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Assessing the Antibacterial Properties of Colistin Sulphate for Controlling *Salmonella Typhimurium* in Poultry Flocks

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ABSTRACT

Broiler chicken intestine health and growth performance are impacted by the bacterial community's makeup. This study's major goal was to investigate how ileal bacteria, intestinal health, and resistance to *Salmonella Typhimurium* infection were affected by flavomycin and colistin sulfate. Six groups of 396 1-day-old broiler chicks were randomly selected. The control diet (CON), the flavomycin at 10mg/kg diet (Anti G+), and the colistin sulfate at 40mg/kg diet (Anti G-) each contain different amounts of antibiotics_ was given to two groups for five days. On the eighth day, one member of each of the two groups was exposed to *S. Typhimurium*; these were referred to as CONS, Anti G+S, and Anti GS, respectively.

Introduction:

A significant cause of sickness, mortality, and financial loss in the broiler industry, Salmonella is a gram-negative bacterium that cause serious food-borne illnesses in humans and cattle worldwide [1]. At least 1500 of the more than 2500 Salmonella serotypes, including Salmonella Typhimurium and Salmonella Enteritidis, can be found in the Salmonella enterica subspecies enterica. This subspecies is responsible for more than 99% of cases of salmonellosis in humans [2]. The most prevalent type related to animal illnesses is *S.typhimurium* [3]. The main health issues brought on by Salmonella infection in broiler chickens are intestinal issues, which have a significant negative impact on growth and speed up the propagation of drug-resistant genes [4]. Increased numbers of Lactobacillus and Bifidobacteria, two helpful microbial species, can protect against Salmonella infections in the intestines [5]. As a result, altering the composition of gut microorganisms can be employed as a tactic to overcome Salmonella's threat and enhance animal growth [6].

Alkaline peptide antibiotic colistin sulfate is mostly used to protect susceptible microorganisms from infection and to promote the growth of poultry and cattle [7]. The lipoprotein-free phosphate present in the cell membrane can interact with colistin sulfate. Cell death and cytoplasm leakage arise from this decrease in tension in the cell membrane and increasing membrane permeability [8]. Escherichia coli and Salmonella are two examples of gram-negative bacteria that are strongly inhibited by colistin sulfate while gram-positive bacteria and fungi are unaffected [9].

Pharmacodynamics

Colistin is an antibiotic that inhibits polymyxin. Cationic polypeptides called polymyxins damage bacterial cell walls in a manner similar to that of detergents. Parenteral polymixin use was generally discontinued with the introduction of less harmful drugs, including extended-spectrum penicillins and cephalosporins, with the exception of the treatment of multi-drug resistant lung infections in individuals with cystic fibrosis. However, more recently, the appearance of gram-negative bacteria those are multi-drug resistant, such as pseudomonas aeroginosa and acinetobacter baumannii, and the dearth of novel antimicrobial drugs have led to the revival of the usage of polymyxins [10].

Discussion

The chicken model has undoubtedly been employed in research on a variety of disorders. However, during the early phases, nothing was understood regarding the ability of different gut bacterial forms in broiler chickens to combat *S.typhimurium* infections. In this investigation, chickens with intestinal Anti G+ and Anti G were developed using flavomycin and colistin sulfate before *S. typhimurium* infection. Despite the fact that certain research has indicated that antibiotic growth promoters have a good impact on poultry production [11].

The Anti G group is capable of boosting body weight gain and feed consumption in comparison to the Anti G+ group. The ability of the Anti G group to inhibit the infection may be the cause of the Gram-negative bacteria *S.typhimurium* the current study's findings supported the negative effects of *S.typhimurium* on the broiler chicken's growth efficiency is measured by body weight gain, feed consumption, and feed conservation ratio [12]. A significant inflammatory response and intestinal lesions can result from several-day-old chicks with *S.typhimurium* infection [13].

Conclusion

The findings of this study demonstrate that, when formed in their early stages, the gut bacterial populations Anti G+ and Anti G may respond to *S.typhimurium* infection in distinct ways. An infection with *S.typhimurium* reduces the diversity index of intestinal bacteria in broiler chickens, cause a range of inflammatory illnesses, and reduce production effectiveness. To strengthen the stability of intestinal bacteria, intestinal Anti G bacterial communities can increase population diversity. Additionally, *S.typhimurium*-induced inflammation was suppressed by Anti G.

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