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Keeping Poultry Cool During Hot Weather: 5 Factors to Utilize

Author: Brian Fairchild, PhD
University of Georgia Department of Poultry Science

Traditionally, hot weather compromises bird performance. The degree to which the performance deteriorates depends on how well the house is maintained and managed. There are a few common issues that are observed every year, that if avoided, will result in optimal bird performance. These issues are low airspeed, turning evaporative cooling on at low temperatures, birds not evenly distributed and dirty evaporative cooling pads. The five factors below will accentuate bird cooling during hot weather.

Optimize Air Speed

While birds lose heat in multiple ways (radiation, conduction, convection and evaporation), the primary two ways are convection and evaporation. If the heat loss is divided into heat lost to the air and evaporative heat loss, research has shown that broilers will lose approximately 40% of their heat to the air and 60% through evaporation. When environmental temperatures increase, the bird will increase evaporative heat loss through gular flutter and panting in order to keep body temperature from increasing. Increasing air speed increases heat lost to the air and reduces the bird's need to pant (Figure 1). Even at optimal house temperatures when the bird is not panting, they are still losing 60% of their heat through evaporative heat loss. Therefore, air speed is really the most important factor in cooling birds. House tightness and maintenance of fans and evaporative cooling pads are an important part of getting the optimal air speed.

Each year some growers indicate concern of over cooling their birds. It is harder than people think to chill broilers that are over 3 weeks of age. They will not need all of the fans running, but typically they can benefit from more fans than what most people are providing. Bird density is a large part of this. The more birds in the house, the more air speed they are going to need. So be sure to run enough air speed over the birds. There is no equation to calculate the proper air speed. The airspeed will depend on a number of factors including temperature, relative humidity, bird density, bird size, and bird age.

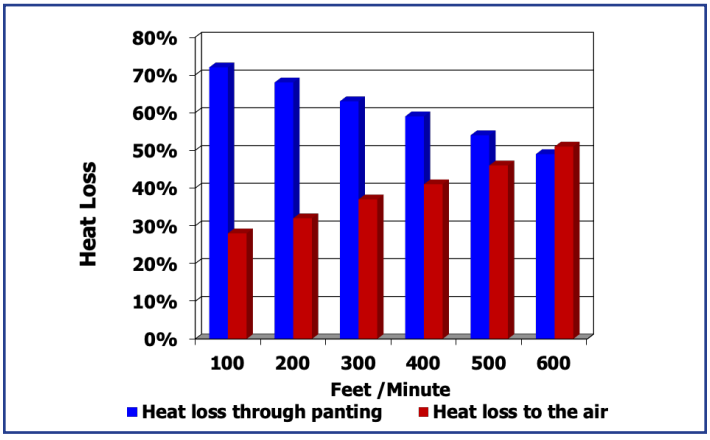

Figure 1. Heat loss to the air increases while panting heat loss is reduced as air speed increases (Simmons et al, 1997).

Run Fans at Night

Run fans during the night to maintain heat removal from the birds and the house. While outside temperatures may decrease 10-25°F at night, the house temperature does not change much more than 5°F (Figure 2). However, many people will reduce the number of fans running at night. Nighttime cooling is important in maintaining bird body temperature especially on hot days where in spite of everything being done correctly, birds in the house were still panting. It is the nighttime cooling that will keep bird body temperature in the normal range and result in consistent weight gain, feed conversion and livability. In many cases, the nighttime bird management will determine the success of a farm. Growers that focus on removing as much heat from the house, and thus the birds, during hot weather see better results than growers that reduce airspeed by turning off some of the fans at night.

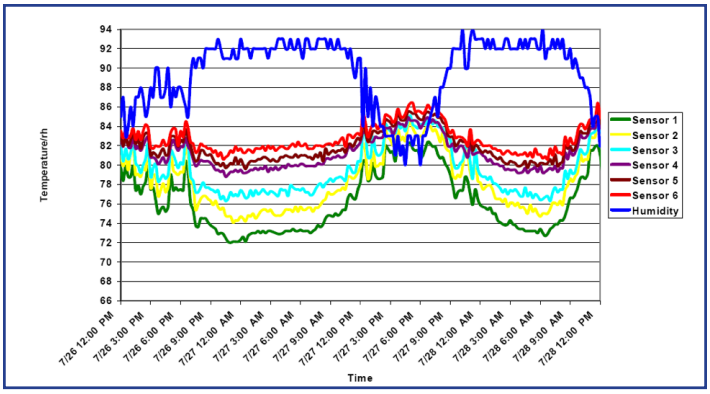

Figure 2. Low air speed at night results in large temperature difference from front to back of the house (Sensor 1 vs Sensor 6). However proper air speed will keep the temperature rise at 5°F or less.

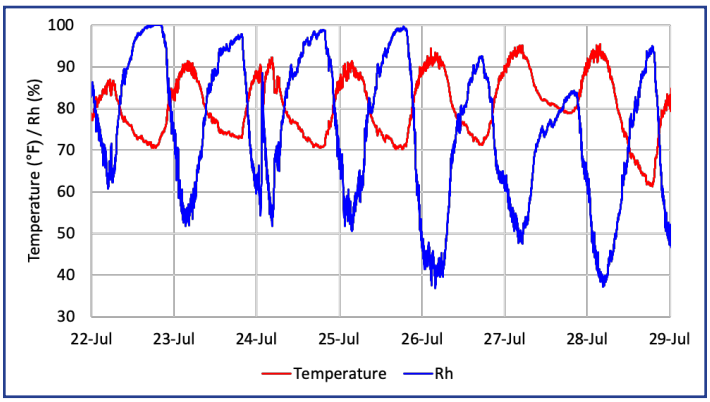

Figure 3. The relationship between temperature and Rh

Daily Evaporative Cooling Until House Temperature is 85° F – 87° F

Farm managers need to remember that evaporative cooling is a tool that increases bird cooling and it is not the primary means of maintaining body temperature during hot weather. The air speed is doing the most to keep the birds cool during hot weather. The evaporative cooling system makes the airspeed more effective. One needs to remember that evaporative cooling actually increases the relative humidity inside the house. As discussed earlier, even at optimal house temperature with no panting, broilers lose 60% of their heat through evaporative cooling from their respiratory system. The longer evaporative cooling is delayed, the more efficient poultry can be in losing heat through this primary method of cooling themselves. Once the evaporative cooling system starts to operate, incoming air temperature is reduced and the house relative humidity is increased. Houses with appropriate air speeds of 600 ft/min or higher, depending on the target market weight, can easily delay operating the evaporative cooling pads until the house temperature reaches 87°F. If houses do not have optimal air speeds, whatever the reason, then turning the evaporative cooling on sooner is warranted.

Another item to consider is that growers should not operate evaporative cooling pads when outside temperatures are below 80°F. Temperature and relative humidity will intersect at 80°F and 80% (Figure 3). Turning evaporative cooling on when outside temperatures are below 80°F only results in higher relative humidity inside the house, wetter floors and compromises the ability of poultry to lose heat. It does not increase bird cooling.

Keep Birds Evenly Distributed

Bird density can affect bird cooling. When too many birds end up in one section of the house, there is increased competition for food and water, litter conditions will deteriorate more quickly and more heat will be produced in that area of the house. Birds are closer together and less air will be moving between the birds. The birds need to be kept evenly distributed down the length of the house. Migration fences should be used all year long to prevent too many birds from ending up in a particular section of the house and be placed 100 ft. apart. This means that a 500 ft. long house would have four migration fences. The migration fence material should prevent birds from passing, but have openings large enough that it does not restrict airflow during tunnel ventilation (Figure 4).

Figure 4. Migration fences should be placed 100 ft. apart down the length of the house

Thoroughly Clean Evaporative Cooling Pads

Evaporative cooling pads should be cleaned regularly. Often times they are dirtier than people think. Dirty evaporative cooling pads restrict airflow resulting in the fans moving less air, which reduces air speed. The water in the pad system should be dumped routinely, as often as weekly, during hot weather. One way to determine how dirty a pad system involves measuring the air speed on small section of pad. Take a gallon bucket with clean water and splash on that area of the pad 2-3 times. Then measure the air speed in that section again. Compare the air speed in that cleaned section to other sections in the pad system for comparison. Usually the area that is cleaned will have a higher air speed moving through the pad because of less restriction. When cleaning a pad several solutions can be used to loosen the debris inside the pads. Cleaning pads thoroughly does take time and requires flushing out the flutes of the pad with water to remove all of the debris that has built up but was loosened by the previously mentioned solution.

Problems with low air speed, low air speed at night, high humidity/damp floors, uneven bird distribution, and dirty pads are routinely observed during hot weather. All affect the ability to cool birds during hot weather. In making sure these factors are addressed properly will help to optimize the bird cooling and lessen the detrimental effects of hot weather on bird performance.

Figure 5. While the front of the pad may look clean, the flutes within the pad can be much dirtier resulting in air restriction that people may not be aware is there.

About the Author:

Dr. Brian Fairchild is Professor/Brian D. Fairchild received his PhD in Physiology from North Carolina State University. He has been a member of the faculty of the Department of Poultry Science at the University of Georgia for 18 years. Dr. Fairchild currently serves as a Professor and Extension Poultry Scientist working in broiler and poultry house management. His area of focus is broiler house environmental control, energy conservation and management. Recent projects focus on factors affecting broiler body temperature, poultry house lighting and broiler water consumption. Dr. Fairchild has traveled extensively providing seminars on the principles of broiler management and poultry house environmental control. His work is available in a number of publications but much of it is available in the UGA Poultry Housing Tips newsletters that can be found at www.poultryventilation.com.

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