Caribbean Poultry Association

THE UNIVERSITY OF THE WEST INDIES

KEEPING COOL: A PRACTICAL GUIDE TO MANAGING HEAT STRESS IN SMALL POULTRY FLOCKS IN THE CARIBBEAN

FOREWORD

The poultry industry is the single largest agro-industrial entity that provides over 80% of the animal protein consumed in the CARICOM Community. The industry involves over 30,000 individuals working in various sectors including breeding operations, hatcheries, broiler and layer farms, grain production, feed manufacturing, pluck shops, processing plants, distribution, retail, veterinary services, and equipment suppliers. It plays a substantial role in food and nutrition security, poverty reduction, and socio-economic development.

Production has consistently grown from approximately 175,000 tonnes in 2001 to 300,000 tonnes in 2024, now constituting over 75% of all poultry meat consumed, and the Region is largely self-sufficient in table eggs.

Rising temperatures and increasing climate variability pose significant challenges, particularly for small-scale producers who are the backbone of the poultry industry in many Caribbean territories. Effective management of heat stress is critical to ensuring animal welfare, productivity, and the sustainability of flocks.

This guide, **"Keeping Cool: A Practical Guide to Managing Heat Stress in Small Poultry Flocks in the Caribbean,"** marks the first in a series of practical, evidence-based resources developed through a collaborative effort between the Caribbean Poultry Association (CPA) and the University of the West Indies, School of Veterinary Medicine (UWI-SVM). By combining the CPA's industry insights with UWI's veterinary and scientific expertise, this document serves as an essential tool for small-scale producers who face the daunting task of safeguarding their poultry against one of the most adverse effects of climate change in the tropics.

The guide includes practical advice on recognizing signs of heat stress, implementing cooling strategies, and making environmental modifications to assist in heat management. Various techniques, such as the use of fans, misting systems, and proper ventilation are discussed to help farmers maintain optimal conditions for their flocks. Moreover, the manual offers insights into dietary supplements that can enhance the birds' abilities to cope with elevated temperatures, including the provision of cool, clean water and balanced nutrition.

The CPA and UWI-SVM aim to support the continued growth and expansion of the Caribbean's largest agribusiness and share resources for a sustainable and resilient poultry industry. Together, we are committed to advancing poultry husbandry best practices suited to the region's unique environmental and economic conditions.

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May 13, 2025

ACKNOWLEDGEMENTS

The production of this **"Practical Guide to Managing Heat Stress in Small Poultry Flocks in the Caribbean"** was made possible through the invaluable expertise and contributions of dedicated professionals.

We gratefully acknowledge:

Dr. Shayne Ramsubeik, the primary author of the guide.

Dr. Victor Gongora, for his insights on poultry health management and heat stress mitigation strategies.

Dr. Nicholas Waldron, for his guidance on environmental adaptations and nutritional interventions.

Dr. Keith Amiel and **Ms. Nisa Surujbally** for final review and overall comments

We also extend our sincere appreciation to poultry farmers, extension officers, and researchers whose invaluable experience and knowledge have shaped this guide. Their practical insights have ensured that the information presented is science-based, applicable, and highly beneficial to small-scale producers.

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LET'S UNDERSTAND THESE KEY TERMS

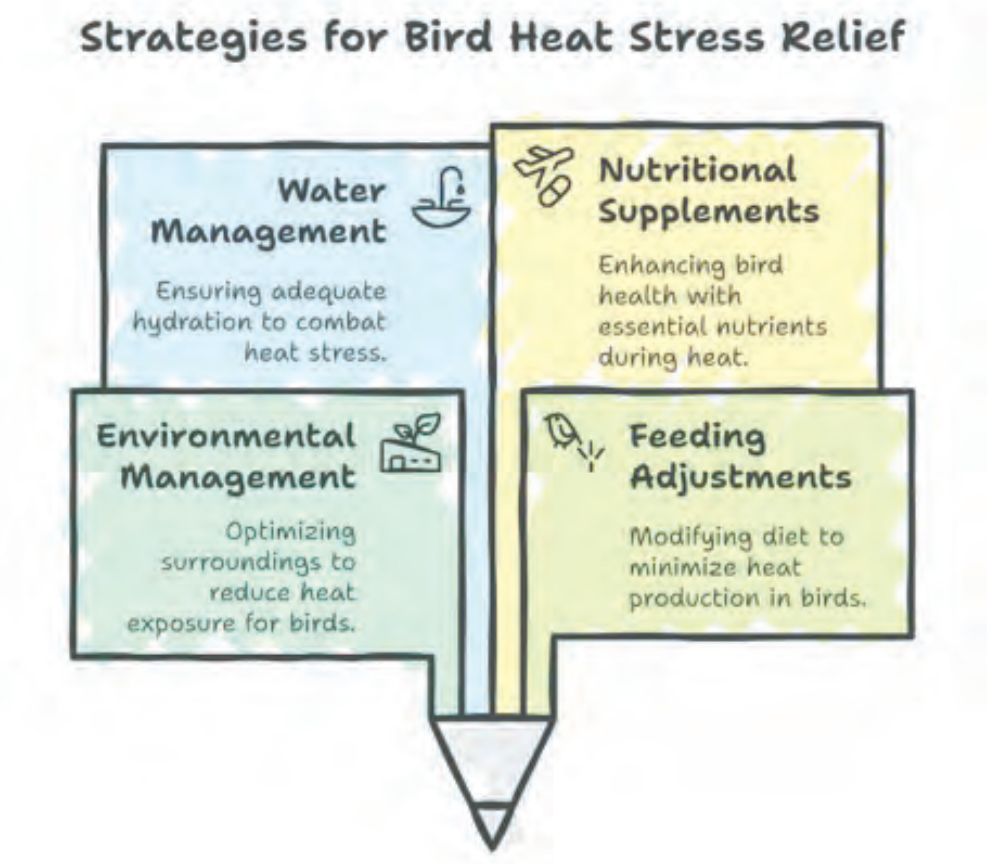
Term	Meaning
Heat Stress	Signs of reduced productivity and health problems caused by high temperatures and humidity.
Panting	Rapid, open-mouth breathing to release body heat.
Lethargy	Low energy or movement due to overheating.
Roll-down Curtain	Adjustable fabric used to control airflow in poultry houses.
Stocking Density	Number of birds per unit area (e.g., 1 square foot per bird).
Electrolytes	Minerals (e.g., sodium and potassium) added to water to maintain balance of body fluids.
Antioxidants	Substances such as Vitamins (E, C) that protect cells from heat damage.
Betaine	A feed additive that helps birds retain water during heat stress.
Phytogenics	Natural plant extracts (e.g., herbs, oils) to boost health in heat.
Thatched Roof	A roof made of natural materials (e.g., palm leaves) that helps to keep houses cool.
Acidifiers	Additives (e.g., vinegar) to encourage drinking and control bacterial spread.
LED Lights	Energy-efficient bulbs that produce little heat.
Dust Bath	A shaded spot with dry soil where birds cool off.
Hydrating Treats	Water-rich snacks (e.g., watermelon) to help birds stay cool.
HPAI	Highly Pathogenic Avian Influenza; a dangerous bird disease.
Brooding	The period of caring for young chicks, providing warmth, shelter and nutrition.

1. INTRODUCTION

A small poultry flock typically refers to a group of chickens or other domestic birds, that is manageable for a household or small farm, usually consisting of **fewer than 100 birds**. This size allows for more personalized care and management compared to larger commercial operations.

Heat stress is a major challenge in poultry farming, especially in hot, tropical climates. High temperature and humidity can lead to reduced feed intake, poor growth, decreased egg production, increased disease/poor flock health and even mortality.

This guide provides simple strategies for managing heat stress in small flocks. It covers the factors that contribute to heat stress including **environmental management, water and feeding management, and the use of nutritional supplements**.



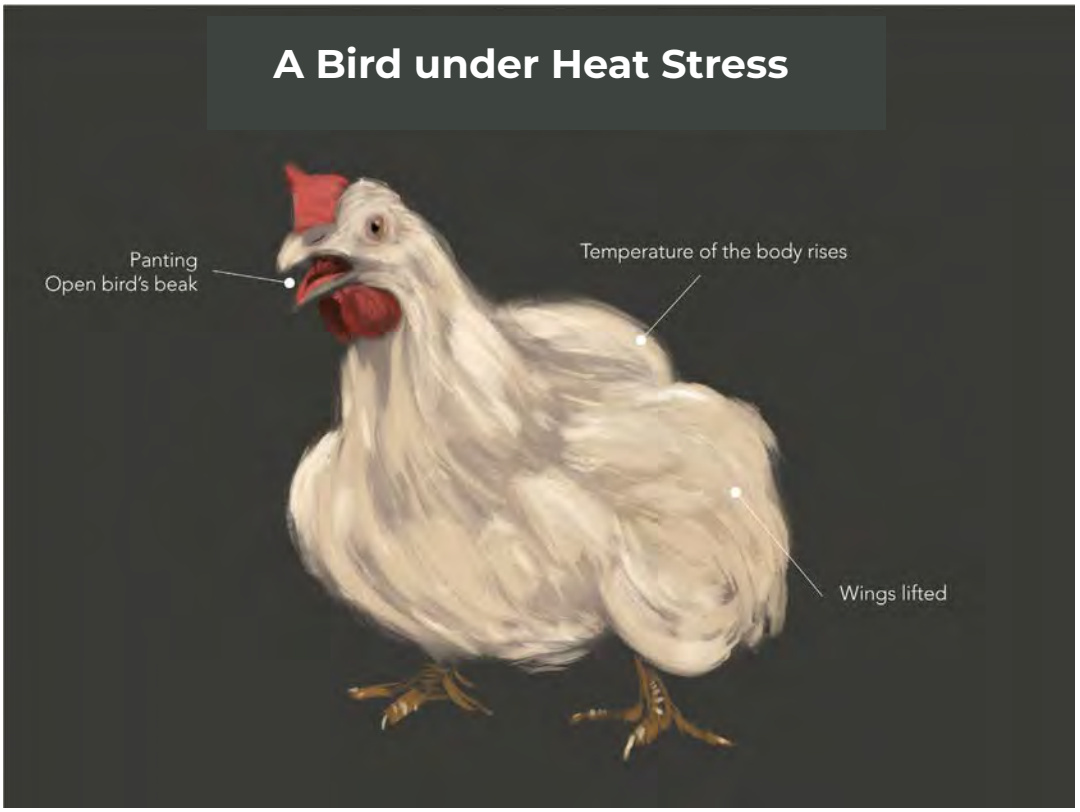
Key point: Successfully reducing the impact of heat stress in birds involves using a combination of strategies. These include modifying the environment to keep it cooler, providing adequate water and adjusting the diet to manage the birds' body functions while considering the available resources.

2. KNOW THE SIGNS OF HEAT STRESS

Observe your birds and look out for these signs in your birds:

- Panting heavily – Fast, open-mouth breathing
- Wings spread out – Trying to release heat and increase air flow over body
- Lethargy – Less movement, sitting more (reduces heat production/increases heat loss by direct contact with cooler floor)
- Eating less, drinking more – Loss of appetite
- Watery droppings – Heat stress affects digestion and increases water intake
- Crowding around cooler areas of pen – shaded areas, direct draughts, damp spots
- Sudden death – In extreme cases

Act fast if you see one or more of these signs!



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3. WEATHER MONITORING & EARLY ACTION PLAN

Check daily weather forecasts especially in the hot dry season – Alerts will allow you time to prepare for periods of heat waves.

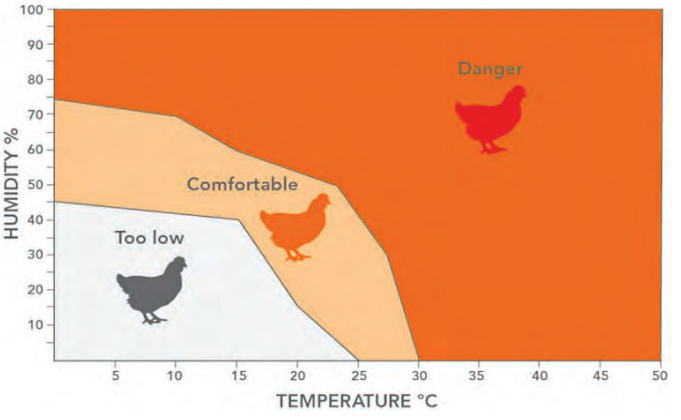
Your traditional knowledge of local weather patterns is an important guide to planning ahead.

Simple Monitoring Tools:

a. Free Weather Apps
   - AccuWeather (heat index forecasts)
     Heat Wave Alert | AccuWeather
   - Caribbean Weather
     Caribbean Weather – Weather.org
   - Local meteorological service alerts
     e.g., *Meteorological Service of Jamaica*

b. Barn Thermometer Placement:
   - At bird height
   - In shaded areas (direct sun gives false readings)
   - Digital models with humidity readings are best. (These are available at less than US$20 per unit)

c. Understand the danger zone



Source: Kepro

Heat stress mitigation strategies must be implemented before temperature and humidity reach the danger zone, as shown above.

Key point: Stay ahead of the heat! Monitor weather conditions and take proactive steps to keep your birds cool and healthy.

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4. KEEP THE HOUSING COOL

A cooling strategy for small flock farmers should be tailored to your available resources, ensuring effective heat stress management while remaining cost-effective and sustainable.

Natural Ventilation: Ensure poultry houses are oriented east-west to minimize direct sunlight exposure. Use open-sided designs with ***roll-down curtains*** for airflow adjustment.

Roll Down Curtains: Roll down curtains installed on the sides of housing can be raised or lowered to control airflow and ventilation within the building. They allow hot air to escape over the top of the curtain, away from the flock.

Provide shade: Plant trees around the house to keep the area cool or place shade cloth over the house. **Ensure that branches are trimmed to a height below the roof level of the house to facilitate airflow**.

For optimal heat reduction in tropical poultry housing, shade cloths should be suspended above the roof surface creating an air gap that allows hot air to escape while blocking solar radiation. The cloth should be draped at least 1 meter (approximately 3 feet) beyond building walls to block low-angle sunlight and be slightly loose to permit airflow while maintaining shade coverage throughout peak daylight hours

Warning: Planting trees for shade around a poultry house can help reduce heat stress, but it may attract wild birds that carry highly pathogenic avian influenza (HPAI). Ensure strict biosecurity measures to protect your flock.

Some Equipment and Construction Options:

- **Fans:** Improve air circulation to reduce heat buildup.
- **Sprinklers on the roof:** Lightly wet the roof to cool it.
- **Misters + fans:** A **fine water mist** with moving air; cools like a breeze but does not make birds wet.
- **White or reflective roofs:** Paint roofs white to reflect heat.
- **Insulate roof:** Insulation reduces **radiant heat transfer**. e.g. reflective foil, polystyrene foam or even a tarpaulin ceiling.
- **A thatched roof** made from natural materials such as straw, reeds, or palm leaves provides excellent insulation and ventilation, helping to keep poultry houses cooler and reducing heat stress for the birds. (CAUTION! vermin, wild birds, fire hazard)

Key point: Natural airflow can help keep the ambient temperatures lower in the house. Make sure there is plenty of air flow and ventilation.

5. OVERCROWDING & BIRD HANDLING

Prevent Overcrowding

- **Problem:** Too many birds housed together generate excess body heat.
- **Solution:**
  - Reduce stocking density by 10–20% in hot weather.
  - The recommended floor space in hot weather is 1.5 to 2.5 square feet per bird.

Avoid Disturbing Birds During Peak Heat

- **Problem:** Handling and managing birds (feeding, catching, vaccination, weighing, transporting) increases stress.
- **Solution:**
  - Schedule activities for early morning or late evening.
  - Minimize human movement in the house during hot hours (12 noon to 3 pm).
  - If you MUST enter the house during the hottest part of the day, move quietly and calmly to cause minimum disturbance in the pen and get out as quickly as possible.

Overcrowded Chicken House

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6. WATER IS LIFE IN HOT WEATHER

Ensure Ample Water Supply

- Birds drink **2–4 times more** in heat stress.
  Provide:
  - **Extra waterers** to prevent crowding.
  - **Provide cool water** (below 24˚C) to help lower body temperature.
    Store water tanks in full shade.
    Paint water tanks WHITE to reflect heat.

Keep Water Clean & Fresh

- **Clean drinkers daily** to prevent bacterial growth.
- Keep drinkers at eye level to encourage drinking.
- Flush water lines or change water in waterers several times per day to keep it cool.

Increase Water Intake

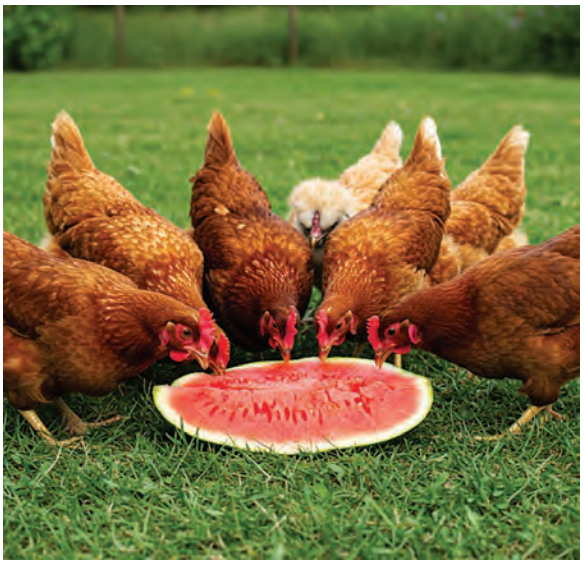
- Add ICE to the water.
- Use **acidifiers** (like apple cider vinegar) to encourage drinking.

Keeping water cool in elevated white tank with roofing and shade cloth

Offer Some Cooling Treats

Treat your chickens to healthy, refreshing snacks along with their cool water.

- Feed chill or frozen fruits such as watermelon, cucumbers, salad greens, tomatoes, and other vegetable scraps which serve as delightful and cooling treats.
- Herbs such as peppermint, thyme and oregano have been shown to have cooling and antioxidant properties that can benefit your birds during hot weather



Key point: Provide plenty of water to your birds, especially in shaded areas. Birds will drink as much as they need. Adding ice to their water can help keep them cool.

Warning: When offering treats, monitor the area for wild birds, rodents or other wildlife which may pose potential health risks and facilitate disease transmission.

Pay close attention to the condition of the floor of the pen during hot weather (spillage and wetter faeces) in and around dhaded areas around the drinkers. Wet floors cause injuries to feet/hocks and can cause health problems (build-up of bacteria and ammonia).

7. SMART FEEDING

Encourage Eating During Cooler Times

- **Feed Early or Late:** Offer feed in the early morning or late evening when temperatures are lower – Provide light in the pen so that birds can be active and feed during the cooler nighttime hours.
- **Use Pellets where available:** Pelleted feed is easier to eat and digest than mash.
- **High-Energy Diet:** Increase fat in feed – produces less heat during digestion than starches/proteins.

Fasting Before Extreme Heat

- **Stop Feeding 6-8 Hours Before Peak Heat (usually 12pm to 3pm):** This reduces body heat that is produced during digestion.
- **Birds Will Catch Up:** They will eat more when it cools down; so any weight loss is temporary and will be compensated.

8. NUTRITIONAL SUPPLEMENTS FOR HEAT STRESS

Some of the common ingredients in modern heat stress supplements include:

- **Electrolytes** (e.g., sodium, potassium, chloride) – Replenish lost minerals and maintain body fluid balance.
- **Antioxidants** (e.g., vitamin E, vitamin C, selenium) – Reduce oxidative stress caused by high temperatures.
- **Betaine** – Supports osmoregulation and improves water retention.
- **Prebiotics and Probiotics** – Enhance gut health and nutrient absorption under stress.
- **Phytogenics** (e.g., essential oils, herbs like ginger or turmeric) – Improve feed intake and have anti-inflammatory effects.
- **B Vitamins** (especially B1, B2, B6, B12) – Aid metabolism and energy production during heat stress.
- **Organic Acids** (e.g., citric acid) – Support digestion and reduce pathogenic bacteria.
- **Zinc & Chromium** – Help strengthen the immune system and improve heat tolerance.

A Simple homemade electrolyte formula:
To 1 gallon of water, add
- 1 tablespoon of sugar (or honey),
- 1 tablespoon of baking soda (sodium bicarbonate), and
- 1 teaspoon of salt (sodium chloride).

NB: Always seek advice from technicians and follow manufacturers' instructions carefully when using commercial supplements and additives. As a rule of thumb, provide a fresh mixture every 12-24hrs

Key point: A commercial heat stress supplement for birds should contain antioxidant vitamins (such as Vitamin E and Vitamin C) to protect cells from damage, electrolytes to maintain hydration and balance, and essential amino acids to support metabolic functions and improve overall resilience during high temperatures

9. BROODING IN HOT WEATHER

- Brooding chicks require careful attention to temperature control and hydration in hot weather. Ensure the brooding area is well-ventilated and shaded to prevent overheating.
- Regularly monitor the temperature, aiming to keep it around 32˚C for the first week, then gradually decrease it.
- Provide fresh, cool water at all times and check waterers frequently.
- Avoid overcrowding to reduce stress and heat buildup.

These steps will help maintain a comfortable environment for your chicks during hot weather.

10. LIGHTING ADJUSTMENTS

a. Adjust Lighting Schedules to Reduce Activity During Peak Heat

- Intermittent Lighting: Use short cycles (e.g., 1 hour on, 2 hours off) during the hottest part of the day to reduce bird activity and metabolic heat production.
- Nighttime Feeding: Shift lighting to encourage feeding during cooler nighttime hours (e.g., dim lighting at night) while keeping birds in darkness during peak daytime heat.

b. Use Low-Heat Lighting Fixtures

- LED Lights: Produce minimal heat compared to incandescent or halogen bulbs, helping to lower the house temperature.
- Place Lights Higher Up: Mount lights at distances from birds that minimises the exposure to the emitted heat.

c. Dimming or Reduced Light Intensity

- Lower light intensity during extreme heat to calm birds and reduce movement, which minimizes internal heat generation.

11. TRANSPORTING BIRDS IN HOT WEATHER

- Cover vehicle with open side that allow ventilation.
- Do not overcrowd vehicle/crates.
- Transport birds during the coolest parts of the day (early morning, late afternoon/night).
- Take the most direct route to destination and avoid all unnecessary stops.
- If vehicle must stop for a prolonged period, make sure to park in a shaded spot out of direct sunlight.
- If transporting chicks over long distances, place pieces of succulent fruit in the boxes (e.g., orange or watermelon) to keep them hydrated and cool during the trip.

12. FIVE QUICK HEAT STRESS CONTROL TIPS FOR PASTURE REARED BIRDS

i. Maximize Shade – Ensure plenty of natural (trees) or artificial (tarps, shade sails) shade in grazing areas.

ii. Cool, Fresh Water – Provide multiple shaded water stations, add ice.

iii. Adjust Grazing Times – Let birds forage in early morning and evening; restrict midday roaming in extreme heat.

iv. Dust Baths & Ventilation – Keep dust baths in shaded spots and ensure shelters have good airflow.

v. Heat-Smart Feeding – Feed during cooler hours and offer hydrating treats (e.g., watermelon, cucumbers).

13. EMERGENCY COOLING (IF CHICKENS ARE COLLAPSING)

Quick steps to save them:

- Move to shade right away
- Dip feet in cool water (not ice cold!)
- Give electrolyte water with a dropper if needed
- Fan them if possible

Never spray birds directly with water—it can make heat stress worse!

Choose breeds/strains of poultry suitable to climatic conditions and free-range management systems wherever possible.

“Observe your birds’ behavior and respond appropriately. Trust your gut!”

14. QUESTIONS AND ANSWERS

Q1: What temperature is dangerous for chickens?

Answer: Poultry experience heat stress at ambient temperatures exceeding 32˚C (90˚F), with severe stress occurring when the heat index (temperature + humidity) surpasses 37˚C (98˚F). Chickens lack sweat glands and rely solely on panting for cooling, which becomes ineffective in high humidity.

Q2: Why does egg production decline in heat?

Answer: Heat stress directly reduces feed intake by up to 20%, limiting energy for egg synthesis and reduces calcium absorption, leading to 28% thinner eggshells.
Solution: Provide oyster shell supplements and feed during cooler hours.

Q3: Why do birds dig holes in heat?

Answer: Dust bathing exposes cooler subsurface soil (10–15˚C below surface temperature), allowing conductive heat loss. This behavior reduces core body temperature by 1–2˚C.

Q4: Are chicks vulnerable to heat?

Answer: Chicks under 4 weeks old cannot pant efficiently, raising their heat stress risk. Provide ventilation and cool water every 2 hours during heat waves.

Q5: Are ducks susceptible to heat stress?

Answer: Yes, ducks can suffer from heat stress, but they handle heat better than chickens due to their waterproof feathers, however, extreme heat and humidity can still harm them.

Q6: Are Ducklings More Susceptible to Heat Stress Than Adult Ducks?

Answer: Yes,ducklings are far more vulnerable to heat stress than adult ducks because they can’t regulate their body temperature as well.

Q7: Can heat cause watery droppings?

Answer: Heat stress damages intestinal villi, impairing water absorption and causing diarrhea. Electrolytes (sodium/potassium) restore fluid balance and reduce mortality.

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