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Role of Probiotics on Intestinal Flora of Poultry

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ABSTRACT

Probiotics are living microorganisms that promote immunity and the overall health of the poultry. Several strains, particularly *Lactobacilli* and Clostridiaceae play a role in sustaining the gut flora that ultimately supports the immune response in the poultry. Probiotics compete with harmful pathogens and can be used as an alternative to chemotherapeutic drugs to avoid the negative impacts of antibiotics. Moreover, by using probiotics as an alternative to antibiotics, issues like antibiotic resistance can be overcome. Furthermore, probiotics increase immunity by stimulating T helpers and B cells and promoting the overall production of poultry. Additionally, probiotics provide a supportive environment that aids in maintaining the normal physiological function of the intestinal flora. This article highlights the beneficial effects of administrating probiotics, comprising lowering the load of diseases and antibiotic resistance, mitigating stress and enhancing the immunity of poultry birds.

Keywords: Immunity booster, Intestinal flora, Poultry health, Probiotics, Production stress

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Introduction

The development in the poultry industry has resulted in emerging challenges of disease proliferation and antibiotic resistance. To overcome the load of diseases, antimicrobial substances are used that result in resistance [1]. Antimicrobial substances such as antibiotics not only destroy the harmful microbes but also disturb the advantageous bacteria. Continuous and needless use of antibiotics causes resistance in the host by suppressing the immune system [2, 3]. To avoid issues like antibiotic resistance and disturbance of intestinal flora, attention is diverting towards the use of naturally derived substances such as organic acids, nanoparticles [4], prebiotics, probiotics and postbiotics. Among these, probiotics are gaining the attention of the poultry industry after the ban on the use of antibiotics for poultry production. Probiotics are living microorganisms that impart advantageous impacts to poultry birds by improving the balance of intestinal flora and stimulating the antibodies formation [5]. In the gut particularly the crop of poultry, microflora grows that should be in balance for the proper functioning of the gut. The microflora population present in the poultry gut is composed of 70% Lactobacilli, 11% Clostridiaceae, 6.5% Streptococcus, 6.5% Enterococcus and 6% others [1, 6]. However, the processing of feed, nature of supplementation and form of the feed may alter the composition of microflora. Therefore, all these parameters should be considered while formulating a feed to avoid disturbance of intestinal flora on consumption [6]. Huge amounts of Lactobacilli adhere to the crop region of the gut, dominating the microflora population and protecting against the detrimental effects of foreign microbes. As Lactobacilli dominates the gut flora, they are commonly used in poultry as a probiotic that reduces digestive infestation and improves immunity [7]. The gut microflora forms a protective covering by adhering to the walls of the gut, reducing the risk of attachment to pathogenic bacteria. Along with the protection from pathogens, probiotics also aid in nutrient assimilation to support immunity [8]. This article highlights how probiotics interact with the gut flora, maintain poultry health and prevent the emergence of diseases by stimulating the immune response.

Mode of action

Probiotics work by improving the gut flora through an integrated process. First, they prevent the proliferation of pathogens by competing with pathogens for nutrients and adhering to the available substrates. Probiotics occupy the available substrates that inhibit the pathogenic organism from adhering. In this way the receptors or substrate required to pathogenic organisms for fermentation and proliferation become unavailable. Probiotics build up a strong intestinal barrier effect [9] and liberate metabolites such as glutamine or arginine that prevent the adherence of pathogenic organisms. Probiotics also release products like bacteriocins and some organic acids that confer them antimicrobial agents. This antimicrobial property enables them to kill and destroy harmful bacteria [10]. Probiotics play a role in enhancing immunity by interacting with gut-associated lymphoid tissues (GALT) which begin a multifactorial process of immunity boosting. By integrating with GALT, they trigger macrophages and dendritic immune cells, which results in a discharge of chemokines and cytokines and activate systematic immune response. Probiotics provoke the activation and maturation of T helpers and B cells, which is important for mucosal immunity. This mechanism plays a role in the regulation of intestinal mucous formation and intestinal motility [11]. Probiotics also result in decreased pH, coagulate the infectious microbe, metabolize toxic substances by binding them and elevate the activity of natural killer cells to destroy the malignant or malfunctioned cells. Probiotics stimulate a tight junction protein expression that limits the translocation of pathogens and systemic inflammation. Along with that, they can ferment the dietary substances into short-chain fatty acids such as butyrate that serve as an energy source for the epithelial cells of the intestine, leave anti-inflammatory effects and maintain the integrity of the gut barrier. All these dynamics improve the health of poultry birds, decrease the risk of gastrointestinal ailments and prevent from negative impacts of chemotherapeutic drugs [12].

Probiotics driving profitability

Profitability is the main concern of successful poultry farming by improving carcass yield. The addition of probiotics to the feed of poultry birds resulted in increased daily weight gain, higher live weight and overall weight gain. By lowering feed intake and improving digestion, probiotics led to a better feed conversion ratio in poultry [13]. Probiotics bring benefits to the poultry industry by improving digestion [14] and controlling the disease load by boosting the immune system [15]. By regulating the activity of dendritic cells, B and T lymphocytes and macrophages, probiotics modulate the innate as well as adaptive immunity of the host [16]. In this way, probiotics limit the dependency on antibiotics and other chemotherapeutic drugs. This not only reduces veterinary costs but also synchronizes with the demand of the consumer for antibiotic-free poultry products. Poultry producers can ensure economic viability by incorporating probiotics into the feed [17].

Future perspectives on probiotics

Probiotics are extensively used in clinics as therapeutics and are also used for veterinary purposes [18]. The development of additives like probiotics, postbiotics and prebiotics has opened a path for alternatives to harmful antibiotics. Such innovations are supposed to bring development to the poultry industry [19]. The addition of probiotics with other substances like prebiotics and postbiotics may enhance immunity and alleviate the chances of disease outcomes. Probiotics as a chemical-free product can elevate poultry production without compromising the welfare of birds and the environment [20, 21].

Conclusion

In conclusion, the incorporation of probiotics into poultry feed promises improved efficiency and health of the birds. Probiotics not only facilitate gut microflora by competing with foreign pathogenic agents but also improve digestion and assimilation of nutrients. Furthermore, probiotics also enhance immunity by the production of antibiotics and overcome stress that ultimately increases production. Increased and organic production of poultry birds contributes to increased revenue and a safer environment. As the poultry industry is growing day by day it's essential to replace antibiotics with some natural resources to overcome issues like antibiotic resistance that transfer to human beings too by consuming meat. The application of probiotics should be ensured for the long-lasting potential of the poultry industry.

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