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# Effect of Replacement of Antibiotic with Probiotic and Prebiotic on Growth Performance, Carcass Characteristics, And Nutrient Digestibility in Broilers

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## ABSTRACT

The purpose of this study was to assess how probiotics and prebiotics, as opposed to antibiotic growth boosters, affected the growth performance, carcass features, and nutrient digestibility of broiler chickens. Day-old broiler chicks were randomized to receive diets supplemented with probiotics, prebiotics, or both, as well as an antibiotic control. During the course of the trial, growth metrics such body weight gain, feed intake, and feed conversion ratio were noted. At slaughter, characteristics of the carcass, such as dressing percentage and breast yield, were measured. Additionally, the apparent nutritional digestibility of crude protein and dry matter was ascertained. The probiotic and prebiotic-fed birds outperformed the antibiotic-fed group in terms of weight gain and feed efficiency. Breast proportion and carcass yield were either unchanged or somewhat increased in the supplemented groups. It was determined that broiler diets supplemented with probiotics and prebiotics can effectively replace antibiotics, improve performance and nutrient utilization while support sustainable chicken production.

**Keywords:** Ascariasis, Ectopic, Migration, Adult

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The poultry industry, in one of the most dynamic and rapidly growing sectors within global agriculture, plays vital role in the food sector and also contributes in employment and rural income generation. It also has significant potential of supplying affordable high-quality protein in form of meat to consumer end (Brasso *et al*., 2025). According to the Economic Survey of Pakistan 2023–2024, the poultry sector remarkable 7.3 percent annual growth rate over past decade and contributes approximately 1.5% to the national GDP, broiler meat accounting for the 40.7% of total meat production and providing employment to 1.5 million people.

While the widespread use of antibiotics has significantly enhanced the growth performance of poultry and animals, their misuse in animal diets can result in antibiotic residue in animal products and the direct selection of bacteria resistant to antibiotics, which can be harmful to people (Seal *et al*., 2013). One of the fastest-growing animal husbandry applications, broilers, have serious issues that affect their intestinal health and growth performance (Jadhav *et al.,* 2015).

Research indicates that probiotics (PB), essential oils, and botanical extracts may be utilized to treat animals in place of antibiotics (Alagawany *et al.,* 2019). In the past, livestock and poultry have made considerable use of antibiotic growth promoters (AGPs) as a practical means of preventing infections and preserving health and productivity. AGP use has been found to be beneficial for animal productivity, but it has also been linked to the quick emergence of bacteria resistant to antibiotics. Since antibiotics are inefficient in treating serious illnesses, this in turn puts human health at serious danger (Muneeb *et al.,* 2025). In particular, the European Union is one of the regions where it is illegal to utilize antibiotics as growth promoters. This has prompted scientists to look for potential growth-promoting substitutes for antibiotics that don't degrade the productivity and quality of broiler production that this prohibition might have an impact on (Europa 2005). Probiotics may be used in place of antibiotics to maintain or increase broiler output while maintaining food safety.

Some enzymes, probiotics, and prebiotics have been found to be effective alternatives to antibiotics. Probiotics enhance growth, balance gut flora, and promote immune system function. Improve nutritional digestibility, as well as enhance the host animal's intestinal architecture (Mountzouris *et al*., 2010). Clostridium butyricum and Bacillus subtilis are among the probiotics being extensively tested in broilers (Ren *et al.,* 2023). Prebiotics are non-digestible substances, mainly oligosaccharides that stimulate the growth of beneficial bacteria in the gastrointestinal tract, such as lactobacilli and bifidobacteria. Consumers are increasingly seeking antibiotic-free meat and are frequently ready to pay more for it as a result of growing knowledge of antibiotic resistance, antibiotic use bans, and rising demand for organic poultry meat. Research has therefore focused on identifying substitutes for AGPs (Gadde *et al*., 2017). By detoxifying toxic chemicals, probiotics may increase the digestibility of dry and organic materials. Additionally, they generate enzymes that improve the hens' digestive tracts' absorption of nutrients. (Chang *et al.,* 2022). Probiotics refer to individual or combined cultures of live desirable microorganisms employed in chicken production to establish a robust and varied gut microbial ecology that selectively eliminates harmful microbes (Krysiak *et al.,* 2021).

In broilers, probiotics improve immunological response, microbial populations, antioxidant capacity, and digestive function. Furthermore, probiotics can improve nutrient absorption and utilization in broilers by repairing intestinal features like villi height and crypt depth (Neveling and Dicks 2021). Studies have shown that broiler gut health improves when B. subtilis PB6 and AMPs are added to the diet (Jayaraman *et al.,* 2013; Xie *et al*., 2020). It was hypothesized that probiotics increase gut microbiota balance, pathogen inhibition, and nutrient absorption, replacing antibiotics with them will preserve or improve growth performance. Probiotics will improve intestinal villus height and enzyme activity, which will boost apparent nutrient digestibility (DM, CP, and energy because probiotics promote better nutrient partitioning and gut health, the features of the carcass will be the same or better (greater breast output, reduced belly fat). Probiotics are described as live microbes present in gut that improve host health by supporting beneficial bacteria (Mizock, 2015).

Probiotic supplementation in broiler diets is suggested as an economical and growth-promoting agent that leaves no residual effect like antibiotic growth promoters (Irshad, 2014). Synbiotics are a combination of probiotics and prebiotics. Probiotics usually depend on the substrate known as Prebiotic. Probiotics' viability are therefore improved with the supplementation of appropriate non-digestible Prebiotics (Sekhon and Jairath, 2010).

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