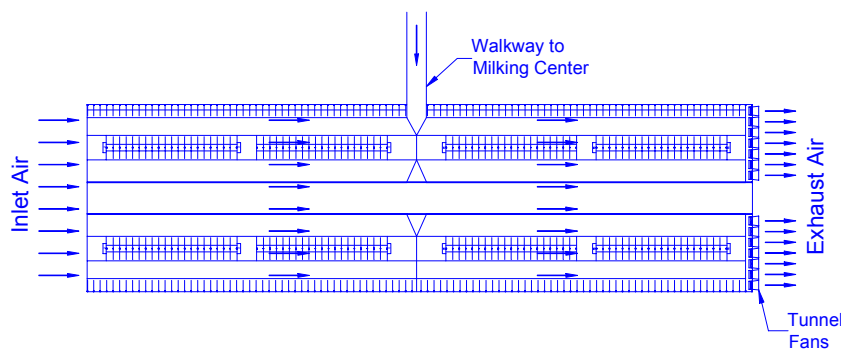


Interactive Web Site for Designing Tunnel-Ventilated Dairy Barns

by:
Curt Gooch, P.E.

Tunnel ventilation for dairy barns is a technique proven to overcome summer time ventilation challenges that exist in many tie stall and freestall barns. With a tunnel system, fresh air is drawn into a barn through an open endwall by a slight negative pressure that is created by operating exhaust fans (called tunnel fans) mounted at the opposite endwall. A floor plan of a basic tunnel system is shown below.



An interactive web site has been developed to allow users the opportunity to design a tunnel ventilation system for their barn and obtain a cost information that can be useful in making business decisions. **To access the web page go to: www.prodairymfacilities.cornell.edu** Click on Interactive Tunnel Ventilation Program.

Specifically, this web site will allow the user to:

- Design a tunnel ventilation system for a freestall or tie stall facility based on a large selection of user-selected fan choices that are available. (Fan performance information in the program's data bank is based on unbiased test results from fans tested at the University of Illinois at Urbana Champaign Bess Lab). Or, the user can input their own fan data as desired for use in system design.
- Determine the annual cost for owning, operating, and maintaining the designed system.
- Predict the amount of daily milk production required per cow per day in order to achieve a break-even return on investment by running a simple cash flow analysis. This will help users decide if tunnel ventilation is a profitable investment for their barn.



Helpful Hints...

1. Use the program to investigate several fan options for your barn. Print the program's output page for each fan investigated in order to make initial comparisons.
2. Then obtain specific fan pricing information from fan vendor(s) that look favorable to you and use this as program input data to get the most accurate output results.

What's needed from the user...

Here is an overview of the information you will need to have in hand before you begin. In many cases, you can use the suggested values that are provided:

Barn and Location Information

- Key barn dimensions that will allow the program to calculate the cross sectional area of the barn perpendicular to the direction of air flow or the cross sectional area of the barn.
- The number of anticipated days that the tunnel system will be operation each year.
- Average number of hours per day the tunnel system will be operational.
- Average daily electrical cost

Cow Information

- Total number of cows located in the tunnel ventilated barn
- Average milk production per cow during non heat stress conditions
- Number of days cows favorably respond to reduced heat stress conditions after tunnel system is shut down for the summer.

Financial Information

- Term length and interest rate of loan (only if borrowing money for tunnel system)
- Average summertime milk price
- Milk marketing expenses (hauling plus governmental promotion fee)
- Variable expenses that change as milk production changes (i.e., purchased grain)

Fan Information

- Estimated installation cost per fan
- Estimated annual cleaning cost per fan
- Estimated maintenance and repair cost per fan
- Specific fan information including air movement capacity and efficiency at 0.15" static pressure and pricing if the user desires to use a fan other than those available herein (Aerotech, Airstream, American Coolair, Canarm, Dayton, J & D Manufacturing, Multifan, Schaefer, and Triangle).

Note: Fan pricing information (list price) is available for many models of fans. This information is needed to determine the minimum amount of milk production per cow per day that is needed to pay for the investment. Actual purchase price per fan will vary based on volumes purchased and supplier discounts—this needs to be determined by



the user. If the actual purchase price is available, it can be entered and used in place of the data provided by the program.

For more information...

Check the PRO-DAIRY web site at www.ansci.cornell.edu/prodairy/index.html for reference information on tunnel ventilation. Relevant papers that are available include:

Tunnel Ventilation for Freestall Barns

Natural or Tunnel Ventilation of Freestall Structures: What is Right for Your Dairy Facility?

Economics of Tunnel Ventilation for Freestall Barns

Time Integrated Value Environmental Control Technology: Step Up to the Times

Application of Time Integrated Value Environmental Control Technology for Dairy Barns