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Poultry Housing Tips

Fogging Nozzles and Temperature Reduction in Tunnel-Ventilated Houses

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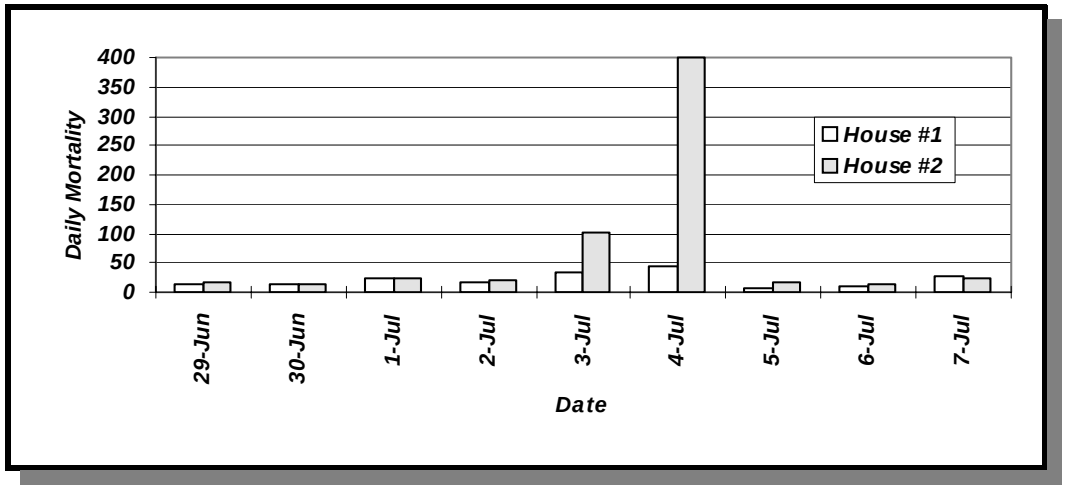

Figure 1. Daily Mortality

The chart above shows the daily mortality in two 36' X 350' tunnel-ventilated broiler houses on a farm near Athens, Georgia during the first week of July. In House #2, over 500 birds were lost from July 3rd to the 4th. During this same time period only 80 birds were lost in House #1. Both houses had dropped ceilings, six 48" slant wall fans, migration fences, and a fogging system. Birds in both houses were placed at a density of 0.84 square feet per bird and were the same age, approximately seven weeks old. The increased heat loss was not a chance occurrence. The two other houses on the same farm also lost an average of over 450 birds during the same two day period. What caused the difference in mortality?

During the first week of June a visit was made to the farm in question. The producer wanted to learn more about the operation of tunnel-ventilated houses. After an evaluation of the houses it became evident that there were not enough fogging nozzles. It was explained to the producer that in order to reduce the temperature of the air 1°F in a tunnel-ventilated house it takes approximately two, one gal/hr nozzles per 48" fan. Since the houses only had about 70 nozzles, he could only expect a maximum of six degrees cooling out of his fogging system. The producer was told that this amount of cooling would probably be sufficient on a day where the outside temperature reached the mid to high eighties; however, if the temperature reached into the nineties, he would likely be in trouble.

The reason for concern was that windchill effect, which is crucial to the cooling of the birds, is most effective if the air temperature stays in the low to mid eighties. For instance, in a tunnel-ventilated house with 400 ft/min air speed the windchill effect at 85°F is about 10°F making the birds think that it is about 75°F. But, as air

temperature rises, windchill effect decreases. As a result, at a house temperature of 90°F the windchill effect may be as little as 6°F, making the effective air temperature approximately 84°F. So even though the actual house temperature may have only gone up five degrees, the effective temperature may go up as much as nine degrees because of the reduction in windchill effect.

The producer agreed to install additional nozzles in one of his houses. He would evaluate the effectiveness of installing additional nozzles and then make his decision on what to do with the rest of the houses on his farm.

The existing fogging system consisted of a row of 10 nozzles located in the center of each of his 40' tunnel curtain openings. Five additional rows of nozzles, 11 one gal/hr nozzles per row, ran from side wall to side wall approximately 50' on center starting 50' from the tunnel curtain end wall. The producer did not use the row of nozzles nearest the exhaust fans in order not to cause fan wetting problems.

To increase cooling, four additional rows of one gallon per hour nozzles running from side wall to side wall were installed within the first 50' of the house. The 44 nozzles were located in the vicinity of the tunnel curtain because of the good air mixing created by air entering through the tunnel curtains. Furthermore, by placing the nozzles near the tunnel curtain opening the cooling process would begin as soon as the air entered the house maximizing temperature reduction. Two additional rows of nozzles (11 per row) were added approximately 65 and 75 feet from the tunnel curtain end wall. Each line of nozzles had a cutoff valve so that additional nozzles could be added in stages. The producer was instructed that his existing nozzles should be turned on when house temperature reached 85°F and that the new nozzles should be used at 87°F.

The producer learned through experimentation that on days when the temperature was in the mid eighties that the new lines of fogging nozzles caused excessive litter/bird wetting in the tunnel curtain area. He found litter wetting problems to be minimal if he waited until outside temperature climbed into the nineties before using the new nozzles.

Temperature measurements showed a dramatic increase in cooling when the new nozzles were used. On 90°F days the temperature of the air in the house with the improved fogging system was in the low eighties while temperatures were in the mid to high eighties in the unmodified houses.

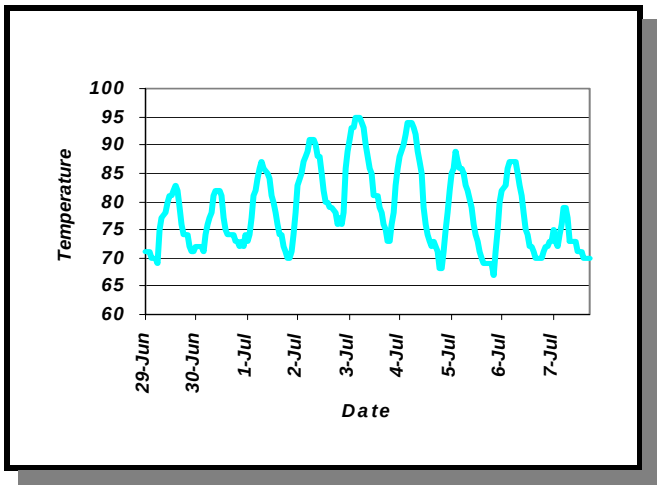

Figure 2. Outside Air Temperature Athens, Georgia (June 29 - July 7)

On the afternoon of July 3rd, outdoor air temperature reached 97°F. The temperature of the air, measured 100' from the fans, was 91°F in the houses with the unmodified fogging system and 84°F in the house with the improved fogging system. The birds were noticeably more comfortable (less panting) in the house with the improved fogging system. The producer made the comment that the house with the improved fogging system felt like it was air conditioned.

The cooler temperatures in the house with the improved fogging system had a dramatic effect on bird mortality (and probably on bird weights and feed conversions, though they were not measured). The key to keeping birds cool during extremely hot weather is making sure you have enough fogging nozzles. A tunnel ventilated house should have 20 one gallon per hour nozzles per fan. The fogging pump should produce a pressure of at least 180 psi to insure a fine mist which will evaporate quickly. The nozzles should be installed so they can be turned on in stages and so the number of nozzles used can be adjusted according to outside temperature and humidity to minimize house wetting.

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