Completed Research

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Optimizing Brooding for Broilers

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"Precise Management of Broiler Brooding Temperatures"

Description of the Problem: The brooding phase is a critical phase in the life of chickens. During this early period the ability to self regulate body temperature (TEM) is not completely functional. House TEMs have been managed based on historical general recommendations that have demonstrated adequate broiler performance. Additionally, the best house TEM conditions that guarantee physiological comfort for chickens of strains that have increased growth rates and muscle mass growing up to 7 and 9 weeks are unknown. Preliminary data from our trials showed that optimal house TEM for brooding might not be the same for every flock. Therefore, a study to optimize brooding TEM utilizing rectal TEM as a tool to adjust ambient TEM was proposed. Chick body TEM data can be easily collected with pediatric thermometers at very low cost. Rectal TEM are indicators of effective TEM which is dependent upon environmental TEM (dry bulb), relative humidity and air speed. Our objective was to compare, under commercial conditions flock live performance, meat yield, and gas propane use of the integrators traditional brooding TEM management systems to one that is managed by direct measurement of hatchling rectal TEM.

Material and Methods. Seven trials were accomplished in five farms with two paired houses each. In each farm, broiler flocks with a comparable composition of day old hatchlings, similar strain, age of breeder flock, management, feed, time of placement, and age of marketing were evaluated. This project was conducted in several environments in North Carolina during the winter and spring of 2007 and 2008. In the test houses, the rectal TEMs of 25 hatchlings per house were measured and ambient TEM reduced by 0.5 or 1°F when necessary to avoid chicken body TEMs higher than physiological optimum or "normal" at chick placement and daily during the first week. The first day, the optimum was TEMs between 103 and 104°F. Rectal TEMs of 104 to 105°F are normal during the first five days. Rectal chick TEM rises to 106 or 107°F after 5 days of age. Higher body TEMs during the first week are thought to be detrimental and were avoided by reducing house target TEMs. During the second and third week, the body TEM data was collected and house TEM adjusted every other day. After that, the chicken body TEM was taken once a week until market and some adjustments were done generally until week five. Individual body weights of 200 birds per house were recorded at 7 and 56

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days of age to estimate growth rates and flock uniformity. Feed and mortality were recorded to calculate feed conversions. Two data loggers were installed in each house to collect environmental TEMs. Data of gas usage, carcass yield, carcass condemnations and general profitability were collected.

Results and Conclusions. Our data showed that rectal TEMs can be used as a tool to micromanage brooding TEMs in power ventilated houses. The results also suggested that profiles of house TEMs for each farm or house can be slightly different depending on weather, type of housing, brooding equipment and age of litter. Additionally, every flock may need slightly different optimum TEMs to obtain the best performance possible depending on growth rates associated with broiler strain, chick quality and feed traits. House TEMs during the first week of age obtained with our methodology and the traditional recommendations of brooding were very similar. Main differences in house TEMs were observed during the second and third week, when the chickens showed a need to lower house TEMs. Obtaining the best brooding TEMs can improve final body weight, feed conversion, and flock uniformity of 9 wk-old broiler flocks. Additionally, it was possible to reduce gas usage between 8 and 45%.

Expected Impact. The benefits of investing time on learning about body TEMs and making decisions to improve thermal comfort of chickens have important economical impacts. The annual average reduction on fuel costs could be almost $600,000, and the improvements on feed conversion can increase annual profitability by $800,000 for a broiler complex producing a half million chickens per month.

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