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## Hot Season Management of Broiler Breeders in Open-Sided Houses

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### INTRODUCTION

One of the most challenging aspects of managing any generation of birds is that of environmental control in open-sided houses. To allow the birds to display their genetic potential, ensure good welfare, and profit from the improvements in nutrition, modern day broiler breeders must be reared effectively and with care. In regions where the hot weather season can see temperatures reaching 40°C (104°F), it is essential to pay extra attention to bird management. Management requirements during the hot season are influenced by factors including:

- Geographical location.
- Type of housing.
- Construction material of the house.
- Height of the house.
- Ventilation blocks around the side of the house.

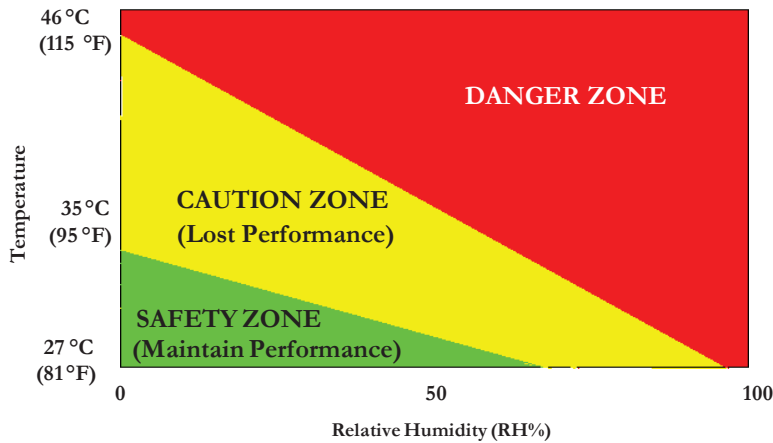
Around the world, there are a greater number of environmentally controlled houses being built to accommodate an ever expanding and evolving industry. However, many broiler breeders are still housed in open-sided houses, which are prone to climatic fluctuations. When high temperature, high humidity, or a combination of both are present, birds can feel the effects of heat/humidity discomfort. This is further complicated by low wind speeds and the difficulty in correctly ventilating open-sided houses. Because the performance of birds in hot weather is influenced by the change in temperature and the length of exposure, it should be understood that optimal welfare or an ideal environment may not be provided in open-sided housing. Broiler breeders under these conditions may exhibit performance losses compared to those birds housed in closed, environmentally controlled houses.

This article summarizes the different management tools that may be used to help reduce the impact of high temperatures and humidity on broiler breeders kept in open-sided houses.

### HEAT AND HUMIDITY

It is not only increased temperature that causes discomfort to the birds, but a combination of temperature and humidity. The sum of the ambient temperature in Fahrenheit (°F) and the Relative Humidity (RH) percent is known as the Heat Stress Index. As a rule of thumb, from 80°F (27°C), if the temperature (°F) and RH add up to 160 or more (107 or more for °C), the birds are likely to be affected by heat and humidity discomfort and an effect on performance can be expected. **Figure 1** below shows the effect of temperature and humidity on bird performance.

Figure 1: Heat Stress Index.

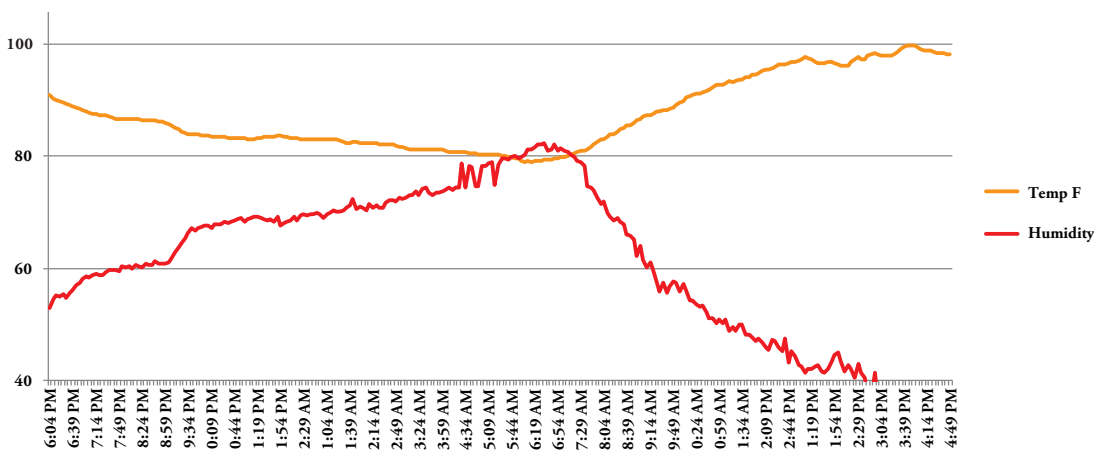


Heat humidity discomfort (heat stress) can be produced by high air temperatures, heat radiation from hot surfaces around the birds, such as non-insulated roof tops which are exposed to direct sunlight, and the metabolic heat produced from the birds themselves. Birds must therefore find a way to regulate their body temperature; conduction, convection and evaporation are the mechanisms used to dissipate heat from the body.

- **Conduction** - heat loss by contact. Birds will seek out cooler areas in the house allowing them to distribute their body heat into cooler surroundings.
- **Convection** - heat loss from the natural rise of warm air from around the body. This is only effective if the air movement around the birds is fast enough to break down the boundary layer of hot air that surrounds the body.
- **Evaporation (Panting)** - the most effective form of heat loss. Birds begin to pant when the temperature rises around 5-7°C (7-11°F) above their current comfort zone temperature (the temperature at which they are most comfortable/efficient). The air sacs allow inhaled air to reach deep into the abdominal cavity, and when exhaled, heat is removed from the body. Birds do not have sweat glands and also use panting to evaporate water from their throats, thus reducing body temperature. If the moisture content in the air is high and/or air speed is low, evaporative cooling is much less effective.

The effect of high temperatures will increase when humidity levels are also high. In general, environmental temperature rises during the day while % RH falls, with the opposite effect at night (temperature falls while % RH rises) (Figure 2). Therefore, during the hot season, it is possible for birds to feel the effects of heat and humidity discomfort at any time, making it even more difficult to regulate body temperature.

Figure 2: Example of the rise and fall of ambient temperature and % RH during the day and at night.



### MANAGING BIRDS DURING THE HOT SEASON

In preparation for the hot season, a number of management techniques may be used to improve the birds' environment. Some tips to help reduce the heat load of the house are as follows:

- Removing dust and cobwebs that may be restricting airflow into the house.
- Adding/improving roof insulation or painting the roof white to reflect sunlight (**Figure 3**).
- Addition of a sprinkler system.
- Using foggers in combination with circulation fans.
- Putting an additive in the drinking water (Vitamin C or Salicylic acid).

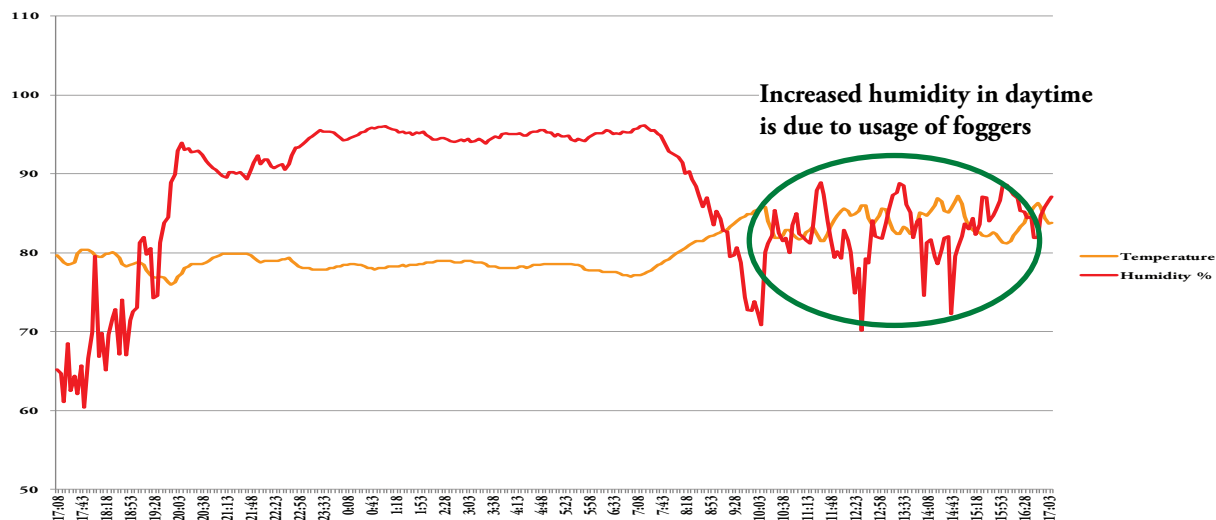
**Figure 3:** Example of a roof painted white to help reduce the heat load for the house.



### Fogging systems as a method of heat control

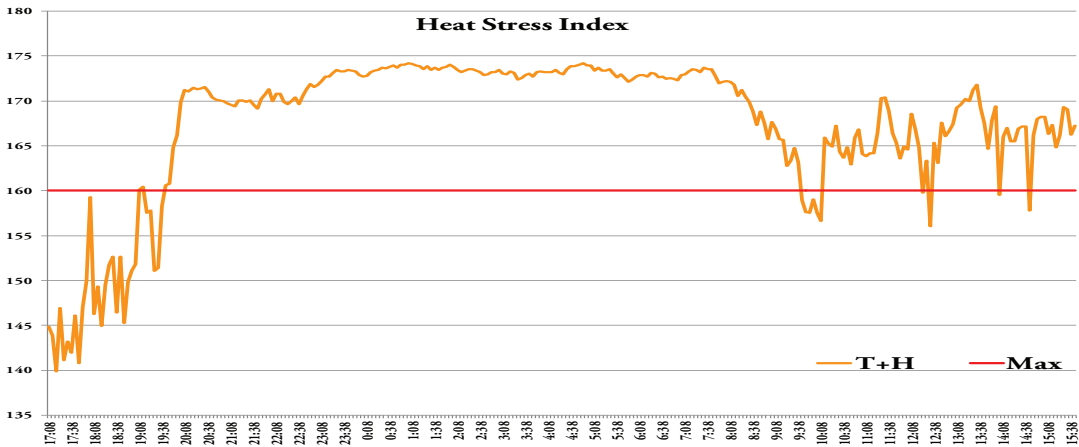
Foggers are used in many hot weather environments to reduce the heat load of the house. Foggers should be run intermittently during the day and in periods of lower humidity levels (below 70-80% RH). To increase the effectiveness of a fogging system, foggers should also be used in combination with circulation fans. **Figure 4** gives information about the temperature and % RH fluctuations when only foggers (no circulation fans) are used. **Figure 4** shows that while foggers are successful in reducing the temperature during the day (which is evident from the fluctuating level of humidity), at night, humidity increases and becomes critical so the fogging system cannot be used.

**Figure 4:** Use of foggers alone during the hot season.



Humidity levels vary between geographical locations and the level of air flow in any given micro-climate. **Figure 5** shows the Heat Stress Index in the same environment, which is the sum of the ambient temperature in Fahrenheit (°F) and the percent Relative Humidity (RH). The birds in this case are exposed to extreme heat humidity discomfort from 7 p.m. in the evening to 9 a.m. in the morning. This situation is difficult to manage and is exaggerated more in this case as a fogging system is the only form of environmental control in use. Use of foggers without circulation fans is therefore not recommended.

**Figure 5:** Example of the Heat Stress Index (°F). When the sum of RH plus temperature (°F) exceeds 160 (107 for °C) birds are likely to experience heat and humidity discomfort.



**Use of fogging systems in conjunction with circulation fans**

During the hot season, the use of fans (**Figure 6**) in conjunction with foggers is recommended to help improve performance and reduce mortality levels. The primary purpose of circulation fans is to provide air movement over the birds in order to remove body heat. Heat is removed from the bird and the house when air speed is increased. Circulation fans should produce an air speed of at least 2 meters per second (395 feet per minute) at bird level. It is essential that birds are exposed to adequate air movement with no or few dead air spots in the bird area. Running fans during both the day and the night will help to keep the birds more comfortable.

**Figure 6:** Example of a circulation fan.



### Nutrition

During the hot season, birds require less energy and feed clean-up time will increase. In some instances, during high daytime temperatures, the feed may never actually be completely consumed; up to 10-20 grams (0.4-0.7 oz) of feed per bird per day may be left. Though the energy requirement drops during the hot season, the requirement for other nutrients like amino acids, minerals, and vitamins remains the same. Therefore, feed formulation has to be balanced according to the feed intake so that nutrient intake fulfills the birds requirements. Failing to do this will affect the consistency of egg production during and after the hot season. Providing a good feed form (low level of fines), using feed ingredients with higher digestibility, and increasing the proportion of the feed energy that comes from fat may also help.

### Lighting

In open-sided houses, the birds are exposed to natural daylength, whatever it may be. The actual amount of daylight will vary with geographic location and may be as long as 16 hours. During the hot season, it may be beneficial to feed birds early in the morning or late in the evening when it is cooler. If this is done, additional light hours may need to be provided. Exposing the birds to daylengths of longer than 13 to 14 hours causes an earlier onset of photorefractoriness, which affects the persistency of production. Adjusting the lighting and feeding programs to feed the birds early in the morning or late in the evening, but keeping the total day light hours to 13 or 14 hours where possible, will help in maintaining persistent performance. However, if birds are exposed to natural daylengths longer than 13 to 14 hours, do not allow the daylength to decrease.

Where birds are reared in open-sided houses, black nets or curtains (**Figure 7**) can be used to manage the birds during out-of-season flocks or flocks that are exposed to increasing daylengths during the rearing period. Using the black nets reduces the light intensity in the house but will also affect the normal flow of air in the house. This will increase the heat and humidity discomfort of the birds, especially during the hot season or when the outside temperature and/or humidity increases. Fans are essential in rearing houses to keep the birds comfortable and reduce the potential of heat and humidity discomfort.

**Figure 7:** Houses with black nets for growing birds out-of-season or for flocks exposed to increasing daylength during rear.



#### KEY POINTS

- Measure both temperature and humidity to understand the Heat Stress Index and its effect on the breeder population.
- Using fans and foggers together is much more effective in combating heat humidity discomfort than foggers or fans alone.
- Adjust diet specifications to ensure the requirement of the breeders during the hot season is still achieved and ensure good feed form.
- Adjust the lighting schedule to accommodate for early morning or late evening feeding. Keep the total daylight hours constant (13/14 hours) as far as possible and do not allow daylength to decrease.