

Heat Stress Management in Poultry

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[DOI:10.5281/Vettoday.15470168](https://doi.org/10.5281/Vettoday.15470168)

Heat stress is a major concern in poultry production, particularly in regions with hot climates or during summer months. As poultry, especially chickens, lack sweat glands, they are highly susceptible to heat stress. It can lead to significant economic losses due to decreased productivity, poor feed efficiency, reduced egg production, compromised immune function, and increased mortality. Therefore, effective heat stress management is essential for maintaining the health and productivity of poultry.

Heat stress occurs when birds are unable to balance body heat production with heat loss. The thermoneutral zone for poultry (temperature range where birds maintain normal body temperature without expending extra energy) typically lies between 18°C and 24°C. When ambient temperatures exceed this range, especially above 30°C, birds begin to show signs of heat stress, including:

- Panting
- Lethargy
- Reduced feed intake
- Open-mouth breathing
- Wing spreading
- Pale comb and wattles
- Increased water intake

Factors Influencing Heat Stress

Several factors can exacerbate the impact of heat stress in poultry:

1. **High Temperature and Humidity:** Humid conditions reduce the efficiency of evaporative cooling through panting.

2. **Poor Ventilation:** Inadequate airflow hinders the removal of excess heat and moisture.
3. **High Stocking Density:** Increases the thermal load due to close body proximity.
4. **Age and Breed:** Older birds and fast-growing broiler breeds are more prone to heat stress.
5. **Feeding Time and Composition:** Heat generated during digestion (heat increment) contributes to internal heat load.

Management Strategies for Heat Stress

Effective heat stress management involves a combination of environmental control, nutritional interventions, and management practices. These strategies aim to reduce the heat load on birds and enhance their ability to cope with high temperatures.

1. Environmental Management

a. Housing Design and Orientation

- Orient poultry houses east-west to reduce solar heat gain.
- Use reflective roofing materials or apply whitewash to reduce heat absorption.
- Ensure adequate insulation to prevent heat transfer from the roof and walls.

b. Ventilation

- Use natural or mechanical ventilation to maintain air movement.
- Install fans and air inlets to enhance cross-ventilation.

- Tunnel ventilation systems are highly effective in large-scale poultry houses.

c. Cooling Systems

- **Evaporative Cooling:** Use foggers, misters, or evaporative pads to reduce air temperature.
- **Sprinkler Systems:** Spraying cool water on the floor helps reduce ambient temperature.
- Ensure that water droplets are fine enough to evaporate quickly without wetting birds.

d. Shading and Landscaping

- Plant trees or install shade nets around poultry houses.
- Trees also act as windbreaks and help reduce dust levels.

2. Nutritional Management

a. Adjust Feed Formulation

- Reduce energy-dense feed during peak heat to lower metabolic heat production.
- Increase fat in the diet, which has a lower heat increment than carbohydrates.
- Provide high-quality protein to offset reduced feed intake and maintain productivity.

b. Electrolyte Supplementation

- Heat stress causes electrolyte imbalance due to excessive panting.
- Supplement drinking water with electrolytes like sodium, potassium, and chloride to maintain acid-base balance.
- Common additives: potassium chloride, sodium bicarbonate, and ammonium chloride.

c. Vitamins and Minerals

- Supplement antioxidants like Vitamin C and Vitamin E to counter oxidative stress.
- Zinc, selenium, and chromium also play roles in stress reduction and immune support.

d. Feeding Time

- Offer feed during cooler parts of the day, such as early morning or late evening.
- Consider split feeding to avoid peak heat times.

3. Water Management

- Ensure constant access to cool, clean water.
- Increase the number of drinkers to reduce competition.
- Use automatic nipple drinkers to reduce water spillage and humidity.
- Monitor water temperature; chilled water can help reduce body temperature.

4. Stocking Density and Bird Handling

- Lower stocking density during hot seasons to reduce heat accumulation.
- Avoid handling or transporting birds during the hottest parts of the day.
- Schedule vaccinations, beak trimming, and other operations during cooler periods.

5. Lighting and Activity Control

- Reduce light intensity to minimize bird activity and heat production.
- Implement intermittent lighting programs to reduce stress and improve feed conversion.

6. Use of Additives and Supplements

- **Probiotics and Prebiotics:** Help maintain gut health under stress.
- **Organic Acids:** Aid in digestion and help maintain gut integrity.
- **Betaine:** Acts as an osmolyte and helps birds cope with dehydration.

Monitoring and Early Intervention

Regular monitoring of temperature, humidity, and bird behaviour is crucial. Use thermometers and hygrometers to track environmental conditions inside the poultry house. Take immediate corrective actions if birds show early signs of heat stress.

Innovations and Technology

Advances in technology are providing new ways to combat heat stress:

- **Automated Climate Control:** Systems that adjust ventilation, cooling, and lighting based on real-time data.
- **Infrared Thermography:** Non-invasive method to detect heat stress before clinical signs appear.
- **Smart Sensors:** Monitor temperature, humidity, and CO₂ levels continuously.

Economic Implications

Heat stress leads to:

- **Reduced Feed Conversion Ratio (FCR)**
- **Lower egg production and shell quality**
- **Increased mortality and culling rates**

Conclusion

Heat stress in poultry is a multifaceted challenge that requires a comprehensive management approach. By optimizing housing, adjusting nutrition, ensuring adequate water supply, and leveraging technology, farmers can significantly reduce the adverse effects of heat stress. With climate change increasing the frequency and intensity of heatwaves, proactive and sustainable heat stress management is no longer optional-it's essential for the success of modern poultry production.