ISOPRENOIDS, A NATURAL ALTERNATIVE TO MITIGATE HEAT STRESS IN BROILER CHICKENS

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Abstract

Heat stress (HS) is a major problem in poultry farming, causing decreases in productive performance, deterioration of intestinal health, liver dysfunction, systemic inflammation, and impaired welfare in broilers. Nutritional treatments based on medicinal plants and, in particular, isoprenoid compounds have attracted increased interest as natural alternatives to synthetic additives due to their antioxidant, anti-inflammatory, antimicrobial, and stress response-modulating properties. Recent studies on broilers subjected to cyclic heat stress demonstrate the beneficial effects of administering isoprenoids (carotenoids, tocopherols/tocotrienols-vitamin E, coenzyme Q_{10}, phytosterols, and a variety of terpenoids/monoterpenes from essential oils) through biochemical mechanisms that can mitigate the effects of hyperthermia: they reduce oxidative stress, stabilize cell membranes, support mitochondrial function, modulate the inflammatory response, and influence the intestinal microbiota. However, there are limitations to the use of isoprenoids, such as: high variability of response depending on dose, exposure time, interactions with other nutritional components, maintenance conditions, bioavailability, compound stability, combinations, risk of unpleasant taste, or antagonism with the intestinal flora. This review summarizes how isoprenoids can improve the effects of HS, presents recent experimental evidence (powder, extracts, essential oils, and isolated molecules: carvacrol, thymol, carnosic acid, etc.), as well as current forms of administration and limitations.

Keywords*: heat stress, oxidative stress, broiler, isoprenoids*