Alabama Cooperative Extension System
Auburn University

Poultry Ventilation Pointers

Answers to Your Questions About:

Tunnel House Air Deflectors/Baffles

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1. Question: I've heard that air deflectors can improve the efficiency of tunnel ventilation. Is this true? How do they work, anyway?

Answer: Air deflectors, or baffles, are a tool used in tunnel-ventilated poultry houses that do not have dropped ceilings. These baffles typically are nothing more than curtain material hung at intervals across the width of the house, with the bottom edges at about the height a dropped ceiling would be. In essence they deflect or direct most of the air stream below this level, effectively reducing the cross-sectional area of the "tunnel" that the ventilating air flows through. The same amount of air flowing through a smaller passage has to speed up, so air velocity increases. Does this "improve the efficiency" of tunnel ventilation? Well, yes, for this type of house, if what we mean by that is more wind-chill cooling effect from higher-velocity air flow.

Baffles hung from the roof can increase tunnel air velocity

2. Question: What type of house can especially benefit from using baffles?

Answer: Baffles should be considered only for tunnel-ventilated house that do not have dropped ceilings. These usually are older houses in the U.S., and houses in other countries where type of construction does not lend itself to building dropped ceiling houses. Baffles are especially useful in shorter non-dropped ceiling houses; for example, houses in the 300-foot range. This is because shorter houses, if they are designed for the proper *air exchange rate*, automatically have lower *air velocity* than similarly designed longer houses. So these houses are more in need of help to increase air velocity.

Baffles are used only in non-drop ceiling houses

We have to remember that the air exchange rate is just as important as the air velocity in hot weather ventilation, and the two factors interact. For example, the basic hot-weather house air exchange rate needed in warm climates such as the southern U.S. is generally accepted to be one air exchange per minute for broilers. One air exchange every minute means the air has to travel the length of the house in one minute – in a 400-foot house going 400 feet per minute, in a 500-foot house going 500 feet per minute, etc. For a 300-foot house, the air will be moving 300 feet per minute – which is well below the desired velocity for good wind-chill cooling. This is why shorter houses can especially benefit from baffles.

Houses under 400 feet long especially benefit from adding baffles

3. Question: How is the increased air velocity from using baffles calculated?

Answer: Here's an example: A high ceiling, short broiler house is 40 feet wide by 300 feet long with an average ceiling height of 14 feet. The air volume will be 40 ft x 300 ft x 14 ft = 168,000 cu ft, so one air exchange per minute will be 168,000 cfm. The wind velocity is figured by dividing the total cfm (168,000) by the cross-sectional area of the house (14 x 40 = 560 sq ft): 168,000 cfm ÷ 560 sq ft = 300 feet per minute average wind speed.

Baffles in a 300-ft house can increase air velocity from 300 to 442 fpm

If baffles are placed every 40 feet in this broiler house with the bottom of the baffle 9.5 feet off the floor, the effective cross-sectional area is now 9.5 x 40 = 380 square feet. Since the air exchange rate of 168,000 cubic feet per minute has not changed, the effective wind speed in the house will be increased to 442 feet per minute: 168,000 cfm ÷ 380 sq ft = 442 feet/minute. Thus the baffles have allowed us to increase wind speed without adding unnecessary fans.

4. Question: Can a 400-foot or longer non-dropped ceiling house get by with fewer fans if I add baffles? Or if I put in deeper baffles, coming down lower than a drop ceiling would be?

Must maintain one air exchange per minute

Answer: This sounds attractive, but it is not a good idea because it ignores the *air exchange rate* requirement for hot-weather ventilation. Yes, the baffles, or the deeper baffles, would allow maintaining adequate *air velocity* with lower fan capacity. But it is very important to maintain the *one air exchange per minute* fan capacity needed for hot climates. In non-dropped ceiling houses we have a large heat sink in the roof of the house, plus, typically, a non-insulated roof radiating heat downward. If fan capacity isn't maintained to get this heat build-up out of the house fast enough, the tunnel air stream will get warmed up so much that it will act more like forced-air heating than wind-chill cooling.

Baffles don't substitute for adequate fan capacity

Baffles allow us to apply the tunnel ventilation concept to older houses or houses that are not dropped ceiling, but they do not change our basic ventilation requirements and certainly cannot substitute for adequate fan capacity. The best type of structure for tunnel ventilation is still a well-insulated dropped-ceiling building.

5. Question: If I am installing baffles, how far apart should they be? Can I make use of the existing roof trusses?

Baffles are simple to install – but make sure your house needs them

Answer: The closer the spacing of baffles, the more effective they will be. The air stream will tend to bend upward as it passes under a baffle, creating turbulence which means loss of efficiency. So the sooner the air stream is brought back down, the better. As a practical matter, about 30-foot spacing has been found to work well. Baffles certainly should not be placed more than 50 feet apart. Tacking plastic sheeting over roof trusses is a fairly simple and very helpful move; where trusses do not extend low enough, the curtain-type baffles can be suspended from the bottom of selected trusses. Just remember, even though baffles are easy to put in, they are worth putting in only in houses without dropped ceilings; and, the shorter the house, the more benefit they provide.

The "Answers to Your Questions About:" series of *Poultry Ventilation Pointers* is based on actual questions raised by poultrymen in meetings and in the field. Have a question or two of your own? Write or call Jim Donald, Agricultural Engineering Building, Auburn University AL 36849, 334-844-4181.