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THE ROLE OF ESSENTIAL AMMINO ACIDS AND VITAMINES A,C,D3,E,K SUPPLEMENTATION IN POULTRY HEALTH

SCIENTIFIC PUBLICATION ADDRESSED TO VETERINARIAN CLASS

It is well known how nutritional factors can play a key role by positively affecting animals health, meat quality and eggs production (1).
Most feed used are deficient in essential amino acids (AA), mainly lysine and methionine: the imbalance, deficiency and unavailability of amino acids lead to growth depression (2).
Moreover it has been shown how an enhancement of AA allows to reduce dietary crude protein, increase the efficiency of protein utilization and maintaining a similar bird performances while reducing litter ammonia (3, 9).
Although the growing chicken appears capable of synthesizing roughly part of its glycine need, it has been assessed how a this amino acid is essential for maximal performance at all stages of life between hatching and eight weeks post-hatching (4) and therefore, it has to be carefully supplied with daily feed ratio.
Dietary glycine may need to be considered as a limiting nutrient in early nutrition, especially if crude protein is low, and only vegetable ingredients are being used (5).
Threonine is the third most limiting amino acid in broiler diets behind the total sulphur-containing amino acids and lysine, and its importance in feather growth, gastro intestinal function and therefore in feed conversion rate, interaction with other essential AA absorption, stress response and immune system function has been widely proven (6).

Cell membrane of bird immune organs are very sensitive to oxidative stress: nutrients with antioxidant properties can protect the immune organs increasing the quality of the immune response to vaccination as well as to wild viruses and bacteria resulting in a better stress response(1).
Daily supplementation of vitamin A can increase the production of antibodies and macrophages, and also promote their phagocytic ability (7).
Likewise, vitamin E can suppress oxidative damage affecting immune organs and thanks to the very same mechanism of action, can improve the Haugh Unit Score.
Moreover, since vitamin E can increase the serum concentration of Calcium, while exerting a protective effect on the liver and stimulating production of vitamin D, it's evident its importance in calcium metabolism and eggshell formation (1, 8).
As known, vitamin D is crucial not only for skeletal apparatus growth and maintenance, but it also plays a key role in protecting and modulating immune functions (10), furthermore, due to its antagonistic action toward vitamin A, the balance of these two nutrients must be carefully evaluated.
Facilitating calcium absorption and favoring bone formation and its strength, the beneficial effect of vitamin C on skeletal system is a strong proven evidence.
Furthermore, by decreasing synthesis and secretion of corticosteroids, alleviate the adverse effect of stress and lowers mortality (12).

Moreover vitamin C can protect vitamin A from oxidation and increase its serum levels (13), can enhance egg shell thickness and strength, while improving yolk color thanks to its interaction with vitamin D (1).

Vitamin C supplementation has also been directly related to a significantly improved antibodies titre against ND-Virus, IBD-Virus and IB-Virus due to lymphoid organs weight increases (1).

Among others, stress factors can influence vitamin K levels as well: although synthesis of vitamin K does occur in the bacteria resident in the bird digestive tract, it remains inside the bacteria cell, therefore the only benefit to the bird can arise from bacterial cells digestion via coprophagy.

Very common stress factors (such as coccidiosis and other intestinal imbalance) can increase the requirements of vitamin K, as well as its key role in regulating blood coagulation (14).

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