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Broiler House Brooding: Environment, Feed and Water

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A successful start for chicks is a significant part in achieving good results at market age. When chicks hatch they appear to be capable of fending for themselves, but in truth, they are immature. They are still developing with many of the body systems becoming fully functional. The modern broiler chick will impressively increase its body weight four to five fold in the first seven days. Achieving this growth rate, with body systems such as the digestive, immune, skeletal and endocrine systems still developing, requires that the bird be housed in conditions that do not present challenges that the bird must overcome. For example, low temperatures, high ammonia, and damp bedding material can result in stress that will cause the bird to devote the resources needed to achieve that optimum growth and development mentioned earlier to compensate and survive. There are many challenges in managing broiler houses that may result in birds not finding food and water sources. Therefore, getting the house environment correct helps chicks perform well. When farms use methods to provide a better environment or to alter chick behavior, these approaches should provide growers a return on their investment of labor and money.

Light

There are many challenges a grower faces to make sure that chicks find food and water as soon as possible to ensure survival and superior growth performance. One is making sure the birds have enough light to locate these sources quickly after placement. Therefore, light intensity is recommended by several broiler management guidelines to be 30 lux (3.0 ftc) with less than 20% variation from the brightest point of the house to the darkest point. Bird activity increases as light intensity increases. If the light intensity is too low, then birds tend to spend more time in the darker areas sleeping rather than seeking out food and water. Recent research suggests that broilers tend to prefer to eat and drink in higher light intensity and then return to darker areas to rest and sleep. However, while this is true for birds that have already located food and water resources, the chick needs adequate light intensity in the first few days to find those areas. Traditionally, providing 24 hours of light during the first week has been common practice. More and more research is demonstrating the benefits of having a dark period. The data is limited on whether there is an actual difference in performance between providing a full 24 hours of light compared to 22-23 hours of light with a 1-2 hour dark period. Providing a brief dark period starting on the first day of placement may have more advantages than disadvantages.

Monitor Water Consumption

Birds that are too cold will tend to huddle and move less often. However, when they do find food the energy they take in is utilized towards body heat and is not efficiently used for growth and development. This can have a negative impact on feed conversion. Farms that have controllers connected to a computer should utilize the data recording advantages that system offers.

Monitoring the total water used in a 24 hour period is useful, but it does not catch management issues that might be occurring. Below is data collected on a 15-minute interval that demonstrates a heater issue that lead to house temperature dropping which was correlated with less water consumption (Figure 1).

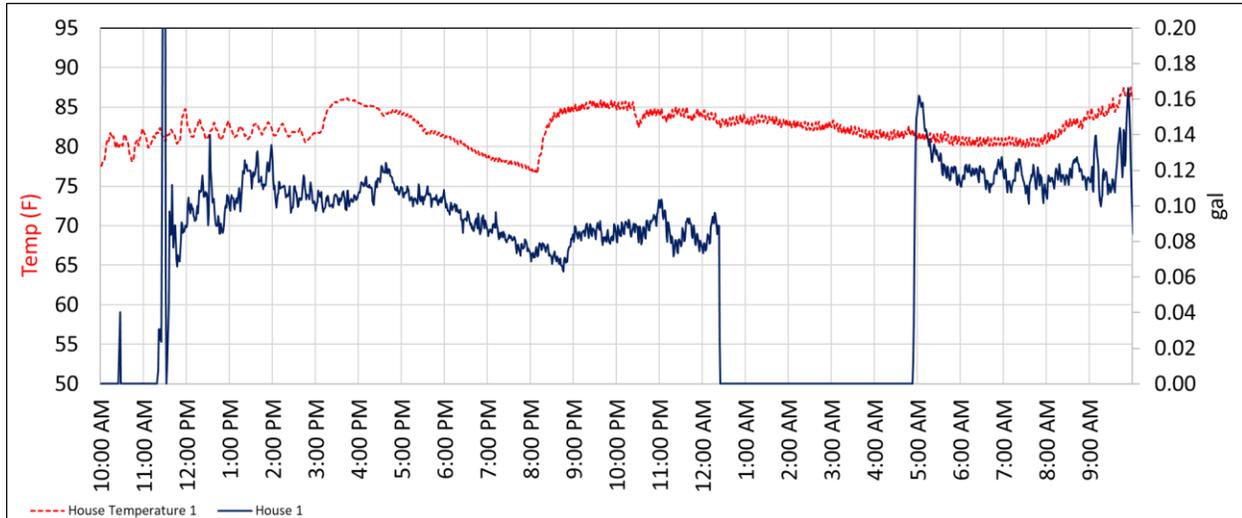


Figure 1. Broiler chicks water consumed reduced as house temperature dropped.

Feed and Water

Another common practice during brooding is to utilize a variety of methods to get birds to eat and drink as soon as possible after placement in the house. Supplemental feeders are often used to increase the feed surface area and make it easier for chicks to find food. In the past, supplemental feeders were placed between automatic feed pans and filled with feed. Over the last decade or so, a variety of other methods have been employed sporadically, to increase the likelihood that chicks find food and water. This includes, but not limited to, putting paper under feeder and drinker lines, putting extra feed pans or feeders throughout the house, using mini drinkers attached to the drinker line and even putting out drinkers in non-drinker areas. The data regarding the success of these practices is not very well studied and results appear to be highly variable. Recent fieldwork conducted by our lab at the University of Georgia has begun to evaluate some of these practices. For example, putting paper under drinker lines has been found to inconsistently increase water consumption. In instances where it did affect water consumption, the increased water intake was only for two to three hours. No differences were noted in cumulative 24 hour water usage, weekly water usage or in weight gain nor bird livability in the first week between houses with the paper and houses without.

Because food and water are so closely related (Figure 2.), they consumed less feed and the energy from the feed was not utilized as efficiently due to the bird using more of it to stay warm.

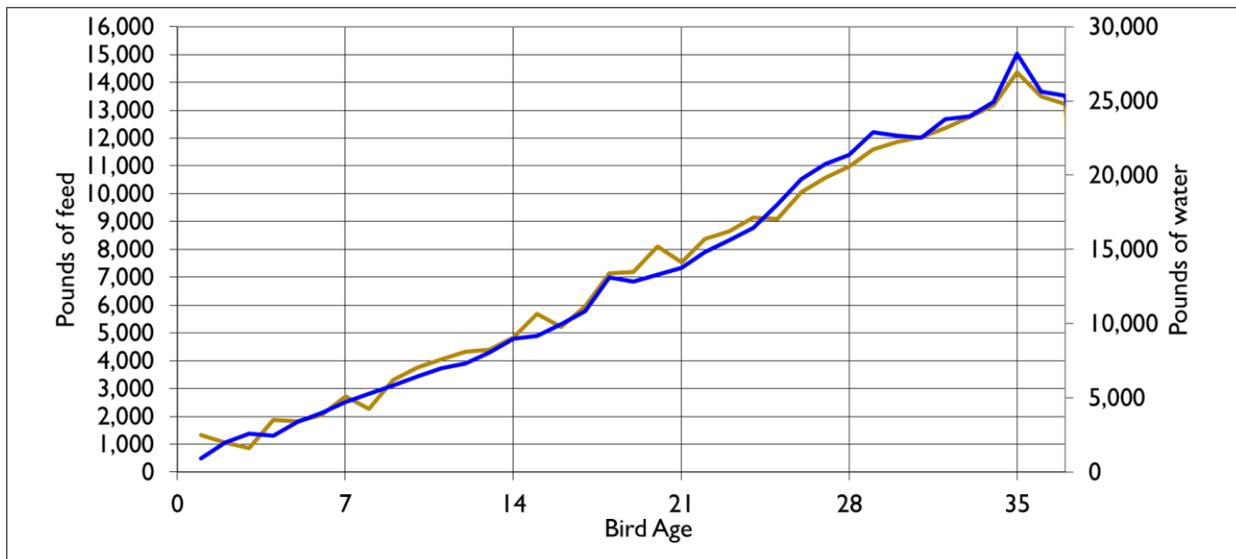


Figure 2. Broiler feed and water consumption are closely related ($R^2 = 0.9921$)

House Temperature

Getting the correct temperature is a multifaceted process. Adequate bedding depth is needed as it serves as an insulator from the cold floor and absorbs moisture produced by the birds. The heating system should not only be sized correctly to provide the heat needed to warm the house and replace the heat lost through ventilation and house leakage, but the brooders should be distributed to provide as much radiant heating of the floor area as possible.

Air Quality

Air quality consists of ammonia, carbon dioxide, carbon monoxide and relative humidity. Table 1. lists the acceptable ranges for these air quality parameters. Litter management between flocks is a part of the process in achieving proper air quality. This means that caked litter should be removed. Bedding depth for pine shavings should be a minimum of three inches and the depth of other bedding products may be deeper depending on the material. Adequate ventilation rate should be implanted with adjustments being made daily based on inside and outside conditions in addition to water consumption.

Table 1. Recommended maximum levels of air quality parameters for poultry houses

Ammonia	25 ppm
Carbon Dioxide	5,000 ppm
Carbon Monoxide	50 ppm
Relative Humidity	60%

Air Movement during Brooding

One way to improve environmental conditions for broiler chicks during brooding is by breaking up vertical and horizontal temperature stratification while moving air from warmer to cooler areas of the house. The effective temperature, what it feels like to the chick, is a combination of

air temperature, floor temperature, relative humidity, air movement and bird density. Many of the broiler management guidelines suggest that air movement should be less than 50 ft/min. This might be true in situations where cool air is leaking into the house or if the house temperature is too low. However, when house temperatures are in the 90-95 F range the air movement could actually help the birds and this has been demonstrated by body temperature and bird distribution.

A circulation fan system is important to achieving uniform temperatures throughout the house. It is used to move heat from warmer areas to cooler parts of the building as it not only provides a warm environment for the chicks but also reduces energy costs as well. Recent research has demonstrated that installing enough circulation fan capacity to create air speeds of 150 ft/min or more will not only reduce energy usage and break up temperature stratification, but it also aids in drying the bedding material. This drier bedding can lead to lower ammonia, less microbial growth, better paw quality and bird welfare. Video data has also shown that birds tend to distribute throughout the house better as a result of the better environmental conditions provided by the circulation fans.

There are many variables that need to come together to get optimum chick performance. Farms want to provide the best environment possible while running houses efficiently. There are a lot of good ideas that sound logical, but they often yield inconsistent results. The ultimate decision on the use of these ideas should be based on well-planned and monitored studies. The successful ideas should provide a return on investment on most if not all of the farms where they are implemented. The points discussed in this paper tend to vary considerably from farm to farm. However, farms that control these parameters tend to perform above average.