THE SCIENCE WORLD
A Monthly e Magazine
Popular Article
ISSN:2583-2212
December, 2022; 2(12), 2079-2082

Application of Probiotics in Poultry

Dr. Pallabi Das[1] and Anshu Ahlawat[2]
[1]Assistant Professor, Department of Animal Nutrition, M.B. Veterinary College, Rajasthan-314001
[2]Asscociate Professor and Head, Department of AGB, CoVSc & AH, KU, Junagadh- 362001
https://doi.org/10.5281/zenodo.7422218

Abstract

Probiotics, which serve as antibiotic alternatives in the chicken business, have grown in popularity in recent years as dietary supplements and feed additives. Probiotics are all-purpose feed additives that can be combined with other feed additives to support increased performance and health. The relationship between the intestinal microbiota and each host is dynamic and, generally speaking, advantageous to both parties. Intestinal dysbiosis is associated with a number of metabolic illnesses because this intricate interaction is thought to be a factor in determining both health and disease. As a result, manageable approaches that focus on the control of the gut microbiota can treat a number of conditions that are closely related to inflammatory and metabolic illnesses. One of these methods is the addition of probiotics to the diet, which has the impact of improving intestinal epithelial barrier and gut function in chickens by altering the quality of the gut microbiota.

KEYWORDS: Gut microbiota, growth promoters, health, poultry, probiotics

Introduction

Due to their wide range of positive effects, such as fostering growth and production, enhancing immunity, and protecting health, feed additives and nutritional supplements are becoming more and more important in the poultry industry as well as in healthcare systems (Alagawany *et al*., 2020). Additionally, non-nutritional elements including hygienic practices, the preparation of feed components, ambient temperature, animal health, and genetics have an effect on animal performance (Chlebicz & Slizewska, 2020). The chicken business has made great strides in its production system over the past 50 years thanks to advances in nutritional research, proper management, and genetic development. The success of current broiler production has been enhanced by the increased usage of feed additives. Generally speaking, feed additives are compounds used to increase the potency of nutrients and exercise their effects on raising poultry performance (Ashour *et al*., 2020).

Probiotic are incorporated into poultry diets in order to promote growth because of their tendency to

increase feed consumption. Both directly and indirectly, they have beneficial effects that can be seen in the gastrointestinal tract and poultry immune system immunomodulation. Greater laying and egg quality, increased daily increments, and an enhanced feed conversion ratio are all nutritional impacts seen in flocks administered probiotics (FCR). Additionally, the quality of meat has improved. In addition to these benefits on production, enabling the organism to better defend itself against diseases and stress improves avian immunity. Due to the gut microbiota's significant influence on the host's metabolism, physiology, nutrition, and immune system, it has been referred to as a hidden metabolic "organ."

Probiotics, Acidity and pH

Probiotic strains with specific properties can endure harsh conditions in their hosts. When exposed to very acidic surroundings like stomach acid and bile, they can pass through the GIT and continue to be viable. This is difficult because many animals' stomach pH fluctuates from 1.5 to 3.0. Additionally, bile salts and a number of gastric and intestinal enzymes contribute to the destruction of the microorganisms. Due to its harsh environment, the stomach offers little possibility for probiotic bacteria's vegetative cells to pass through. The most recent data, however, demonstrates that spores germinate and persist throughout the GIT. Feed particles may become contaminated with bacteria as they move through the body. The simplest way for germs to spread throughout the body is by re-sporulation. The feed appears to have an impact on the spore's capacity to sprout and spread since spores require an abundance of resources to thrive (Johnson *et al*., 2019).

Probiotics and Spore Formers

The ability of spore formers to germinate, create new germs, and then re-sporulate makes them well-known. Even when there is a nutritional shortage, they can reproduce and survive. Spore-forming bacteria, like Bacillus, can survive and flourish after entering the gut. *Sporolactobacillus*, *Brevibacillus*, and *Bacillus* species are spore formers having probiotic benefits. These are now used more frequently by the livestock and poultry sector since they can go through more rigorous processing techniques.

Probiotics and Gut Microbiota

The makeup and operation of the gut microbiome are significantly influenced by probiotics. The competition with other microorganisms for nutrients, binding sites and receptors on intestinal mucosa, and inhibition of the growth of other microbes by creating antimicrobial compounds are some of the proposed methods of probiotics to achieve these effects. Additionally, probiotics can lessen pathogen translocation across the intestinal mucosa by preserving immunological tolerance and improving intestinal barrier integrity. The addition of *Bacillus toyonensis* and *B. bifidum* to the diet delayed the proliferation of all fungi

and coliforms and decreased the populations of cecal coliforms and *E. coli*, according to Kassem *et al*. (2021). Polysaccharide lyase genes and glycosidic hydrolysis, which are necessary for polysaccharide dispersion, are absent in poultry. As a result, this procedure is made possible and easier by the presence of bacteria. Using probiotics effectively depends on the metabolism of the bacterial microflora.

Probiotics and Heat Stress

A condition known as stress is one that occurs in animals and poultry as a result of one or more stressors, which may have either external or internal causes. Poultry health and performance are frequently impacted by a stressor because it alters the normal physiological balance or homeostasis. Being homeotherms, poultry will attempt to maintain relatively constant body temperatures by balancing heat loss and HP in their bodies through behavioral and physiological adaptation in conditions of mild temperature fluctuation. However, when temperatures and humidity rise above the essential conditions, which can be characterized as HS, birds find it challenging to maintain a stable body temperature through adaption. Probiotics improve animal performance and GIT health, and this feeding technique appears to be effective in reducing the harmful effects of HS. The severe consequences of HS will be felt by modern-bred chickens.

Conclusions

Over 9 billion people will inhabit the globe by 2050, according to predictions, as existing population patterns continue to exponentially climb. The consumer of today consumes a greater percentage of meat and animal products. By 2050, it may be necessary to raise agricultural food production by 60% to 110% to meet these demands for additional meat and dairy products. Future feed additive companies might emphasize advantages like maintaining healthy microbiota or more exact strain and dose selection. The advantages of these compounds in chicken production will increase with better understanding of them and with more exact selection of their composition and suggested dose.

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