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THE ROLE OF ORGANIC ACIDS SUPPLEMENTATION IN POULTRY INTENSIVE FARMING

SCIENTIFIC PUBLICATION ADDRESSED TO VETERINARIAN CLASS

Approvals for the large use of nontherapeutic antibiotics in animal feed are fast disappearing worldwide.

Organic acids are molecules with antimicrobial effect that have the capacity to dissociate ions and reduce bacterial cell pH; they have a long history of being utilized as food additives (1, 2).

Among the candidate replacements for antibiotics are organic acids, both individual acids and blends of several acids.

Like antibiotics, short-chain organic acids also have a specific antimicrobial activity.

Reductions in bacteria are associated with feeding organic acids, which are particularly effective against acid-intolerant species such as *E. coli, Salmonella* and *Campylobacter*.

The disruption of the microbial cell physiology and metabolism through, denaturing and causing oxidative damage to proteins/enzymes, increased energy expenditure, osmotic stress and compromising membrane integrity/function, are the mechanisms related to the direct growth inhibition and/or bacteria cell death (3).

These acids are a natural component of the gastrointestinal (GI) environment, arising from microbial fermentation of dietary substrates and endogenous secretions.

As the composition and density of the intestinal microbiota changes with age, GI tract location and dietary components, then the concentration of fermentation products (e.g. SCFAs) varies accordingly.

In broiler chickens, typical total SCFA concentrations have been reported to be in the range of 2-12 and 40-100 μmol/g in the small intestine and caeca, respectively.

Given the recognized beneficial effects of organic acids, their concentrations within the intestine are often seen as indicators of gut health status (3).

Moreover organic acids can improve protein and energy digestibility by reducing microbial competition with the host for nutrients and endogenous nitrogen losses, by lowering the incidence of subclinical infections and secretion of immune mediators, and by reducing production of ammonia and other growth-depressing microbial metabolites.

Furthermore, organic acids can evoke reduction in digesta pH, increased pancreatic secretion, and trophic effects on the gastrointestinal mucosa (4).

There are considerable scientific literature data testifying how organic acids can ameliorate the performance of birds and enhance the specific and non-specific immunity in poultry (5).

The action on the immune system is promoted also by Saccharomyces Cerevisiae (SC): in a filed study it has been shown how SC cell wall can exacerbate the cellular immune response, suggesting its capability of a better maintenance of the immune status in response to microbial challenge (6).

Furthermore, SC supplementation can significantly control *Campylobacter* carriage in chickens with some positive effects also on *Salmonella* presence, thus reducing the contamination of carcasses at slaughtering and preventing human foodborne diseases (7).

Beneficial effects on immune system are attributable as well to Citric acid supplementation: it was demonstrated to improve the immune status, effect detected by densely populated immune-competent cells in the lamina propria and submucosa of cecal tonsils and ileum and also in the cortex and medulla of bursa follicles; moreover it showed proven positive effects on growth, feed intake, feed efficiency, carcass yield and bone ash (8).

All these findings together underline how an accurate and balanced supplementation can help maintaining an healthy intestinal environment, while promoting and sustaining gastrointestinal and immune system function of birds challenged by intensive farming stressful factors.

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