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Six additives that help broilers withstand heat stress

Ioannis Mavromichalis, MSc, PhD

This issue examines six feed additives that can help broilers withstand heat stress, where each one fits, and why no additive can compensate for inadequate ventilation, cooling, or water supply.

Heat stress does more than reduce feed intake. Panting alters acid-base balance, oxidative pressure rises, intestinal integrity weakens, and nutrients are diverted from growth toward survival. Broilers reduce activity, spend more time near drinkers, and generate additional metabolic heat whenever they eat and digest feed. As the challenge continues, growth slows, feed conversion deteriorates, flock uniformity declines, and mortality risk increases. The damage is therefore physiological, nutritional, and economic. Feed additives can reduce part of this cost, especially when introduced before predictable hot weather, but they cannot cool the house.

Betaine protects water balance

Betaine acts as an osmolyte, helping intestinal and other cells regulate water movement during rapid respiration. A practical target is 800–1,200 mg active betaine/kg complete feed, often centered at 1,000 mg/kg. Product concentration matters because inclusion rate is not the same as active betaine supply. Its principal value during heat stress is osmotic protection. By helping cells regulate water movement, betaine can support nutrient absorption when panting, increased water consumption, and altered electrolyte balance place additional pressure on the bird. Supplementation should begin before predictable hot weather and continue throughout the challenge.

Vitamin C supports stress control

Broilers synthesize vitamin C, but endogenous production may not cover demand during prolonged or severe heat stress. Supplemental vitamin C can support antioxidant status, corticosterone control, immunity, and performance. Research responses commonly center around 200–250 mg/kg complete feed. The response is usually greatest during a genuine heat challenge rather than under comfortable conditions. Vitamin C can be supplied through feed or drinking water, although water application requires careful attention to solubility, product stability, sanitation chemicals, and actual water consumption.

Vitamin E limits oxidation

Heat stress accelerates lipid oxidation and damages cell membranes. Vitamin E is the principal fat-soluble antioxidant. Commercial programs often provide 100–200 mg/kg complete feed during periods of elevated risk. Vitamin E requirements also depend on the oxidative burden of the diet. Rancid fats, poorly stored ingredients, high concentrations of polyunsaturated fatty acids, and inadequate antioxidant protection can increase demand. Supplementation should be considered together with selenium because the two nutrients operate at different but complementary points in the antioxidant system. Increasing one cannot correct a serious deficiency of the other.

Selenium supports antioxidant defense

Selenium is required for glutathione peroxidase and other selenoproteins that control peroxides generated during heat stress. A total concentration around 0.30 mg selenium/kg complete feed is a common commercial target. Organic selenium sources may be used where the objective includes building tissue reserves before the onset of hot weather. Selenium complements vitamin E but does not replace it. It also has a relatively narrow margin between nutritional requirement and excessive supply. Formulation must account for selenium contributed by ingredients, premixes, and other supplements.

Chromium may support metabolism

Chromium is associated with insulin action and may moderate the metabolic and hormonal consequences of stress. Organic chromium can improve nutrient use, immunity, and sometimes feed conversion, but commercial responses remain inconsistent. Where the source is authorized, 0.2–0.4 mg supplemental chromium/kg complete feed is commonly evaluated for growing poultry.

Probiotics support gut integrity

Heat stress diverts blood from the digestive tract, increases intestinal permeability, and disturbs the microbial population. Selected probiotics may support barrier integrity, immune regulation, and nutrient digestion. A probiotic should be selected according to its organism, strain, and demonstrated function, not by microbial count alone. It must remain viable through manufacture, storage, feed delivery, and, where applicable, pelleting. Compatibility with organic acids, disinfectants, antibiotics, and other additives also requires attention. Evidence obtained directly under broiler heat stress is more valuable than general claims based on unrelated species or laboratory conditions.

In brief, no additive allows broilers to overcome a house that remains too hot or a drinker system unable to meet peak demand. Products should be matched to the flock's specific challenge, with active concentrations verified against basal specifications and legal limits. Supplementation should begin before predictable hot weather and continue throughout the challenge. Its value should be judged against mortality, feed intake, growth, feed conversion, flock uniformity, litter condition, processing results, and economic return. Environmental control must always

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