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Heat stress changes electrolyte requirements in broilers

Ioannis Mavromichalis, MSc, PhD

This issue examines why dietary electrolyte balance becomes increasingly important during periods of heat stress and argues that proper adjustment of dietary electrolyte management can support better performance, survivability, litter quality, overall health, and flock stability.

Heat stress is not simply a temperature problem. It is a systems problem that disrupts physiology, behavior, water balance, acid-base status, and ultimately flock performance. As temperatures rise each summer, producers focus heavily on ventilation, cooling, and water availability. All are essential and all must work together. Yet one nutritional factor consistently remains under-appreciated: dietary electrolyte balance.

Electrolyte balance does not eliminate heat stress, but it helps birds maintain homeostasis when normal physiology is challenged. During periods of elevated temperature, it becomes one of the most powerful nutritional tools available to support flock stability, survivability, and performance.

Why electrolyte balance matters

Under heat stress, birds increase their respiratory rate to dissipate heat. Excessive panting reduces blood carbon dioxide and shifts acid-base balance toward respiratory alkalosis. At the same time, feed intake declines, water consumption increases, mineral metabolism changes, litter moisture rises, and growth performance suffers. Electrolyte balance helps stabilize acid-base status and supports physiological resilience during these periods of environmental challenge.

How electrolyte balance is measured

Dietary electrolyte balance (DEB) is expressed in milliequivalents per kilogram (mEq/kg). The standard Mongin equation remains the most widely used:

$$\text{DEB (mEq/kg)} = \frac{\text{Na (mg/kg)}}{22.99} + \frac{\text{K (mg/kg)}}{39.10} - \frac{\text{Cl (mg/kg)}}{35.45}$$

More complex acid-base equations exist that include calcium, magnesium, phosphorus, and sulfur, but these are rarely used in commercial broiler formulation. Most formulation software programs use the Mongin equation.

Requirements change during heat stress

Under normal conditions, broiler diets are typically formulated around 200–250 mEq/kg.

During heat stress, many nutritionists increase DEB to 250–300 mEq/kg to compensate for increased respiratory losses and reduced feed intake. The optimal value depends on age, temperature, humidity, water mineral content, and management.

The exact level should be decided by the nutritionist who understands the system factors that affect final electrolyte balance.

Ingredients influence electrolyte balance

Soybean meal and vegetable proteins are rich in potassium and tend to increase DEB. Salt and chloride-rich ingredients like fish meal move the balance in the opposite direction.

Water minerals—especially sodium, sulfate, and hardness—may significantly alter total electrolyte supply and should not be ignored.

Minerals offer practical adjustments

Electrolyte balance can be modified efficiently using feed grade salts such as sodium bicarbonate, potassium bicarbonate, potassium carbonate, sodium chloride, or ammonium chloride. These allow fine-tuning without reformulating the entire diet. However, electrolyte supplementation must remain part of an integrated heat-stress strategy, not the sole intervention.

Birds provide important warning signs

Inaccurate electrolyte balance during heat stress often presents as reduced feed intake, excessive panting, wet litter, poor growth, reduced uniformity, and increased mortality.

Changes in water consumption and behavior frequently accompany performance losses.

Electrolyte balance should be adjusted before an expected heat wave affects the birds, not afterwards when its use is of limited benefit.

In brief, dietary electrolyte balance becomes increasingly important during heat stress because it helps birds maintain acid-base equilibrium when normal physiology is challenged. Proper electrolyte management supports performance, survivability, litter quality, and flock stability. But, electrolyte balance is only one component of heat-stress management. Successful summer production requires addressing the entire system, not a single nutritional measure. Most broiler nutritionists adjust DEB to 250–300 mEq/kg during periods of heat stress.

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