Abstract

Broiler chicken production is one of the key sectors of global agriculture, facing major challenges related to gut health, feed efficiency, and the reduction of antibiotic growth promoters (AGPs). The ban on AGPs in the European Union has forced the search for alternative strategies to improve poultry health and productivity, with probiotics being among the most promising solutions. *Lactiplantibacillus plantarum* and *Bifidobacterium animalis* are characterized by strong adhesive capacity to the intestinal epithelium, production of antimicrobial metabolites, and beneficial modulation of immune responses, making them attractive candidates for poultry nutrition.

The aim of this study was to evaluate the effects of a selected probiotic preparation containing *Lactiplantibacillus plantarum* ATM14 and *Bifidobacterium animalis* ATM30 on broiler health indicators, intestinal histomorphology, gut microbiota composition, and production performance. It was hypothesized that supplementation with these probiotic strains would improve intestinal barrier integrity, increase microbial diversity, and result in better feed utilization and higher final body weight.

The experiment was carried out on 360 Cobb-500 chicks randomly assigned to three groups: a control group (no probiotics) and two experimental groups receiving the probiotic preparation at different dosages via drinking water. The rearing period lasted 35 days. Productive parameters (body weight gain, feed conversion ratio, survival), histomorphological indices of the small intestine (villus height, crypt depth, VH:CD ratio), and gut microbiota composition (assessed by high-throughput sequencing) were analyzed.

Probiotic supplementation significantly improved rearing performance. The experimental groups showed higher body weight gain and more favorable feed conversion compared with the control. Histomorphological analysis revealed elongated villi, shallower crypts, and an increased VH:CD ratio, indicating enhanced absorptive capacity. Microbiota analysis demonstrated greater taxonomic diversity and an increased proportion of short-chain fatty acid (SCFA)-producing bacteria, particularly *Lactobacillus* and *Bifidobacterium*.

The findings confirm that supplementation with selected probiotics positively affects gut health, production performance, and microbial stability in broiler chickens. The tested preparation may serve as an effective alternative to antibiotic growth promoters, aligning with the One Health concept and global strategies to combat antimicrobial resistance. These results

have practical significance for feed producers, poultry farmers, and the advancement of sustainable poultry production.