Poultry Housing Tips

Tunnel-Ventilated Broiler House Fan Comparison Spreadsheet - 2008

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Figure 1. Example of Tunnel Fan Comparison Spreadsheet.

PUTTING KNOWLEDGE TO WORK

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As covered in a number of past newsletters, selecting the right tunnel fan for a new house or one that is being retrofitted to tunnel ventilation is one of the most important decisions a producer has to make. The right tunnel fan will not only insure maximum bird cooling during hot weather, but can lower fan operating costs 25% or more, resulting in thousands of dollars in savings each year.

Trying to compare tunnel fans may seem like a nearly impossible task. First you have to figure out how many of each type of fans is required to produce the desired air exchange and air speed. Then you have to compare energy efficiency ratings to see which fan is more energy efficient, not really knowing how much a difference of 2 cfm/watt is really going to save you each year. Last but not least, you have to compare the fans based on their air flow ratio. Should you pick the fan with the 0.80 air flow ratio or the one with the 0.70? These are hard decisions to make considering you are not sure what difference it is going to make when it comes to keeping your birds cool when it is 100°F outside. It is little wonder with all that is required to properly compare tunnel fans that many producers end up selecting fans based on which one moves the most air or which one is the least expensive.

To take some of the mystery and work out of comparing tunnel fans, a Microsoft Excel spreadsheet has been developed (Figure 1). The spreadsheet, available for download from www.poultryventilation.com, allows the user to compare three different tunnel fans in just a matter of minutes. The following is a brief explanation of the tunnel fan comparison spreadsheet:

Section 1:
In Section 1 of the spreadsheet the user inputs information about the tunnel house in question (house dimensions, dropped vs open ceiling, average electricity rate and estimation of how many hours each year each fan will run). From this information the spreadsheet calculates a minimum recommended tunnel fan capacity. This minimum tunnel fan capacity is what is typically required to insure no more than a 5°F temperature rise from the inlet to fan end of the house with market age birds and 100°F outside air temperature. If the user wants to increase this calculated value he is able to. Keep in mind the minimum calculated fan capacity may not provide the sufficient air speed to produce the level of bird cooling desired.

Section 2:
In this section the user inputs performance information (air moving capacity, energy efficiency ratings) on up to three different fans they would like to compare. One of the best sources of up-to-date fan performance information on the majority of the fans sold in the U.S. is the University of Illinois BESS Labs web site (www.bess.uiuc.edu).

Section 3:
Each of the fans to be compared is given a rating from “poor” to “outstanding” on both their energy efficiency rating and air flow ratio. Fans that do not receive at least a “minimum acceptable” rating in both categories should not be considered.

Section 4:
The number of fans required to move the minimum tunnel fan capacity specified in Section 1 is calculated along with an estimation of yearly electricity usage, tunnel air speed, and wind chill effect at both a static pressure of 0.10" and 0.15". The air speed and wind chill effect are given at the higher static pressures to provide the user some idea of how the fans will perform under high static pressure situations encountered when the shutters and pads become dirty. You will notice that fans that have the higher air flow ratio will have less of a difference in air speed and wind chill effect between 0.10" and 0.15" static pressure. In addition, the spreadsheet calculates the minimum six inch evaporative cooling pad area along with the maximum pad water usage on a hot humid day as well as a hot dry day when all the tunnel fans are operating.

Section 5:
In this section the user is allowed to increase or decrease the number of tunnel fans specified in Section 4. In some instances the minimum tunnel fan capacity specified in Section 1 will not be sufficient to produce the desired wind speed. So the user can increase the number of fans to see what it would take to produce an air velocity of, for instance, 600 ft/min and see what effect the additional fans would have on operating costs, pad area requirements,
water usage, etc. The number of fans can also be decreased and the user can see how the environmental conditions and operating costs would change if you put in less fans than the minimum amount specified.

**Section 6:**

This section provides a simple five and ten year cost analysis of the various tunnel fan options specified in Sections 4 and 5.

With the tunnel fan comparison spreadsheet, producers should find that comparing tunnel fans is a relatively quick and simple task. Within just a few minutes you will know valuable information about the tunnel fans you are considering to purchase so you will be assured that in years to come not only will you be able to keep your birds cool, but also your fan operating costs will be kept to a minimum.

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