans. The barn has 14-foot side-walls and insulated ceiling. The fans are suspended about 14 feet off the floor in the center of the feed alley. In the winter, they're running at 15 rpm. The maximum is 60 rpm, says Paull. He runs them at that top speed when the temperature is above 50 degrees.

He says that two fans were installed with the third yet to be put in place when he was behind the cows giving shots one day. He could definitely tell the air was "stuffer" in the portion of the barn that was still without a fan.

"The air comes down and moves across the floor, so it's on the cows' faces

- HVLS

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when they're eating and when they're lying down. It encourages them to lay down more," he remarks. "They like their heads where they can feel it (a slight breeze)."

Paul says HVLS fans are very quiet. However, he does admit that with his barn being an all-metal building, there's nothing to "soak up the vibration and the headlocks rattle a bit."

He runs the fans at full speed until it gets too cold to work in the barn in the fall; then he turns them down. They're easy to adjust and do include auto restart if the lights should flicker at all.

He's been told by visiting farmers that the air in his barn smells fresher. "Air isn't hanging around," says a farmer who relies on alley scrapers to keep the barn clean. He points out that these fans don't blow feed or his rice-hull bedding around.

During those horribly hot days last year when the thermometer climbed dangerously over 100 degrees, another visiting producer couldn't believe how comfortable his cows looked. They were either eating or lying down in their stalls. There wasn't a single cow panting.

Paul reports that after that hot weather, his herd vet told him that the conception rate in his herd was better than other clients'. The producer notes that he doesn't have any respiratory problems this winter either.

He likes the fact that there are no belts to loosen up and require maintenance. He says these three fans are equivalent to 21 four-foot fans in terms of the air being circulated. He can't even see the cost of running them on his elec-