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Conceptual Paper

Heat Stress in Chicken

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Stress is a state of threatened homeostasis. Heat stress is also known as Heat Stroke orHeat prostration, it is a condition in which body temperature gets so high that it starts interferingwith normal bodily functions, and if unchecked, it leads to prostration (lying down with extreme physical exhaustion) and eventually death.

Introduction

India being a tropical country, so heat stress is amongst important causes of mortality here. The birds are particularly prone to heat stress in the summer season as it is associated with thick covering of feather and fluff over the body of chicken adding to its lack sweat glands make the birds highly susceptible to heat stress, particularly bird in stage of production [1].

When the environmental temperature reaches between 28°C and 35°C, non-evaporativecooling becomes the chief method of heat loss, it is achieved by relaxing the wings and hangingthem loosely at their sides along with an increase in the peripheral blood circulation. However,a rise in the environmental temperature up to 41°C, only method of cooling left now is rapid respiration and open mouth breathing (panting), the evaporative cooling and if body temperature of the bird still rises, bird become weak and die from encountering the respiratory,circulatory or even electrolyte imbalances.

Causes

- The most common cause of heat stress is high environmental temperature accompanied withhigh humidity in the vicinity of bird, even by hot and dry wind in arid and semi-arid areas.
- Inadequate water supply and improper ventilation.
- Comparatively smaller poultry house leads to overcrowding and lower height of ceiling in the poultry house.
- The lack of vegetation or shady trees, creepers plants and the absence of the proper vegetation so as to cool down the air coming in and the environmental temperature of the poultry house.
- Heat stress may also be present even in the environmentally controlled poultry houses, though a rare phenomenon, caused by ventilation failure within houses which contains a largenumber of poultry birds. Same happens in the temperate regions.
- The rate of body metabolism has a direct relation with the incidences of heat stress. Layinghens and the rapidly growing broiler birds are more intended for heat stress.
- The ration containing high energy, high protein, if offered in summer, causes the birds to be more at risk of heat stress.
- Some breeds are particularly prone to it owing to their genetic constitution. In general,broiler breeds are more susceptible than layers.
- Lack of proper supply of cool, fresh and drinking water at all the times further intensify thecalamities of high temperature.
- When the bird is exposed to atmosphere with higher temperature and higher humidity, theadverse effect over the birds multiplies certain times.
- The chicks within the 3 weeks of age are more resistant to the heat stress than elder ones.

Figure a

Symptoms

The first and foremost symptom is breathing with mouth open, kind of rapid and shortbreathing (panting), increased thirst and the bird actively seek water, reduced appetite, drastic reduction in the egg production and smaller size of eggs, thinning of shell, in broilers reducedgrowth rate and birds shows a characteristics posture of standing with wings outstretched and then, prostration eventually leading to death. The mortality may vary from 5% to 50% and mayeven go up to 100%. The temperature of affected bird can be as high as 42° C.

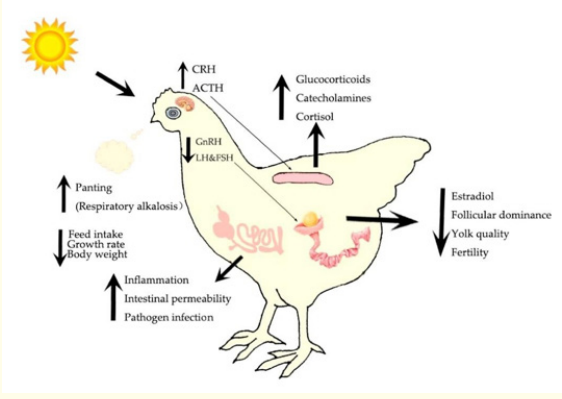

Figure b

Adverse effects of heat stress

- The higher rate of respiration for the longer duration causes the carbon dioxide concentration to fall in the blood, leads to disturbance in the acid-base balance. An increase in pH of the blood lowers the calcium in the blood, this causes a greater number of thin-shelled eggs in the laying flock.
- There is a drastic reduction in the feed intake of the birds due to excessive temperature and this causes lower growth rate in fast growing birds, a havoc to the modern broiler industry.
- Open mouth breathing leads to higher chances of the respiratory infections. Breathing by mouth leads to by-passing of the natural filters present in the nose to trap the dust.
- In the laying flocks, the reduction in the feed intake causes reduction in the egg production,egg size and even effects on the egg quality.

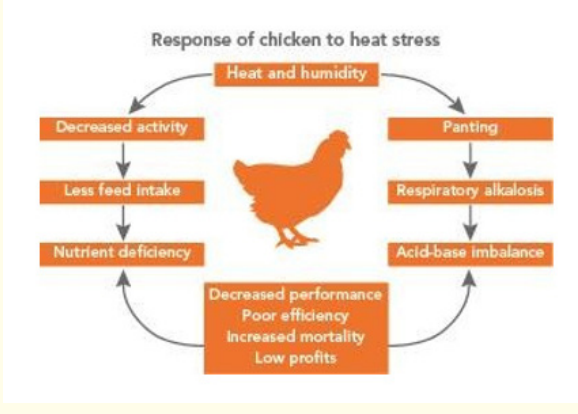

Figure c

Postmortem findings

The bird died of heat stress shows dehydrated and highly congested carcass, particularlybreast muscles are affected. The carcass presents a characteristic "cooked meat appearance" asthe muscle loses their normal red colour and become pale even up to white. There

is often mucous like exudate present in the nostrils and in mouth of birds.

Treatment

- The first and most important thing is to immediately arrange for adequate cool, fresh, potableand clean drinking water (if possible, with ice cubes in it).
- Try to open all the curtain and switch on all ventilation devices (sprinklers and fogger) tofacilitate the maximum ventilation, to allow fresh air circulation and heat loss from the house.
- Drugs, such as Nicarbazine, virginiamycin is also known to lower the heat stress. Paracetamol @ 10g per 100kg of feed should be given or it may be given in drinking water.
- Give vitamins in higher amount, it is found that the Vitamin C have beneficial effects inreducing heat stress, Vitamin E have given good results in the layer birds.

1. Give electrolyte in the drinking water to restore the minerals and acid-base balance. Electrolytes @ 500g – 1kg per ton of feed or 1gram per litre of drinking water is sufficient.
2. In severe condition, cooling of the bird can be made by dipping them in water or by sprayingthe birds directly with cool water reduces the mortality drastically.
3. Every effort should be made to increase circulation of air by running different available ventilation equipment at full capacity. Cooling of the air can be accompanied by using a hose to wet the floor, walls, ceiling and outside roof.

CONTROL

1. Provide the optimum environmental conditions, comfort zone, for the survival, growth and production, and eventually reducing the rate of metabolism in the stress striken chicken.
2. While constructing the poultry houses, proper height and width of the house should be keptin mind to order to provide adequate ventilation and comfort to birds. Evaporation coolers, through which the air is sucked into the building and cooled down can be used.
3. The roof should be insulated and outside painted white by using white or aluminium paint, to minimise the effect of radiation. Plant shady trees and creepers to cover the roof of poultry house can be good choice.
4. Water sprinklers may be provided for the sprinkling over the roof and on ground around poultry house. Foggers should be provided for inside cooling, without wetting the birds themself directly. Water pipe should not be directly exposed to glaring sun.
5. Birds must be provided with adequate cool, fresh drinking water in summer and a diet withlower protein-energy ratio.
6. The stocking density should be reduced, to avoid overcrowding, both on floors and cages toabout 80% of the condition that would have been in cooler conditions.

SUMMARY

In our country because of the prevailing tropical conditions, the heat stress is one of themajor factors that is responsible for sudden mortality in birds. Heat stress not only lowers the resistance of chicken towards heat, also they will suffer from variety of infectious diseases, most devastating being is *E. coli* infections as colisepticaemia, mycoplasmosis, infectious corzya, CRD, and even coccidiosis. Ultimately leads to severe damage to the poultry farm and end up ruining the farm and economy. All the possible measures must be taken aforehand in the beginning of summer season to prevent the birds from catastrophic effects of heat stroke.

Bibliography

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