The University of Georgia

College of Agricultural and Environmental Sciences
Cooperative Extension

Poultry Housing Tips

How Does Tunnel Fans Placement Affect Fan Performance and Air Distribution? - Part 2

Volume 23 Number 10 **October, 2011**

Figure 1. Six tunnel fans operating.

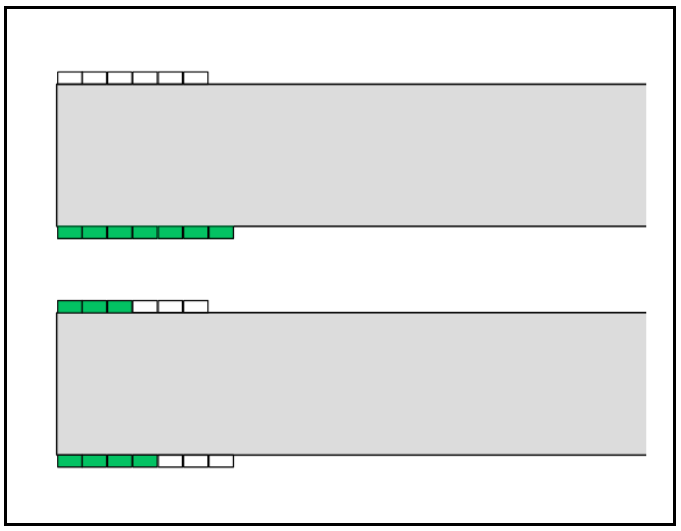

Figure 2. Seven tunnel fans operating.

Recently a study was conducted in a 50' wide tunnel-ventilated broiler house with 13, 52" tunnel fans to examine how tunnel fan placement affects average house air velocity and air distribution. Five poles with three anemometers on each pole were evenly spaced across the width of the house approximately 100' from the tunnel fan end wall. The anemometers were mounted on each pole two feet above the floor, two feet below the ceiling and 4.5' above the floor. Each of the 15 anemometers were connected to a data logging system that recorded air speed every minute for 15 minutes. The 15 anemometers allowed a very accurate determination of both the average house air velocity and air velocity distribution across the width of the house.

Four fan operation configurations were tested: seven fans operating in one side wall, four in one side wall and three in the other, six fans operating in one side wall, and three fans operating in each side wall (Figures 1 and 2). Analysis of the data found that the average air velocity did not change whether all seven fans were operating in one side wall or three in one and four in the other. Likewise, the average air velocity was the same whether six fans were operating in one side wall or three in each side wall (Figure 3). This confirms what has been observed on other farms, that fan placement has little effect on the overall air-moving capacity of tunnel fans.

Of potential greater interest was the fact that air velocity distribution did not significantly change with operating fan location. Whether the fans were in one side wall or split between the two side walls, the air velocity distribution remained essentially the same (Figure 4). Though it is true that the air velocity tended to be slightly higher (25 ft/min) on the “right side wall” compared to the left, this differential remained essentially the same regardless of which fans were operating, indicating that fan operating position was not the cause.

The fact is that tunnel fan placement only has an effect on air velocity distribution in the immediate vicinity of the tunnel fans. Air travels down a tunnel-ventilated house fairly evenly from wall to wall until the air is within approximately 20' of the tunnel fans, at which time it starts to move towards the tunnel fans to exit the house. As a result, in a house where the tunnel fans are placed in one side wall, the air would travel down the house relatively evenly until it was within 20' of the first fan at which point the air would tend to start moving toward the side of the house where the fans are installed. The difference in air velocity from wall to wall would become greater and greater as the air moves toward the end wall, dropping to essentially zero at the side wall opposite the fans near the end wall.

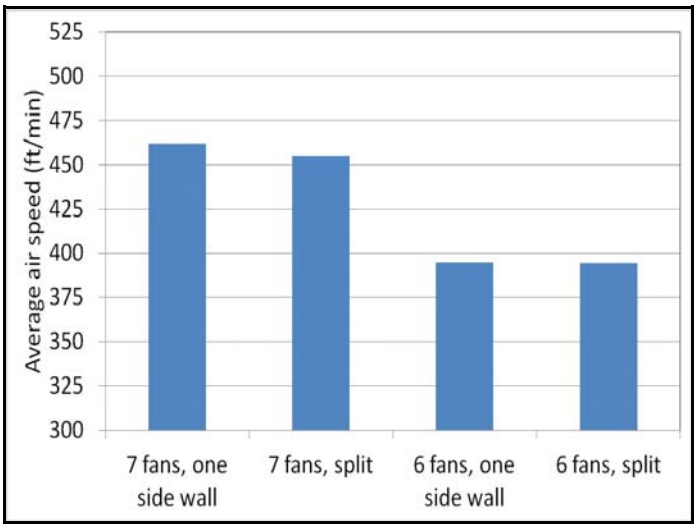

Figure 3. Average air speed vs. tunnel fan position.

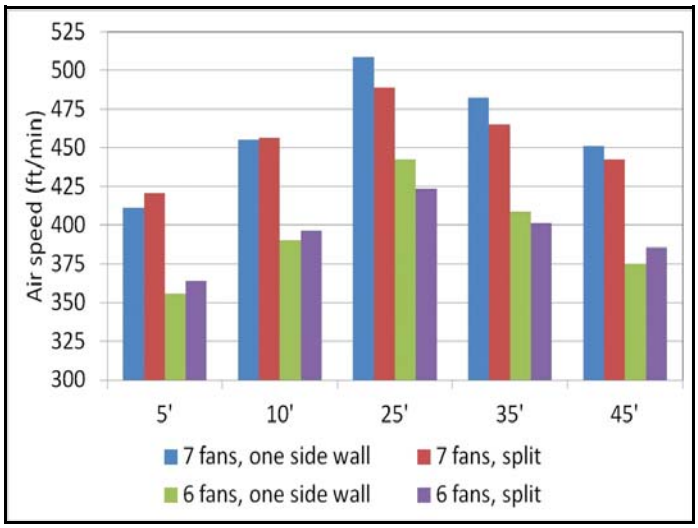

Figure 4. Air velocity distribution vs. fan positioning.

The most significant factor that affects air velocity distribution is not tunnel fan placement but rather side wall smoothness and obstructions. Exposed posts or wall studs tend to deflect the air away from the side wall towards the center of the house resulting in higher velocities toward the center of the house and lower air velocities near the side wall. Objects such as forced air furnaces near the side wall can also deflect air away from the side wall of a house. In some rare instances differences in the amount of air entering through the tunnel openings can lead to difference in air velocities from one side of a house to another. For instance, if the pads were dirtier on one side of a house than another or there were a strong breeze blowing on the pads on one side of the house. In these cases the air velocity differences across the width of the house tend to be greatest near the pads and decrease along the length of the house.

The only area that tunnel fans placement affects air velocity distribution is near the tunnel fan end wall. Placing tunnel fans in the end wall can reduce the size of triangular dead spot near the end wall that tends to occur in houses where the tunnel fans are placed solely on the side walls. The downside though is when fans are installed in the end wall a larger area is affected by the light entering through the fans, thereby significantly increasing the level of bird activity in the last approximately 100' of a house. But, the fact remains that from a fan performance and overall air-velocity-distribution standpoint, tunnel fans can be placed in the end walls, side walls, or a combination of the two; it simply doesn't matter.

Michael Czarick
Extension Engineer
(706) 542-9041
mczarick@uga.edu
www.poultryventilation.com

Brian Fairchild
Extension Poultry Scientist
(706) 542-9133
brianf@uga.edu