Stress management of GPS &PS

Stress

State of physiological having interference with normal well-being.

or

Stress is a systemic state which develops as a result of the long-term application of stressors.

In a medical or biological context **stress** is a physical, mental, or emotional factor that causes bodily or mental tension and may be a factor in disease causation. Stresses can be external (from the environment, psychological, or social situations) or internal (illness, or from a medical procedure). Stress can initiate the "fight or flight" response, a complex reaction of neurologic and endocrinologic systems.

Stressor

Stressors are environmental factors/conditions/agents which cause stress or which stimulate homeostatic, physioligical and behavioural responses in excess of normal.

or

A stressor is a chemical or biological agent, environmental condition, external stimulus or an event that causes stress to an organism.

Events that trigger the stress response may include:

- Environmental stressors (temperatures, humidity, ventilation, sound levels, over-illumination, overcrowding etc)
- Daily stress events (e.g., quality and quantity of physical activity)
- Life changes (e.g., shipment of birds, feeding or watering system)
- Workplace stressors (e.g., Housing conditions, debeaking)
- Chemical stressors (e.g., P^H, heavy metal)
- Social stressor (e.g., cannibalism)

Sources of stress

- ❖ Management/Husbandry practices/Drug application
- ❖ Nutrition and feeding practices
- ❖ Environment

Stress factors

1. External Environmental factors:
   a) Change of weather (Inclement weather) e.g. Heat, Excess rainfall, Draught, Storm, Cyclone etc.
   b) Day length
   c) Noise
   d) High altitude
2. Internal Environmental factors:
   a) Disease
   b) Infection with microbes, parasites etc.
   c) Use of anti-parasitics in (coccidostats) medicines
3. Nutritional factors:
   a) Deficiency
   b) Changes of dietary elements (grain)
   c) Unhygienic water
   d) Keeping birds off-water for long period
4. Management factors:
   a) Hygienic and sanitary status
   b) Vaccination
   c) Transport
   d) Faulty management on light
   e) Weighing of birds
   f) Change of litter and
   g) Dampy litter with bad odour
   h) Debeaking

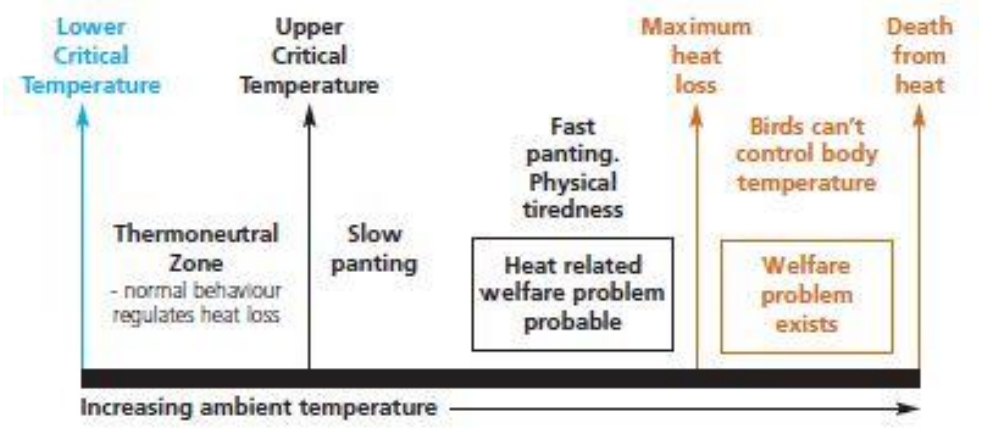
5. Physiological factors:
   a) Use of steroids, hormones and other growth promoters and fattening agents
   b) Genetic manipulation for rapid growth and other commercial gain
   c) Disturbance of flock causing jumping of birds, running from one place to another
6. Psychological factors:
   a) Sudden changes of flock to new place and alteration of shade
   b) Crowdedness

Heat stress

Birds are 'heat stressed' if they have difficulty achieving a balance between body heat production and body heat loss. This can occur at all ages and in all types of poultry.

Look at Diagram 1 – in the 'thermoneutral zone', birds can lose heat at a controlled rate using normal behaviour. There is no heat stress and body temperature is held constant. When conditions mean the 'upper critical temperature' is exceeded, birds must lose heat actively by panting. Panting is a normal response to heat and is not initially considered a welfare problem. But as temperatures increase, the rate of panting increases. If heat production becomes greater than 'maximum heat loss' either in intensity (acute heat stress) or over long periods (chronic heat stress), birds may die. The body temperature of the bird must remain very close to 41^0C (106^0F). If body temperature rises more than 4^0C above this, the bird will die.

Diagram 1 – Diagram of Thermoneutral Zone



How do birds lose heat?

Heat can be lost in a variety of ways. Three normal methods of heat loss are listed below. Birds modify their behaviour to stay in the 'thermoneutral zone'.

- *Radiation* – Heat will be lost from the body by radiation if the surrounding surfaces are below bird surface temperature. Conversely hot walls and roofs may radiate heat to the bird surfaces.
- *Convection* – Heat loss will occur from the natural rise of warm air from around a hot body. Providing moving air can assist convection, but only if the air moves fast enough to break down the boundary layer of still air that surrounds the body.
- *Conduction* – Heat will transfer from one surface in contact with another surface, for example, if the birds are seated on litter that is cooler than their bodies. However, the litter immediately under the birds soon assumes a temperature close to that of the body. After a bird can no longer maintain its body heat balance by one of these three methods (upper critical temperature), it must use "evaporative heat loss", or panting. Evaporative heat loss, at the same time as essential to the bird, does not contribute to heating the house.
- *Evaporation* – This is very important at high temperatures as poultry do not sweat but depend on panting. This is only effective if the humidity is not too high. Hot, humid conditions are therefore much more stressful than hot dry conditions.

How do birds respond to increasing temperature?

Birds will try to re-establish their heat balance with the surrounding by changing their normal behaviour. Birds may:

- Try to move away from other birds.
- Move adjacent to cooler surfaces
- Lift their wings away from their bodies to reduce insulation and expose any areas of skin that have no feathers.
- Elect to pant slowly.
- Rest to reduce heat generated by activity.
- Reduce feed intake.

- Increase water consumption.
- Divert blood from internal organs to the skin, which darkens skin color.
- Begin fast panting.

What are the consequences of panting?

- Heat is lost as moisture is evaporated from airways in the birds.
- Panting requires muscle activity, requiring energy use that generates some additional heat. The heat lost by evaporation must be greater than the additional heat generated by panting.
- Slow panting is a normal activity and can be sustained for extended periods of time.
- Respiration rate can increase by as much as 10 times the resting rate. Heavy panting can exhaust birds, reducing their ability to cope with extended periods of hot weather.
- High relative humidity reduces the effectiveness of evaporative heat loss.
- Increased respiration rate results in loss of carbon dioxide and a rise in blood plasma pH (called respiratory alkalosis). Blood potassium and phosphates are depleted, sodium and chloride levels increase.
- Growth rate or egg production will reduce.

Can poultry acclimatize to high temperatures?

Adult birds take about five days to acclimatize to high temperatures. Birds are more susceptible to sudden, large changes in temperature. The first very hot days after cool season often result in increased incidence of heat stress.

What are the key features of housing that protect birds from hot weather?

The key features are:

- Insulation
- House design and location
- Ventilation

Effect of stress factors on health and production

- ❖ Reduce body immunity (Humoral antibody)
- ❖ Reduce growth, production and feed efficiency
- ❖ Increase cortico-steroids in blood circulation which reduce production of lymphocyte and thus reduce humoral antibody.
- ❖ With corticosteroid in blood circulation due to stress, vaccinal response is not as much as it should have been and even if the response is there, the production of lymphocyte is hampered and thus reduce humoral antibody.

Influence

- ❖ Low weight gain/feed efficiency
- ❖ Reduced egg production
- ❖ Small and thin shelled eggs
- ❖ Loss of appetite
- ❖ Excessive thirst
- ❖ Progress muscular weakness
- ❖ Cannibalism
- ❖ Lowered resistance to infection
- ❖ Improper sexual maturity
- ❖ Enhanced moulting

Heat stress and water requirement

Striking feature: There is no sweat gland in chickens. Good housing temperature is 10-25^{0}C. Birds effect at 29.4^{0}C. As a result gasping occurs to reduce body heat particularly when ambient temperature reaches close to that of chicken (41^{0}C). Birds can regulate well if the ambient temperature is at 28-35^{0}C

Other symptoms:

- Wings stretched
- Lameness (even) and tiredness
- Appears lazy and remain seated in a place
- Starts pricking each other
- Loss in body weight
- Lowered egg production

- Lay thin shelled eggs or smaller eggs
- Loss of fertility in breeder eggs
- Increased risk of respiratory infections due to dust and microbes entering through gasping.

Season Vs Management Requirements

Summer Season: March-July

- Provision of shade: Plantation of trees
- Cross ventilation ensured
- Exhaust fan/ceiling fans
- Fogger for cooling if at all needed
- Cool water: Addition of dextrose electrolyte (extreme summer)
- Adequate drinkers: Fresh clean water at regular/increased intervals
- Low calorie and high CP diet
- Wet mash can be provided with care for avoiding bacterial/fungal growth
- Strict sanitary measures to avoid collibacillosis associated with heat stress.
- Strict attention to avoid vaccine break:
    - Cold chain system and storage
    - Vaccination during cool hours of the day
- Increased (20-40%) vitamin and mineral supplementation particularly Vitamin-C
- Anti stress drug in feed

Rainy season: July/August-October

- Complete all repair work, roof leakage, floor damage and plastic screen to protect from stormy wind/ shower
- Provide dry litter with required replacement of wet litter. Do not use sugarcane bugassee to avoid aspergillosis
- Store fed in dry place to care against fungal growth (ground nut cake in particular)
- Water reservoirs are disinfected with bleaching powder/pot chloride
- Do not allow any breeding place of insects/mosquitoes etc
- Keep fill all the ditches in the of poultry house premises

Winter season: November-January/February

- Ensure adequate warmth. Heavy jute curtain.
- Balanced feed to provide additional calories requirement
- Increased lighting period

- Avoid accumulation of ammonia/CO_2 gases due to continuous obstruction in ventilation
- Care against cold stress
- Attention for dry litter

Water intake at different ambient temperature:

21^0C	:	Water intake increases
32^0C	:	Twice (increased) than that at 21^0C
38^0C	:	Thrice more than normal water intake

Water temperature and intake:

Ideal temperature: 10-12^0C
30^0C water temperature: significant reduction in water intake
44^0C water temperature: Chickens do not drink such water

Remedial measures for heat stress

- Feed: Increased ratio of amino acid (methionine and lysine) and decrease amount of energy, increase vitamin and other mineral in consistence with feed intake
- Ventilation: Provisions are to be increased by electric fan
- Litter: Remove wet and caked litters or litters appearing decomposed.
- Stocking density (birds): Keep optimum
- Water: Drinker constantly to be filled with cool water, change the polluted water, saline water can be used enriched with Vitamin-C. Addition of dextrose electrolyte
- Metallic appliances: Be not kept inside houses
- Others:
    - Screens be fitted to obstruct sun rays within the house
    - Roof be kept cooled with straw or gunny bags soaked with water
    - Houses built facing north-south and lengthened east-west

General hygiene/management requirements

1. Routine sanitary measures
2. Disposal of wastes, litters with terminal disinfection
3. Incineration(burning)/deep pits for disposal of carcass, hatchery wastes (integrated farm)

4. Good quality feed/balanced
5. Timely vaccination/ strict schedule and care for any left out
6. Isolation of diseased birds, diagnosis of infection
7. Check immunity level as far as practicable
8. All-in-all-out rearing of birds
9. Avoid multiple age/multiple species in a flock or pen or even in a shed
10. Application of bio-security measures