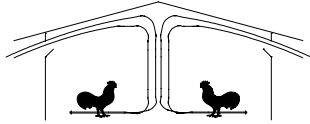




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Poultry Housing Tips

The Importance of Air Speed in Tunnel Houses

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It is important to keep in mind that when it comes to keeping birds cool in tunnel-ventilated houses during hot weather air speed is everything. In fact, it is primarily the amount and uniformity of air speed in a tunnel house that sets it apart from other styles of housing, not so much the use evaporative cooling pads. With the right amount of air speed a producer can lower the effective temperature 10 degrees or more no matter how humid it is, remove trapped hot air from between the birds, as well as keep temperature difference between the inlet and fan end of a house to a minimum. Because air speed keeps the birds cool in so many ways, a relatively small decrease in air speed can have a large effect on a producer's ability to cool birds during hot weather.

To demonstrate the relationship between air speed and bird cooling, four temperature sensors were placed in a 40' X 500' dropped ceiling, tunnel ventilated broiler house with fogging pads. The temperature sensors

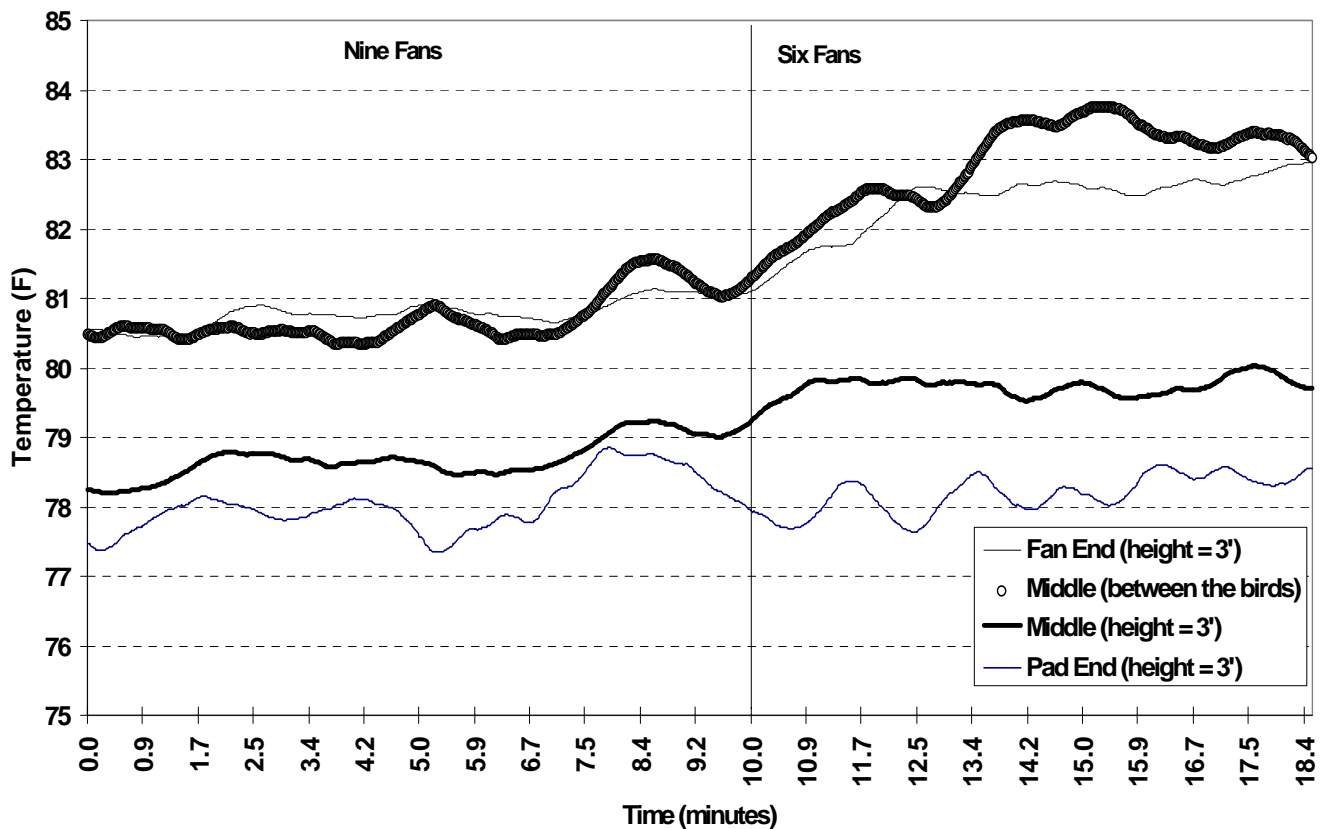


Figure 1. Air Temperatures in Tunnel-Ventilated Broiler Houses with Fogging Pads

were installed approximately 75' from the pad and fan end wall at a height of 3' as well as in the middle of the house. A fourth sensor was placed in a milk crate 3" above the floor. The milk crate was used to obtain the air temperature between the birds without the birds disturbing the temperature sensor. The birds were approximately seven weeks old and the outside temperature was in the high eighties when the measurements were made.

With all nine slant wall 48" fans operating the air speed was approximately 550 ft/min in the center of the house and 450 ft/min near the side walls (measured four feet above the floor). Since the air traveled down the house at approximately 500 ft/min it took only about a minute for the cooled air entering through the pads to make it to the fans. With the air traveling so quickly the air temperature only increased about three degrees on it's trip from the pads to the fans.

An air speed of between 450 ft/min and 550 ft/min would produce approximately a 10 to 12 F windchill effect. So even though the temperature sensors in the house indicated that the air temperature was between 78 and 81°F, the birds would feel as if the air temperature in the house was in the high sixties to low seventies. The effectiveness of the high air speed in lowering the effective temperature was proved by the fact that none of the birds in the house were showing any signs of being too warm (i.e, panting).

The third benefit of having an air velocity of over 400 ft/min in the house was that there was very little build up of hot air between the birds. The air temperature measured in the center of the house at bird level was only two degrees warmer than that measured three feet above the floor at the same location.

When three of the fans were turned off the air speed decreased to about 375 ft/min in the center of the house and 300 ft/min near the side wall. Since the air was now moving slower, it took longer for it to make it from the pads to the fans resulting a larger temperature difference between the pad and fan ends of the house. Whereas before it was only three degrees warmer near the fans, now it was five degrees warmer.

The reduction in air speed would result in a decreased windchill effect. Though exact reduction in windchill effect is difficult to determine, it would not be unrealistic to assume that a 30% reduction in air speed could reduce the windchill effect by two to four degrees.

The most dramatic effect of shutting off three fans was the increased difference in air temperature measured between the birds to the air temperature three feet above the floor. When all the fans were operating it was only two degrees warmer between the birds than it was three feet above the floor. But, when only six fans were operating the temperature difference increased to nearly four degrees, almost doubling.

Location	Nine Fans	Six fans
pad end	80°F	82°F
middle	81°F	84°F
fan end	83°F	87°F

Table 1. Actual Air Temperature at Bird Level (no windchill).

Table 1. illustrates the what the air temperature would be at floor level with nine and six fans operating assuming that the temperature difference between the birds and at three feet above the floor would be the same at all locations in the house. Table 2. approximates what the effective temperature at bird level would be once the windchill effect is taken into account.

Location	Nine Fans	Six fans
pad end	68°F	71°F
middle	69°F	75°F
fan end	71°F	78°F

Table 2. Effective Air Temperature at Bird Level (with windchill)

Though a thirty percent reduction in air speed experienced in this house by shutting off three fans would not likely increase bird mortality during hot weather, it could easily have a detrimental effect on bird performance, especially for those birds at the fan end of the house. Though shutting off three fans would only increase the effective temperature in the pad end of the house about three degrees, from 68 to 71°F, the birds at the fan end of the house would be subjected to an increase in effective air temperature of approximately seven degrees.

You might ask “Why would anyone shut off thirty percent of their fans during hot weather?”. Though not many people would do so intentionally, it happens all the time inadvertently through lack of exhaust fan maintenance. Study after study has shown that the combination of worn fan belts and dirty shutters can easily reduce exhaust fans capacity by 25% or more. Most growers do not recognize that their fan performance has been decreased because the loss of fan performance occurs over the course of time.

Fan performance can also be reduced by too high of a static pressure. If your tunnel curtains are not fully opened or your pads are dirty, your fans have to work harder to pull air into the house. The harder the fans have to work, the less air they will draw into the house and the lower your air speed will be.

Remember, air speed is everything when it comes to keeping your birds cool during hot weather. Clean your shutters at least once a week and replace you fan belts once a year. Ask your flock supervisor to check your air speed. Keep in mind, in the house where the experiment was conducted the air speed was approximately 500 ft/min initially. If you only have an air speed of 400 ft/min with all of your fans properly maintained, a reduction of fan capacity of 30% would result in even greater effective air temperature at floor level.

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