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Heat Stroke and Their management in Poultry

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Abstract

Rising global temperature and fact that highly productive poultry breeds are more prone to heat stress is a challenge for the industry. In tropical country like India heat stroke is an important cause of mortality in poultry. Summer season coupled with thick layer of feathers on the body of poultry and absence of sweat glands makes birds highly susceptible to heat stroke. Inadequate water supply or too low ceiling of poultry house, inadequate ventilation, overcrowding, and absence of vegetation or tree creepers to cool the air in and around the poultry house may cause heat stroke in poultry.

Introduction

Birds are 'heat stressed' if they have difficulty achieving a balance between body heat production and body heat loss. Birds are very sensitive to heat outbreaks, and cannot endure extreme temperatures for long. Heat stress begins when the ambient temperature rises from 26.7°C and potentializes above 29.4°C. The internal temperature of adult birds is around 40°C – 41.66 ° C, if said internal temperature reaches 43.3°C – 45.6° C, the birds are in danger of death. This can occur at all ages and in all types of poultry. The broiler and layer industry faces the challenge of Heat Stroke, which increases production cost and severely damages the meat and egg quality due to poultry's susceptibility to heat because of their rapid metabolic rate and high growth. Birds can lose heat at a controlled rate using normal behavior. Climate change due to global warming is becoming more relevant these days, especially for the chicken meat industry.



Thermoregulatory mechanism in chicken

Heat stress is one of the most important causes of economic losses of poultry farmers and companies in the poultry sector in tropical climates and has a great impact on productivity and mortality. Birds do not have sweat glands unlike mammals, but they have developed some behavioral adaptations to cope with heat, including elevated respiration rate, panting and raised wings. In commercial poultry, high production always remained a priority that made the broiler more vulnerable to environmental stressors. The insulation provided by feathers in commercial poultry is one of the major hindrances in birds' thermoregulation. To sum up, high ambient temperature beyond the thermo-neutral zone during the production phases badly affects meat production, meat quality and cause severe immune problems in the broiler flocks.

Symptoms of heat Stroke

Affected birds may show symptoms like Birds with distended wings, crouched on the floor Slowness, lethargy, Increase in water consumption, Decrease in feed consumption and increase in mortality. The birds under heat stress open the beaks and start panting. After sometimes birds show weakness, incoordination and ultimately die after showing paralytic symptoms. Mortality rate is variable from 5–50% and sometimes 100%. The birds dying of heat stroke do not show any pathognomy lesions.

Effect of Heat stroke on poultry meat and Egg production

Reduction in Feed Intake and Poor Weight Gain. Increase in Fat and Reduction in Protein Contents of Poultry Meat. Excessive heat burden triggers metabolic stress that deteriorates meat quality. Meat quality becomes deteriorate due to drip loss- After slaughtering, when muscle converts to meat, it loses some of its contents, including water, myofibers, iron, and proteins. Loss of muscle contents during which meat tends to lose its original texture and taste are often referred as drip loss. Drip loss is related to overall meat quality as it reduces meat palatability, juiciness, and acceptability of meat.

Severe heat stress can cause declines in egg production and growth rate. As high ambient temperature induces stress in birds, there is an expenditure of energy, which results in a reduction in the productive efficiency of the bird and decreased hatchability. Change in the quality of the egg like smaller eggs, thinner layers, and generally poor internal egg quality. Panting leads to decreased blood carbon dioxide (CO₂) levels and increased blood pH, which hampers blood bicarbonate (HCO₃⁻) and calcium (Ca) availability for eggshell mineralization. Also due to reduced feed intake, the hens



consume less calcium and the levels of calcium in the blood drop; therefore, the calcification of the egg is lower.

Diagnosis- Heat stress is diagnosed by Post Mortem findings which will reveal “slow-cooked meat” appearance or change in the muscles to pale or white colour.

Management of Heat Stress

- **Clean and Cold-water supply-** During heat stress, birds will increase their water intake by 2 to 4 times their normal intake so ensure the supply of enough and cold water in poultry farm. In extreme of summer season birds may be dipped in the chilled water and chilled water may introduce orally in to their crops by a thin polythene tube attached to a syringe.
- **Avoid overcrowding-** One of the best ways to prevent heat stress is to avoid overpopulation. To instantly reduce heat, reduce the number of birds in the house.
- **Housing Management-** Provision of insulated roof, high ceiling, and planting of creepers to cover the roof of the buildings. Adequate ventilation, provision of wet khush hangings, use of exhaust fan, air coolers, water sprinklers around the buildings are the preventive measures adopted by the owners depending upon need and degree of the heat of the area. Use of foggers for big poultry farms is also useful.
- **Feeding Management-** Most often, birds are hungriest in the morning and will tend to fill up. This will make them more prone to heat stress in the afternoon. Withdrawing feed birds six hours before peak warm temperatures in the afternoon can lower the risk of heat stress. Birds can then feed during night time hours when we expect cooler temperatures to occur. Reduce the dietary energy level in feed and reduced protein: energy ratio.
- **Supplementation with multivitamins, electrolytes and individually titrated vitamin C solutions in water is also used.** Ascorbic Acid (Vit. C) is one of the most important vitamins in heat stress. It inhibits the increase in the body temperature of birds, increases food intake, and promotes the recovery of damaged tissue cells. The high temperature inhibits the synthesis of vitamin C in layers and requires additional compensation.
- The supplementation of feed additives such as probiotics, prebiotics, and symbiotics has been used lately to curb the negative impacts HS poses in birds. Feed supplemented with 5% fat and 4% palm oil can improve broiler production performance under the HS environment by lowering feed retention and optimizing the nutrient utilization.



- **Electrolyte therapy-** Panting can be a sign of heat stress and the act of panting can upset the electrolyte balance of birds. Electrolytes such as K, Na, P, Mg and Zn should be used to correct electrolyte imbalance due to heat stress. Use of osmolytes like betaine in feed increase water holding capacity of cells in the body which prevents dehydration and improves water intake,
- **Supplementation of Sodium Bicarbonate-** Soda bicarb in the feed is especially useful for layer birds. This ensures availability of Bicarbonate for egg shell formation.

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