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HVLS Fans for Free Stall Barns

[David W. Kammel](#), Wisconsin Extension Engineer

There has been a lot of interest lately in a new type of fan that has potential use in free stall barns. HVLS--High Volume Low Speed--fans are a large diameter paddle fan that can range from 8-24 feet in diameter. They use a 3/4 hp motor, rotate at approximately 60 rpm, and operate on the same principle as the ceiling fan you might have in your living room or bedroom. The foils or blades are horizontal and push air downward. This vertical air column hits the floor and moves horizontally and radially away from the center of the fan. The main purpose of the fan is to increase the velocity of the air in the area of influence.

HVLS fans have been marketed toward industrial applications to keep workers in large areas cool by increasing air velocity. An article in the June 2001 issue of *Dairy Today* discussed the application in several California free stall barns. They found energy savings to be one benefit of the system. Fans are placed approximately 60 feet apart. One fan mounted in the middle of the barn over the feed driveway can potentially influence the entire barn width. The impact of these or of any velocity fans on cows is hard to determine or measure, but certainly many farms have installed the traditional 3-4 foot diameter high-speed axial fans to increase cow comfort in the hot humid summer. This system may be an alternative.

It is still early to know if these fans are equivalent to the current design recommendations for high-speed fan systems. It will be critical to determine spacing and mounting height specifications to ensure that the fans have an influence area sufficient to provide a desired design velocity, and to determine the fewest fans necessary to provide the desired velocity. There is a lot to learn, but here is some preliminary information I can provide for those interested in pursuing this option.

I have been on two farms in Wisconsin that have installed HVLS fans and have measured velocities. One had a 4-row barn with head-to-head stalls; the other had a 6-row barn. In both barns, fans were spaced at 60 feet on center. During both visits there was a 500-600 fpm 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. 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

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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.

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. The velocities I report here assume little or no wind velocity effect. I recorded 15 second average velocities with a wind anemometer at several locations and averaged the readings. In one barn we closed the curtains and doors to measure velocities only from the fans. The horizontal velocity at the cow's face at the bunk ranged from 200-350 fpm in a direction perpendicular to the length of the bunk. It is highest (350 fpm) at the center line of the fan at the bunk and decreases to 200 fpm at the bunk between two fans. The velocity is highest at the floor (300-400 fpm) at the center of the feed lane and decreases at face height (200-300 fpm). In the feed/scrape alley the horizontal velocity was approximately 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 approximately 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. We will learn more in the next couple of months when other farms install these fans.

The cost of the fans is approximately \$3500-\$3900 depending on diameter plus the cost of controls and installation. For the 4-row, 170-stall free stall barn, three fans were purchased and installed for approximately \$11,000. Each fan uses approximately 300 watts. Some electric utilities are already considering offering rebates for energy efficiency, but this is such a new concept that details will have to be worked out when additional information is available. As far as I know, the only company manufacturing the fans is the HVLS Fan Company. Their web page is <http://www.hvls.com> and their phone number is 877-BIGFANS. If you are considering trying this system please feel free to contact me, at dwkammel@facstaff.wisc.edu or 608-262-9776, to discuss the pros and cons. Contact the company to get information on the fans and to find a dealer in your area. Since this is such a new system I would also recommend getting in contact with a farm that has installed the fans to learn about their experiences.

The information given in this publication is for educational purposes only. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement is implied.

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