Indian Farmer
Volume 12, Issue 03, 2025, Pp. 105-109
Available online at: www.indianfarmer.net
ISSN: 2394-1227 (Online)

Original article

OPEN ACCESS

Summer Stress Management in poultry

Anand Prakash[1], Yashwant Singh[1], Amit Sharma[2] and Subhash Chandra[2]

[1]Department of Livestock Farm Complex, COVS (GADVASU), Rampura Phul, Bathinda (panjab)
[2]Department of Livestock Production Management, COVS (GADVASU), Rampura Phul, Bathinda (Punjab), India

**Corresponding Author: anandprakash0412@gmail.com*

Received: 26/02/2025 *Published:01/03/2025*

- Chickens are very sensitive to environmental temperature. Their growth, egg production, and health are severely affected during extremes of weather. Therefore, within the economically feasible limits, ideal temperature has to be provided to the birds, to obtain optimal growth rate and returns from the birds.
- The normal body temperature of poultry is 40 to 41^{0}C (107 ^{0}C). (Much higher than other livestock species) so poultry is more sensitive to extreme climate. The thermoneutral zone for poultry is 18-21^{0}C. The upper and lower critical temperature is 28^{0}C and 12^{0}C (Van Kampen et al., 1979; Scanes, 2015).
- Above 28^{0}C exposure to heat stress and below 12^{0}C exposure to cold stress and the temperature above 38^{0}C and below 10^{0}C cause drastic detrimental effects on poultry.
- During other seasons especially during summer, the ambient temperature goes several degrees higher than the ideal zone causing severe depression in the growth rate and egg production thereby leading to great economic loss to the poultry farmer.
- By proper summer management, these losses can be overcome to a great extent.

The biochemical process of heat stress

Increase in Environmental Temperature

↓

Decreased Temperature Gradient between Body and Environment

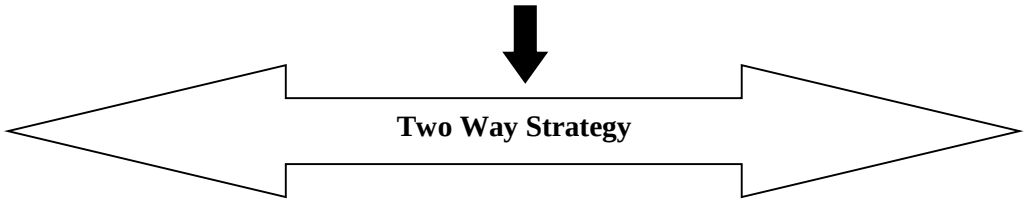
↓

Decreased Rate of Sensible Heat Loss
(Conduction, Convection and Radiation)

↓

Decreased rate of metabolic heat loss of body

(Increment in body heat)



Decrease metabolic heat production

- Decreased feed intake and thereby decreased nutrient intake (Energy, protein, vitamins and minerals, etc.)
- Negative nutrient balance
- Mobilization of body reserves for maintenance
- Increased water intake

Activation of Insensible Heat Loss Mechanism (Evaporative cooling)

- Panting (Open mouth breathing) to get rid of body heat through evaporation of body water.
- Increased gaseous exchange rate (expiration of CO_2 and O_2) and thus decrease in blood CO_2
- Maintenance of blood CO_2 concentration
- $H^+ + HCO_3 \leftrightarrow H_2CO_3 \leftrightarrow H_2O + CO_2$
- Respiratory alkalosis, Disturbed acid-base balance, Ionic balance (Na, K, Cl)
- Decreased carbonate ion, disturbed eggshell formation, calcium metabolism, etc.

Adverse effects

- The various physiological and pathological changes that take place in the flock, during high summer temperatures.
- Energy intake and thereby feed consumption and other nutrient intake reduce as the environmental temperature increases. Consequently, the growth rate and body weight of birds will become lower. Also, there is reduced egg production in layers.
- There will be an early two-fold increase in the water consumption of birds during summer; because during high environmental temperatures, the major way to lose the excess heat produced in the body is by loss of water vapor through expired air.

- High ambient temperature increases the respiratory rate and body temperature. Since there are no sweat glands in Poultry, they will start panting vigorously, in order to lose the excess body heat produced. As the outside temperature increases the heat production as well as the heat loss from the body decreases.
- For every 1^{o}C increase in ambient temperature, the heat production in the body decreases by about one percent. On the other hand, water loss through respiration increases with the increase in ambient temperature.
- High environmental temperature on the other hand decreases oxygen consumption, blood pressure, pulse rate, thyroid size and activity, blood calcium level and body weight.
- The problems with ectoparasites will be more during summer and the following monsoon.
- The high environmental temperature associated with high relative humidity (>70%) may lead to outbreaks of Coccidiosis.
- Incidences of Fatty Liver Haemorrhagic Syndrome and other metabolic disorders like heat stroke, liver rupture etc. are more during summer; especially in case of heavy broilers.
- Birds will shed more feathers during summer, in order to lose the excess body heat produced.
- At high environmental temperatures, nearing the body temperature of the birds, vaporization of body water through respired air is the only way to lose substantial amount of heat from the body. However, this is possible only when the inspired air has very low moisture levels. But if both temperature and relative humidity are high, birds will not be able to lose the excess body heat and will finally die of heat prostration.
- Fatty birds succumb first, perhaps because their air sacs are rather constricted and thereby not able to evaporate moisture and produce coolness efficiently.
- Caged birds and birds reared on slatted floors will suffer more due to high environmental temperature than birds reared on litter floors; because birds on litter can cool themselves to some extent by dusting themselves in the litter.
- Heavy mortality due to heat stroke will be noticed among heavy broilers, in the late afternoon and evening.
- Temperature affects egg breakage. Elevated environmental temperature is associated with a decrease in shell quality. The reduction of shell thickness produced by heat stress is apparently due to respiratory alkalosis which causes a lowering of partial pressure of carbon dioxide in the lungs and raises blood pH (Farnell et al., 2001).
- As the ambient temperature increases above 26^{o}C, the egg size declines.
- Reduced fertility rate due to a) poor semen quality, b) Reduced mating frequency and c) Higher incidence of female infertility. Production of poor-quality chick.

ALLEVIATING MEASURES

Management of Broiler and Layer During Summer

1. Housing Management for a Comfortable environment

- The direction of the shed should be east to west to prevent direct sunlight.
- Maintain a minimum 50 distance between two sheds.
- The overhanging of the roof should be 5 feet.
- The outer side of the roof should be painted with white paint or lime since white paint reflects sunlight. In large farms, an aluminum roof is preferred due to its durability, resale value, and rear reflecting properties.
- By proper roofing, the temperature inside the poultry houses can be kept at 5° - 10°C below the outside temperature. Thatched roofing of about six inches thickness provides optimum comfort to the birds during summer than any other roofing material. However, due to the risk of fire, less durability, more depreciation, and rodent problems, thatched roofing is not preferred, especially by large farms.
- Open-type, cross-ventilation is recommended in the tropics. Except for a side wall, all four sides up to the roof should be provided with 12mm size and 18-gauge chicken wire mesh or 25mm size chain link mesh. The height of the side wall from the floor level should be 1 to 1.5 feet to facilitate proper air movement at the bird's head level and to prevent direct entry of strong wind.
- Provide "Attic insulation" with suitable material (it will work well in winter also)
- As far as possible the width of poultry houses shall not exceed 10 metres. If the width of the poultry house exceeds 10 meters, cross-ventilation alone may not be effective in providing proper airflow in poultry houses. In such cases, also provides "ridge-ventilation" in the roof or mechanical ventilation.
- For birds kept in cages, the center height of the building should be a minimum of 15 feet.
- Thick and wet litter produce/generate more heat. Therefore, during summer, the litter thickness must not be more than 6 cm. Moreover, remove caked-up and wet litter immediately from the poultry house, to stop excess heat production.
- **Mechanical cooling system:** If mechanical ventilation is provided, increase the air flow rate and air exchanges by at least 25%, during summer. Provide tunnel ventilation along with pad coolers for big houses. Use ceiling fans and foggers in the shed. Sprinkle water on the ground surrounding the house to make a cool atmosphere outside.
- Rear relatively more heat-tolerant strains of broilers suitable for tropical climate
- Plant as many green trees around and in between poultry sheds.

2. Nutritional Management

- Increases the energy density of feed by adding fat (for energy). Fat has a low heat increment compared to carbohydrates and is easily digested. Also, fat increases the digestibility of another nutrient by additive action. Nearly 10 to 15% of the calories (energy) in the feed, of carbohydrate and protein origin, may be replaced by fat /oil energy, by adding 2 to 3% oil or fat. But this should not increase the total calories in the feed and only replace the energy of carbohydrate origin.
- Addition of probiotics like lactobacillus or streptococcus which hinder the growth of pathogenic bacteria in the intestine and are beneficial in heat stress.
- The addition of vitamin C (200-500 ppm), vitamin E (50 ppm), and riboflavin (6-8 ppm) in feed helps in boosting the immune system and alleviate heat stress.
- Sodium bicarbonate is added @ 100 g/quintal of feed to maintain homeostasis along with the proper amount of minerals i.e., Sodium, Chlorine, and Potassium in feed.

3. Feeding Management:

- Feed birds during cooler part of the day i.e. early morning and evening.
- Feed the bird in pellet form so that more feed is eaten.
- Feed mash by spraying water on feed 3 to 4 times a day.

4. Watering management

- Supply fresh, cool and clean water in ample quantity all the time, to avoid dehydration
- Increase the number of waterers up to double as water consumption is doubled.
- Increase the frequency of offering water 3 to 4 times/day in the deep litter system.

REFERENCES

Muhammad Saeed, Ghulam Abbas, Mahmoud Alagawany, Asghar Ali Kamboh, Mohamed E. Abd El-Hack, Asmaa F. Khafaga, Sun Chao. 2019. Heat stress management in poultry farms: A comprehensive overview, Journal of Thermal Biology, 84: 414-425. ISSN 0306-4565, https://doi.org/10.1016/j.jtherbio.2019.07.025.

Van Kampen, M., Mitchell, B.W., Siegel, H.S., 1979. Thermoneutral zone of chickens as determined by measuring heat production, respiration rate, and electromyographic and electroencephalographic activity in light and dark environments and changing ambient temperatures. J. Agric. Sci. 92 (1), 19–226.

Scanes, C.G., 2015. Sturkie's Avian Physiology (Chapter 37) – Regulation of Body Temperature: Strategies and Mechanisms. sixth ed. Academic Press USA, pp. 869–905.

Farnell, M.B., Moore, R.W., McElroy, A.P., Hargis, B.M., Caldwell, D.J., 2001. Effect of prolonged heat stress in single-comb white leghorn hens on progeny resistance to Salmonella enteritidis organ invasion. Avian Dis. 45, 479–485.