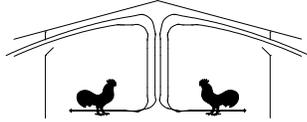




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Poultry Housing Tips

Tunnel-Ventilated Broiler House Fan Comparison Spreadsheet - 2008

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Tunnel-Ventilated Broiler House Fan Comparison Spreadsheet 2008

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Enter green values in all sections (don't enter "\$" or ",")

1) Input house dimensions, electricity rate, and yearly operating hours

House Length=	500	Electricity Rate =	\$0.10
House Width=	50	Yearly Operating Hours =	3,500
Side Wall Height=	8		
Ceiling Peak Height=	11	Minimum recommended fan capacity (calculated) =	237,500
Open/Dropped Ceiling (o/d)=	d	Change minimum fan capacity ("0" if you don't wish to modify)	0

2) Input tunnel fan information

Tunnel Fan Model	Air Flow (0.05")	Air Flow (0.10")	Air Flow (0.15")	Air Flow (0.20")	Energy Efficiency cfm/watt @ 0.05"	Energy Efficiency cfm/watt @ 0.10"	Price of Fan (\$)
3001	25,100	27,300	25,000	22,700	20.0	18.0	\$900
3002	26,400	24,500	22,300	20,100	23.6	20.8	\$900
2207	27,400	25,800	24,000	21,600	25.5	22.5	\$900

3) Tunnel fan ratings

Tunnel Fan Model	Energy Efficiency (cfm/watt)	Air Flow Ratio
3001	18.0	0.78
3002	20.8	0.76
2207	22.5	0.79

EER and AFR ratings rankings

Rating	Energy Eff. Ratio (@0.10")	Air Flow Ratio
poor -	Less than 19.1	Less than 0.70
min. acceptable	19 - 19.9	0.70 - 0.72
good +	20 - 20.9	0.73 - 0.77
excellent ++	21 - 21.9	0.78 - 0.82
outstanding +++	22 +	0.83 +

4) Calculated tunnel fans required, resulting air speed, wind-chill, pad area, and pad water usage (don't change values)

Model #	Number of fans required *	Total air moving capacity	Total fan electricity usage (yearly) *	Average air speed @ 0.10" pressure	Wind-chill @ 85 F @ 0.10" pressure	Average air speed @ 0.15" pressure	Wind-chill @ 85 F @ 0.15" pressure	Minimum total pad length (5' tall pad)	Maximum pad water usage (50 F - 50% Rh)	Maximum pad water usage (100 F - 20% Rh)
3001	9	245,700 cfm	\$4,680	520 ft/min	11.8 F	470 ft/min	9.6 F	139 ft	6.1 gals/min	11.6 gals/min
3002	10	245,000 cfm	\$4,010	520 ft/min	11.8 F	470 ft/min	9.6 F	139 ft	6.1 gals/min	11.6 gals/min
2207	10	258,000 cfm	\$3,880	540 ft/min	12.7 F	510 ft/min	11.3 F	146 ft	6.5 gals/min	12.2 gals/min

* Number of tunnel fans required calculated @ 0.10" static pressure

* Yearly power usage determined @ 0.075" static pressure

5) Do you want to change the number of fans installed to increase tunnel air speed? (change number of fans)

Model #	Number of fans required	Total air moving capacity	Total fan electricity usage (yearly)	Average air speed @ 0.10" pressure	Wind-chill @ 85 F @ 0.10" pressure	Average air speed @ 0.15" pressure	Wind-chill @ 85 F @ 0.15" pressure	Minimum total pad length (5' tall pad)	Maximum pad water usage (50 F - 50% Rh)	Maximum pad water usage (100 F - 20% Rh)
3001	11	300,300 cfm	\$5,710	630 ft/min	17.3 F	580 ft/min	14.6 F	170 ft	7.5 gals/min	14.2 gals/min
3002	12	294,000 cfm	\$4,810	620 ft/min	16.7 F	560 ft/min	13.6 F	167 ft	7.4 gals/min	13.9 gals/min
2207	12	309,600 cfm	\$4,660	650 ft/min	18.4 F	610 ft/min	16.2 F	176 ft	7.7 gals/min	14.6 gals/min

6) Simple cost analysis (fans + electricity usage)

Option	Total fan cost	Five Year		Ten Year	
		Electricity cost	Total cost	Electricity cost	Total cost
a	\$8,100	\$23,400	\$31,500	\$48,800	\$54,900
b	\$9,000	\$20,050	\$29,050	\$40,100	\$49,100
c	\$9,000	\$19,400	\$28,400	\$38,800	\$47,800
d	\$9,900	\$28,550	\$38,450	\$57,100	\$67,000
e	\$10,800	\$24,050	\$34,850	\$48,100	\$58,900
f	\$10,800	\$23,300	\$34,100	\$46,600	\$57,400

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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