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Research line: Nutrition and production of non-ruminants

Intestinal histomorphometry of laying hens fed a symbiotic versus zinc bacitracin

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Food additives such as probiotics, prebiotics, and symbiotics promote benefits for poultry by acting on the balance of the intestinal microbiota, with the potential to improve poultry health and productivity. The supply of these additives alters the community of bacteria in the intestinal microbiota, as well as the metabolites that are produced and which can be absorbed by the intestinal epithelium and modify its structure. The study aimed to assess the effect of using a symbiotic additive at different rearing stages on the histomorphometry of the duodenum, jejunum, and ileum of commercial layers. A total of 198 laying hens of the Dekalb White strain aged 70 weeks were used in a completely randomized design consisting of six treatments with six replicates. The experimental diets consisted of two base diets, the first consisting of corn and soybean meal without additives (RMS) and the second with the addition of meat and bone meal without additives (MBM). The other experimental diets were formulated based on the MBM diet, but with added additives, one diet with 0.05% of the additive Zinc Bacitracin (ZnB) and the others with 0.1% of the additive Symbiotic from the starter phase (SIMC), growth phase (SIMR) and production phase (SIMP). The RMS, MBM, BAC, and SIMBC treatments were fed from the first day of the birds' lives. The SIMBR and SIMBP diets were fed from the birds' 5th and 17th weeks of age, respectively. At 90 weeks of age, one bird per experimental plot was selected for intestinal collection. Sections of 15 mm were taken from the small intestine, fixed in 10% formaldehyde, dehydrated, clarified, and impregnated in paraffin, followed by a 5 µm microtomy and staining with hematoxylin and eosin. The following parameters were assessed using digital images: villus height (VH), villus width (VW), crypt depth (CD), villus:crypt ratio (V:C), and absorption area (A). The data was submitted for analysis of variance, and, in the event of a significant difference, the means were compared using the orthogonal contrast method ($p<0.05$). Significant effects were observed for all the variables evaluated for the duodenum and jejunum, but for the ileum region, significant effects were found only for VH, V:C, and A. These histomorphometric parameters made it possible to investigate the effects of the intestinal microbiota, especially the area of the villi, with higher values being observed for the birds supplemented with the symbiotic in all regions of the intestine from any stage of production, which is positively related to the birds' greater absorption efficiency. The results of this study show that supplementing layers with the symbiotic, regardless of stage, resulted in improvements in the histomorphometric variables of the duodenum, jejunum, and ileum.

Keywords: additive, digestion physiology, poultry science

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