

Heat Stress Management in Broilers

Neospark

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Introduction

High ambient temperatures coupled with high humidity can be devastating to commercial broilers. Heat stress interferes with the broilers comfort and suppresses productive efficiency. Although increased heat is seen as a major problem in poultry production, studies show that it is not only the excessively high temperatures, but also the fluctuation of the temperature. This naturally occurs during the temperature change from daytime to nighttime.

Recent studies have shown that broilers tend to perform reasonably well in a high, but constant environment of 38°C (100°F), but become stressed when fluctuating temperatures exist. When temperature fluctuations occur, birds need to use more energy in an attempt to maintain their body temperature of 41-42°C (106-108°F). When their body temperature rises above 42°C (108°F), mortality begins to occur. It is important to be aware of the temperature in the shed, and be conscious of how much it may fluctuate.

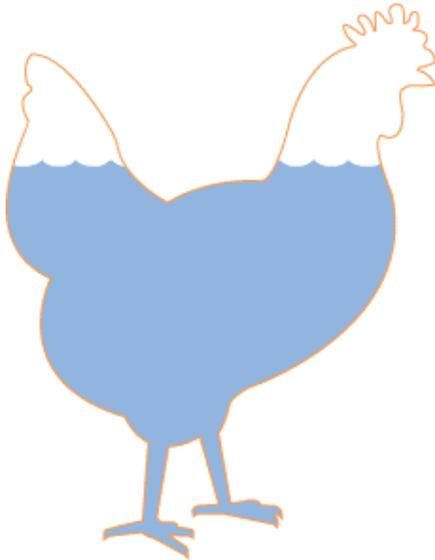


During periods of heat stress the broiler has to make major thermo-regulatory adaptations in order to prevent death from heat exhaustion. The result is that the full genetic potential of the broiler is often not achieved. The purpose of this paper is to review some of the effects of heat stress on broilers and methods, which can be used by the poultry producer to partially alleviate some of the detrimental effects of heat stress on broiler performance.

Physiological response to heat stress

Broilers subject to high environmental temperatures exhibit many behavioral changes which allow them to re-establish heat balance with their surroundings. Broilers rest more during periods of heat stress. Some birds will stand quietly while others simply crouch near walls or waterers. Usually, their

wings are spread away from the body to promote cooling by reducing body insulation. Within the bird, blood flow is diverted from certain internal body organs such as the liver, kidneys and intestines to dilated blood vessels of the peripheral tissue (skin) in order to facilitate heat loss.



Hyperventilation or "panting" increases during periods of high environmental temperature. Heat loss through evaporative cooling allows the broiler to dissipate the heat it is generating. However, panting requires increased muscle activity and these results in an increased energy requirement, which is associated with heat stress. Therefore, decreased energy efficiency also accompanies hot weather. Panting would normally be expected to occur when the ambient temperature is near or above 30°C.

Relative humidity influences evaporative heat loss through panting. Broilers, as well as other domestic poultry, cannot tolerate high temperature coupled with high relative humidity. Death due to heat exhaustion will occur very quickly, especially in heavier birds, if both temperature and humidity are high. In normal birds, panting will remove approximately 540 calories per gram of water lost by the lungs.

Importance of panting

Normally, blood pH is controlled by the lungs and kidneys along with the various buffer systems, which prevent rapid changes in the pH. However, as the respiratory rate increases in heat stressed broilers, there is a corresponding decrease in the levels of blood carbon dioxide. Respiratory alkalosis (elevated blood pH) results. *Heat stress also depletes potassium and other minerals in the body, altering the delicate electrolyte balance in the body.*

Feed intake Vs Heat stress

Broilers maintained in hot environments reduce their feed consumption. This is a part of their physiological adaptation to heat stress. The reduction in feed intake results in a decrease in the daily intake of nutrients responsible for growth. However, fewer nutrients to metabolize means less heat produced by the body. Thus, even though growth is slowed, the broiler can now more easily cope with the heat because of the lessened need for heat dissipation. Research data clearly shows that the survival rate of broilers decreases as feed intake increases during heat stress, especially during the hottest part of the day.

Importance of fasting during heat stress

In addition to heat-stress mortality, economic losses associated with broiler heat stress also occur as a result of lowered growth rate and decreased feed efficiency. Therefore, it is natural for producers to want to stimulate feed consumption in hot weather. However, any management technique, which promotes feed consumption or increased activity during the peak hot periods may be counterproductive. The extra feed consumed will increase the bird's heat load and probably result in additional mortality. Fasting the broiler prior to or during peak hot periods of the day lessens the heat load and enhances survival.



Fasting reduces the heat production from digestion, absorption and metabolism of nutrients. Fasting also has a calming effect. Movement in animals occurs through muscle contraction which generates heat. In hot environments this heat production only adds to the heat load. Therefore, to lessen the heat load, broilers should be kept as calm as possible. This is especially important during the hottest parts of the day. Once the hottest periods are over and ambient temperature starts to fall, the broilers will usually begin consuming feed again.

Five Tips For Handling Heat Stress

1. Add nutritional supplements to the feed or water.

The electrolyte balance in birds is altered during heat stress due to panting. Panting increases carbon dioxide loss in the bird, which reduces the birds' ideal water intake. By adding electrolytes to the feed or water, birds increase their water intake, which aids in keeping a constant body temperature and maintains an effective system of evaporative cooling.

2. Carefully select a proper time of feeding and withdrawing feed.

During the late afternoon there is a significant rise in body temperature, which, if severe, may kill the bird. The late afternoon may not be the hottest time in the day, but it is the peak of digestion in birds when eating in the early-mid morning period. A good management strategy for layers to aid in reducing heat stress is to withdraw feed prior to the anticipated time of peak temperature so that it may take an unneeded heat load off the bird. For broilers, a period of darkness in the late afternoon can be used to avoid excessive activity. If using a feed withdrawal program, it can be beneficial to give supplemental lights during the period of natural darkness.



3. Have readily available drinking water

Ensure that the water is clean and of optimum quality. Water must be readily available and have nipple drinkers at the right height. Adding nutritional water supplements that run continuously in hot weather is also of great benefit.

4. Ensure good ventilation.

By providing the birds with a comfortable environment, common stressors and heat will reduce. Always check airflow patterns and keep your ventilation system well cleaned. Misting systems can also be used to help aid the birds in their own cooling mechanisms.

5. Dietary modification during heat stress

Heat stress causes broilers to decrease feed intake and consequently nutrient intake. Therefore, the dietary nutrient concentrations should be increased.

Simply increasing the protein concentration is the wrong approach. The energy content of the diet, along with other nutrients, should be increased. Increasing fat calories should be considered. Dietary vitamin and mineral concentrations should be re-evaluated. The use of vitamin C, as an anti-stress agent, is often considered during periods of heat stress. Choosing the correct coccidiostat is very important as well as the use of antioxidants and mold inhibitors in stored feed. Protein contributes more to metabolic heat production than do carbohydrate and fat. Therefore, feeding imbalanced diets with regards to amino acids will result in increased metabolic heat production. Amino acid balance in the diet is especially important. Efforts should be made to formulate diets with slightly lower protein levels and to utilize synthetic amino acids, especially methionine and lysine.



Summary

Broilers under heat stress have to make critical physiological adjustments. Feed intake is depressed and water intake is increased. Dietary adjustments can help reduce metabolic heat production and maintain nutrient intake. Energy intake and amino acid balance is of extreme importance in heat stress. Providing adequate ventilation and stimulating water consumption is essential. Minimizing bird activity during the hottest parts of the day lessens the heat burden. Controlled fasting is beneficial and usually increases survival rate of broilers during heat stress.

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