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Review Article

NUTRITIONAL MANAGEMENT OF HEAT STRESS IN POULTRY

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Introduction

Poultry is subject to multiple environmental factors such as temperature, humidity, light, altitude, wind velocity, solar energy, quality of air and water and density of population. None of these factors are completely constant and are all interrelated. These factors counteract/reinforce the impact each one has on the bird. Acclimatization tends to allow poultry to withstand sudden short-term excursions from normal (NRC, 1981).

Temperature is one of the important factor, affecting poultry production. Most parts of India are tropical, and the temperature in some parts of the year exceeds 35ºC. Heat stress is a problem in broilers from 4 weeks of age onwards and in layers and breeders during production. Environmental interventions available for reducing the temperature are not economically feasible for many broiler producers to modify the environment. Hence, means of reducing the heat load on broilers through nutritional strategies would be valuable.

Nutritional Management

1. Water:

Water is the important media for heat loss. About 70-80% of heat production in poultry during heat stress is dissipated via panting. Hence adequate water provision, reduction of water temperature and addition of salts are helpful in improving water intake in poultry and reduce the heat stress.

1. Feeding time:

One of the method to reduce the heat stress in poultry is to withdraw feed 8 hours prior to the anticipated time of peak temperature. Hence 1/3rd of the daily ration should be given in the early morning and 2/3rd in the evening.

2. Feed type:

The practices used to raise feed consumption and stimulate feed intake during high temperature are:

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- Wet mash feeding increased feed intake and improved performance. But on large scale practices it is not possible.
- Pellet feed required less energy for feed intake. In chicks of 21-28 days of age, mash feed 38 g consumed in 102 minutes in 35 numbers of meals per day and 2.9 minute for each meal. Pellet feed 37 g consumed in 34 minutes in 27 numbers of meals per day and 1.1 minute for each meal (Jensen *et al*., 1962).

3. Energy:

The energy requirement for maintenance decreases by about 30 kcal/day with increase in environmental temperature above 21ºC. Increasing the ME content of feed improves energy intake results in improved growth but increased fat in the carcass and also the mortality. The feed energy concentration should be adjusted to allow for the reduction in feed intake at higher temperatures. The concentration of energy should be increased by 10% during heat stress, while the concentration of other nutrients should be increased by 25%.

4. Protein:

The heat increment with protein (amino acid) catabolism is more than that of carbohydrates and fat. Reduction in protein in diet to reduce heat increment, increases feed intake due to deficiency of amino acids. Less protein in diets also reduces water intake, hence does not reduce the effect of heat stress (Gous and Morris, 2005).

5. Amino acid:

A low protein diet with balanced critical amino acids (methionine and lysine) is more beneficial than a diet high in total protein during summer (Lin *et al*., 2005).

6. Vitamins:

Vitamin A, D, E, C and folic acid reduce the effect of heat stress (Sahin *et al*., 2002). Vitamin C enhances the antioxidant activity of Vitamin E (Siegel, 1995).

7. Electrolytes:

Addition of various electrolytes to water alter the bird's osmotic balance, resulting in increased water consumption, influencing water balance during heat stress and reducing systemic acidosis. The body weight gain can be increased up to 9% by addition of electrolytes in the feed of heat-stressed broilers. To compensate for the reduced feed intake under heat stress, dietary allowances for electrolytes (sodium, potassium and chloride) may be increased by 1.5% for each 1ºC rise in temperature above 20ºC (Teeter *et al*., 1985).

8. Other Nutrients:

Lactobacillus strains may enrich the diversity of Lactobacillus flora in chicken jejunum and caecum, and therefore restoring the microbial balance and maintaining the natural stability of jejunal and caecal microbiota of broiler chicken suffered with heat stress. Dietary supplementation of chromium (120 ppb) is favorable to the performance of heat stressed broiler chickens (Sahin *et al*., 2002).

Conclusion

The higher production performance and feed conversion efficiency make today's chickens more susceptible to heat stress than ever before. Broilers under heat stress have to make critical life sustaining physiological adjustments. Dietary adjustments can help to reduce metabolic heat production and maintain nutrient intake.

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