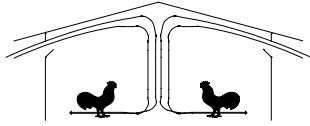




The University of Georgia

Cooperative Extension Service

College of Agricultural and Environmental Science/Athens, Georgia 30602-4356



Poultry Housing Tips

Tunnel Inlet Opening and Air Movement

Volume 7 Number 6

June, 1995

The biggest difference between a tunnel-ventilated and a naturally ventilated house with circulation fans is the amount and uniformity of air movement. If properly designed and operated the air in a tunnel-ventilated house is exchanged about once every minute and birds throughout the house are exposed to a windchill effect of 10 degrees or more. But, if there are not enough fans or fan performance is reduced for one reason or another, the birds in a tunnel-ventilated house may not perform any better than those in a naturally-ventilated house.

In order to get the maximum amount of air movement in a tunnel-ventilated house, it is important that there is sufficient opening for the exhaust fans to draw air in. Research has shown that there should be approximately 40 to 50 square feet of opening per 48" fan to maximize bird cooling. If more than this amount of opening is provided, there tends to be a fairly large dead spot near the inlet end wall. If there is less opening, the fans have to work harder to draw air into the house resulting in reduced fan output, dead spots, and increased electricity usage.

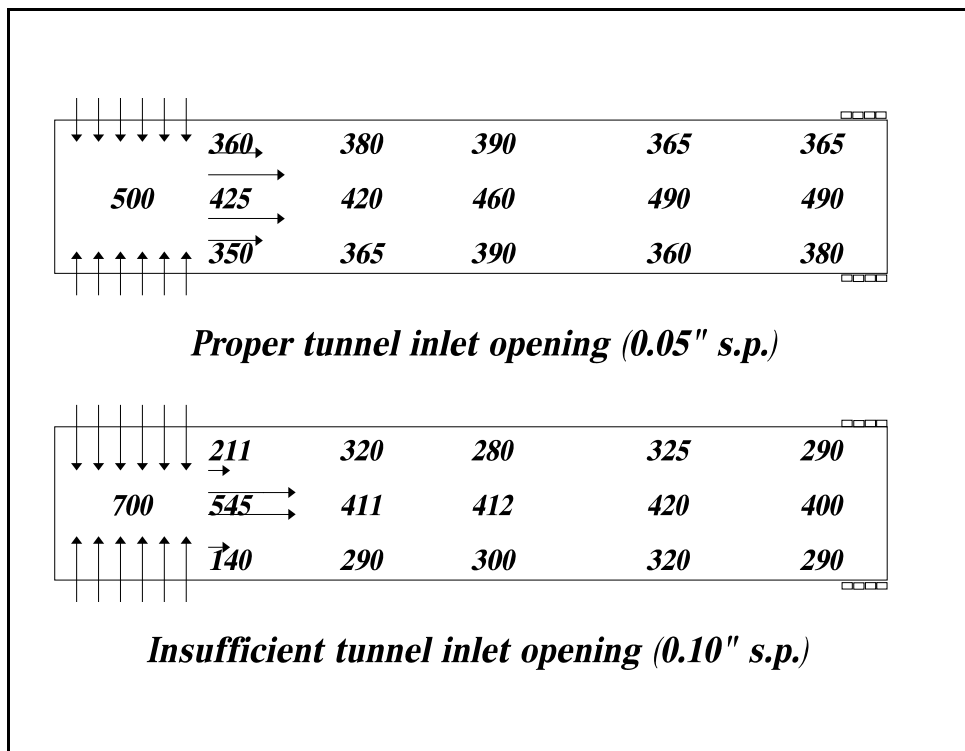
Often growers will reduce the size of their tunnel opening in an attempt to increase the amount of air movement in their houses. Though this will increase air movement and air speed in the immediate vicinity of the tunnel inlet opening, growers are generally unaware that additional dead spots are created and air velocity is often decreased in the rear of the house [Wind Speed in Tunnel-Ventilated Houses, *Poultry Housing Tips* (April, 1994)].

A study was recently conducted to demonstrate the effect that reducing the amount of inlet area has on overall air movement in a tunnel-ventilated house. The study was conducted in a 40' X 500' tunnel-ventilated house with eight slant-wall 48" fans. The two tunnel curtain openings were 55' X 42" and provided approximately 50 square feet of opening for each of the eight 48" fans.

With the tunnel curtains fully opened and all tunnel fans operating, air velocity measurements were taken across the width of the house, five feet off each side wall and in the center of the house at a height of four feet. These measurements were repeated 70', 125', 250', 375' and 450' from the inlet end wall. A total of six air velocity measurements were taken at each location and were then averaged. The speed of the air exiting each exhaust fan was measured as an indicator of exhaust fan performance. Static pressure was measured and recorded. The tunnel curtain was then reduced by approximately 50% and measurements were repeated.

The figure on the following page shows the average air velocity measured at each location in the house with both the recommended inlet opening as well as with the reduced inlet opening. Reducing the amount of inlet opening significantly increased the air velocity in the vicinity of the tunnel curtain opening as well in the middle of the house immediately past the tunnel curtain opening. But the increase in air speed was short-lived. By the time the incoming air reached 1/4 house, the increase in air speed was no longer present. In fact, the air speed was significantly lower than when the tunnel curtain was fully opened. Overall air velocity was decreased by almost 15% when the tunnel

curtain opening was reduced. The reduction in average air velocity was the result of an increase in static pressure from 0.05" to 0.10". The increased static pressure made it more difficult to draw air into the house reducing fan output. The 15% measured decrease in air velocity in the house roughly corresponded to a measured decrease in exhaust fan output of 12%.



The reduction in tunnel curtain opening also created two dead spots immediately behind the tunnel curtain opening on the side walls. The air was coming in so fast that it shot to the middle of the house before turning towards the exhaust fans. These dead spots, though relatively small, could create significant problems during hot weather.

The net result of reducing the tunnel curtain opening is that only about 15% of the birds benefited from additional air movement, while 85% of the birds were harmed by a reduction in air velocity. The reduction in air velocity was most critical for those birds on the side wall where air velocity dropped significantly below what most people view as the minimum desirable level (350 ft/min).

This is not to say that you should never reduce the amount tunnel curtain opening. Growers with houses having only six or seven fans or growers not using all of their fans have found that closing the tunnel curtain to obtain a static pressure of 0.04 to 0.05" can help the fog to roll better and reduce the dead spot near the tunnel end wall as compared to having the curtains all the way open and a static pressure of 0.03". Generally speaking, the static pressure in a tunnel ventilated house with fogging nozzles should not exceed 0.06".

Michael Czarick
 Extension Engineer
 (706) 542-3086

Michael P. Lacy
 Extension Poultry Scientist