

Ventilation and Management for Large Broilers

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Introduction

Summer time conditions (high temperatures and high humidity) adversely affect growth rate and livability of broiler chickens. Broilers approaching market weight constitute approximately 80% of the total heat load in a tunnel ventilated house, whereas heat from side walls, ceiling, curtains, and lights represents the remaining 20%. Body mass is directly proportional to heat production by the broiler, thus larger broilers have a higher need for heat removal than smaller broilers. The ultimate goal with a tunnel ventilation system is to remove metabolic from the broiler while being cost effective.

Results and Discussion

In the past, broiler houses were typically equipped with fan capacity to supply air flow at 400 feet per minute (i.e. 8 fans). Due to the increasing number of broilers being grown to “heavy weights” (> 7.25 lb), air flow at 400 feet per minute is not adequate for these large broilers during the last 7 to 10 days before processing during summer production. From 6 to 7 weeks of age (from 5.26 to 6.96 lb), broilers subjected to air velocity at 600 feet per minute (77-86-77 °F) grew faster (1.30 vs. 1.11 lb) and had improved feed conversion (2.13 vs. 2.57) compared with broilers subjected to 400 feet per minute (77-86-77 °F) (Simmons et al., 2003). Performance benefits of the high air velocity were not observed from 28 to 35 and 36 to 42 days of age. Other research has also found that high air velocity (600 feet per minute) was beneficial from 43 to 49 days when broilers were exposed to temperature cycle of 77-86-77 °F (Dozier et al., 2005a).

Environmental temperature can impact the responsiveness to velocity. Dozier et al. (2005b) evaluated effects of air velocity at either 400 or 600 feet per minute with broilers grown under a cyclic temperature regimen of 77-95-77 °F from 21 to 49 days of age. Body weight gain increases occurred during each weekly interval from 21 to 49 days of age. Final body weight gain was increased by 0.6 lb when broilers were subjected to the high velocity. In contrast to research conducted with broilers exposed to a cyclic temperature regimen of 77-86-77 °F, the benefits of 600 feet per minute were apparent much earlier in life when broilers were grown under higher ambient temperatures (77-95-77 °F).

As processing weights of broilers continue to increase with the current upper limit being around 9.0 lb, the optimum air velocity for these large broilers is not known. In a preliminary study, 288 male broilers were placed in wind tunnels from 49 to 63 days of age (7 to 9.5 lb) and subjected to air velocities of 550 or 750 feet per minute. Body

weight gain, feed conversion, and mortality were evaluated. Body weight gain was not influenced by increasing air velocity to 750 feet per minute from 49 to 56 days, but a 20 point difference in growth rate occurred (no statistics were conducted) with the high air velocity (750 feet per minute) from 49 to 63 days of age. Feed conversion was improved by 12 and 15 points, respectively, from 49 to 56 and 49 to 63 days of age when broilers were subjected to 750 feet per minute compared with broilers subjected to 550 feet per minute. It appears that broilers need to be grown to approximately 9.0 lb for air velocity of 750 feet per minute to be used. More research needs to be done to evaluate high air speeds (750 feet per minute) with heavy broilers to verify the benefits and cost effectiveness.

“Night-time” ventilation is a strategy to help alleviate heat stress. During the last two weeks of production, broilers are tunnel ventilated at night to remove the heat produced throughout the day. This will allow the broiler to cope with the heat generated the following day and has been very beneficial in improving performance during times of high temperatures. Dozier et al. (2006) evaluated “night time” ventilation using 1,440 male broilers from 37 to 51 days of age. Treatments consisted of one tunnel operating with an air velocity of 550 feet per minute for 24 hours and the other tunnel operated with an air velocity of 550 feet per minute for 12 hours and air velocity of 320 feet per minute for 12 hours. Broilers subjected to air velocity of 550 feet per minute for 24 hours had higher 51 day body weight (7.77 vs. 7.53) and improved 37 to 51 day feed conversion (2.41 vs. 2.53) over broilers subjected to an air velocity for 550 feet per minute for 12 hours and air velocity of 320 feet per minute for 12 hours. These advantages in body weight gain and feed conversion should translate to a net return of \$129 per house based on body weight gain, \$0.05 lb for body weight gain, and energy cost for running the fans.

Although a broiler house may be equipped with enough fans to achieve high air velocity, if these fans are not properly maintained, optimum air velocity will not be obtained. Thus, broiler performance will be negatively affected. Worn fan belts, dirty shutters, and clogged pads limit the capability of providing cooling to the birds. Fan belts typically become worn on the sides and drop down into the pulley. When the belt drops down into the pulley by $\frac{1}{4}$ of an inch, fan output can be reduced by 10%. Shutters accumulate feathers, dirt, and dust and dirty shutters can limit air velocity by 20 to 30%. The broiler house may be capable of an air velocity of 600 feet per minute, but with worn belts and dirty shutters it will only produce an air velocity of 480 feet per minute or less. Evaporative cooling pads accumulate algae, spider webs, feathers, dirt, and calcium deposits over time and these contaminants can limit the pad's cooling potential and reduce the longevity of the pad. The pad needs to be completely wet to obtain maximum cooling. The water distribution pipe can become blocked and can be diagnosed by streaks and maximum cooling will not occur. Algae, dirt, and feathers need to be cleaned in the spring and the water distribution should be checked to determine if the pad is completely wet so that maximum cooling is obtained. In addition, the pad should be allowed to dry out overnight to ensure that the life of the pad is not reduced. Evaporative cooling pads are a big investment for any broiler farm and pad maintenance is important to enable the grower to receive the maximum longevity of the pads and optimize broiler performance.

Summary

- 1) "Night-time" ventilate during the last two weeks of production.
- 2) Optimum air velocity for "big birds" is 600 to 650 feet per minute during the last week of the grow-out.
- 3) Replace worn fan belts, clean dirty shutters, and clean pads.

References

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