FULL-WALL VENTILATION FOR DAIRY FREE STALL BARNs

by

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Heat stress should be a greater concern than winter cold for dairymen in Kentucky. Heat stress can cause drops in milk production and breeding efficiency, which result in lower profits for the dairymen. The use of an open sidewall free stall barn can help relieve heat stress by allowing improved ventilation of the barn in summer. The benefits of full-wall ventilation include both improved air movement and some potential increase in evaporative cooling. The increased airflow through the barn increases convective cooling of the cows and carries off a greater amount of excess heat and moisture than conventional barns with sidewalls. Additionally, some evaporative cooling of the barn occurs as a greater volume of outside air is moved through the barn. The drier outside air absorbs more of the moisture from urine, feces, and spilled drinking water than the air in a closed barn does. As the moisture is vaporized into the air, heat is removed from the barn and some cooling occurs.

A continuous sidewall opening of approximately 8' in height on both walls is desirable to gain the greatest benefits (see Figure 1). In Michigan, excellent results have been obtained using full-wall ventilation by opening the barn walls in the summer and closing them with curtains in the winter. A secondary economic benefit is obtained because the curtain is only about 10 to 30% of the cost of a metal sidewall. Even on existing barns, opening the barn walls is recommended to improve ventilation and reduce summer heat stress. Several dairymen in Kentucky have built or remodeled their free stall barns to allow for full-wall ventilation with good results. The barn provides an improved environment for the cows in the summer and the curtain shuts out the wind in the winter. An east or south sidewall can be left open, even in winter in Kentucky, with little or no detrimental effect on the cows.

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To effectively use full-wall ventilation, provide a continuous 8' opening in each sidewall, if possible. Keep at least 12-14" of solid wood or concrete at the bottom of the wall to support the free stall base material, and to contain the bedding. In existing barns, the full 8' opening may not be possible, but is desired. Sheet metal panels may be removed and replaced as a means of opening the walls, but curtain sides are more economical and easier to handle. In some existing barns, metal currently on the barn wall may be used for removable panels in lieu of curtains.

The curtains typically used for open sidewall construction are woven polypropylene material and can either be manually rolled up on pipe or a winch system can be used. The winch system is more costly to install. Figure 1 illustrates how the curtains can be installed in a typical barn, using the manual technique for rolling the curtains. Two by eight or 2 x 6 boards are used at the base of the wall to protect the curtains from the cows and to support the free stalls. The boards should be placed with gaps between each board to allow air movement at the stall level. Plastic netting or wire mesh may be used to help keep the curtain from flapping under breezy or windy conditions. An open weave (such as a 2" x 4" mesh) should be used to allow free air movement through the netting.

A pocket in the curtain can be provided to allow for inserting a pipe in the base to make rolling the curtain easier. One by two furring strips may be used to fasten the curtain in place for winter. The rolled curtain can be fastened in place with baler twine for the spring and summer. Installations in Michigan have been in place for 4 or more years with little deterioration of the curtains. A polypropylene curtain which includes an ultraviolet (UV) light inhibitor will last much longer than a curtain with no inhibitor. Even if the curtains must be replaced, the costs are still low relative to a metal sidewall. As mentioned above, winch or crank systems are available to help automate rolling the curtains and to provide for more adjustment. However, added costs and maintenance must be considered with the cable and winch systems.

In open sidewall barns, an adequate overhang is important to reduce problems with rain dampening the bedding and to cut down on direct sunlight in the heat of the day. A minimum of 3' is recommended with a 4' overhang being desirable. An eave height of 10' is recommended to allow for adequate air movement. Sand and lime bedding will offer fewer problems with entering rain than straw or sawdust. As noted above, the East or South walls may be left open year around under most Kentucky conditions.

Besides the wall opening, adequate ridge and eave openings should be provided. A continuous open ridge will provide good ventilation and little rainfall will enter. No cap is recommended, but one may be used if installed properly. Allow 2" of ridge opening for each 10' of building width. For example, a 40' wide building would need an 8" ridge opening. Even with the curtain closed, an opening should be provided under the eaves for winter ventilation. Allow 1" of opening as a minimum for each 10' of building width. Therefore, a 40' wide building would need at least 4" of eave opening. This is usually provided easily by the trusses or rafters as they rest on the wall girders at the top of each sidewall.

Plans Available

Plans are available for a four-row free stall barn with curtain sidewalls. Contact your County Extension Office or call or write to Plan Service, Agricultural Engineering Department, University of Kentucky, Lexington, KY 40546-0276; Phone- 606-257-3000, ext. 111.
Figure 1. Typical installation procedure for polypropylene curtain sidewalls in free stall barns with manual method for raising and lowering curtain.
Curtain Suppliers

The following is a partial list of suppliers of polypropylene and other curtain materials, plastic netting, and winch or crank systems. The polypropylene material appears to be better for sidewalls, while some suppliers offer a nylon material which works well for mats. Insulated curtains are available but are not recommended for dairy free stall barns due to cost and limited benefit in Kentucky.

Agri-Lon (tm)
Rockland Industries, Inc.
P. O. Box 17293
Baltimore, MD 21203
800/877-ROCK
Contact: Alex Schuster
Insulated curtain supplier.

Henderson, Inc.
P. O. Box 252
Delphi, IN 46923
317/564-3387
Contact: Carolyn Henderson
Polypropylene & insulated curtains.

Stockyard Supply
124 South Johnson
Louisville, KY 40206
502/583-0204
Contact: Gordon Jones
Curtains and hardware.

Foxworthy Supply
4650 20 Mile Road
Kent City, MI 49330
616/675-7584
Contact: Gail Foxworthy
Distributor for Miller Bag Co.
Polypropylene curtains, free stall mattresses. Approx. 23¢/ft.²

Charlotte, NC
704/375/7344
Contact: Bob Crawford
Distributor for Amoco Fabrics, farm-size lots, 129" wide, approx. $2.25/
lin. yd. F.O.B. Charlotte (or 7¢/sq ft.)
(NOTE: These are 1988 prices.)

Agri-Plastics, Inc.
6834 Country Road 27
Goshen, IN 46526
Hardware.
219/533-0497
Contact: Carl VanGilst
Plastic netting.

D & L Processing
P. O. Box 1096
Pearson, GA 31642
912/422-3118
Contact: Linda Mixon
Shadecloth supplier.

Walker Bag Co., Inc.
120 N. Tenth Street
P. O. Box 1088
Louisville, KY 40201
502/583-0285
Contact: Craig Walker
Polypropylene material.

Taul Equipment, Inc.
Highway 62
Cecilia, KY 42724
502/862-4670
Contact: David Taul
Curtains and hardware.

Amoco Fabrics
Nashville, GA 31639
912/686-5511
Contact: Marion McClellan
(Salesman)
Material supplier, deals only in 500-1000 yr. rolls
(129" wide), not individual farms.

Vatamore
Des Moines, IA
800/424-6824
Curtain supplier

The Farm Store, Inc.
4180 Caledonia Road
Cadiz, KY 42211
502/522-6732
Contact: Bob Brame
Curtains up to 3' height and

This listing was compiled by Dr. Larry W. Turner, Extension Agricultural Engineer, Agricultural Engineering Department, University of Kentucky, Lexington, KY 40546-0276. This is a partial listing. No endorsement or exclusion of a particular product is implied or intended.

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