

ENHANCING LIVESTOCK HEALTH AND PRODUCTIVITY WITH PROBIOTICS

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ABSTRACT

Probiotics offer a sustainable alternative to antibiotics in livestock, boosting animal immunity and productivity. Their ability to enhance animal immunity and improve productivity, while reducing the reliance on traditional antibiotics, offers numerous benefits both from a health and economic standpoint. They help prevent diseases, reducing the need for antibiotics and improving economic outcomes through lower treatment costs and better efficiency. Probiotics represent a promising and sustainable solution for the livestock industry, not just from a health perspective but also from an economic standpoint. With ongoing research and development, we can expect probiotics to become an even more integral part of the future of animal agriculture.

Keywords: Livestock, health, probiotics, management, gut

I. INTRODUCTION

Live microorganisms added to livestock diets called probiotics have the potential to completely transform livestock management. These "friendly" bacteria have been found to be a good substitute for antibiotics, providing a means of preventing harmful infections and preserving the delicate balance of the gut microbiota. The use of probiotics, prebiotics, and symbiotics in animal nutrition has grown in popularity due to their potential to act as immunomodulators that can alter the immune system to support balance and health, as well as their capacity to enhance feed absorption and the quality of meat, milk, and eggs. Both innate and adaptive immune responses are influenced by the intricate interactions these microbes have with the host's immune system.

II. OPTIMIZING LIVESTOCK NUTRITION AND GROWTH THROUGH PROBIOTIC SUPPLEMENTATION

Probiotics, when given in the right amounts, these good bacteria and their host develop a symbiotic partnership that outcompetes harmful pathogens for resources and attachment sites in the gut. Their presence not only strengthens the intestinal barrier but also creates compounds that directly impede the growth of potential invaders and modifies the immune system (Ullah *et al.*, 2024). (Probiotics have a significant impact on the immune system; they boost innate defenses and adaptive immunological responses, which increases resistance to disease. Numerous case studies that have connected probiotics to better feed conversion rates, enhanced nutrient intake, and higher-quality animal products demonstrate this immunomodulatory activity. Probiotic supplementation has been linked to lower rates of intestinal problems and pathogen shedding in poultry, while it has increased milk and meat output and enhanced feed efficiency in ruminants. The use of probiotics in animal nutrition leads to

balance in the beneficial gut microbiome and eradicate harmful gut pathogens, leading to a number of benefits like improved gastrointestinal tract function, increased systemic and gut immunity, and improved health status for both ruminants and non-ruminants.

Enhancing ruminal fermentation efficiency, such as stabilizing pH-enhanced fiber digestion and lowering methane production in the rumen, has been the main goal of probiotic use in ruminants, which has an effect on production performance. When it comes to enhancing performance metrics in non-ruminants, bacterial probiotics outperform yeast. Probiotics have also been demonstrated to enhance the quality of meat and milk in food animals, lower the incidence of intestinal illnesses, and decrease the shedding of gut pathogens in feces.

III. PROBIOTICS IN ENHANCING ANIMAL PRODUCTIVITY

Probiotic usage has been shown to increase feed efficiency and average daily gain (ADG) in a variety of species, indicating a clear link between probiotic use and improved growth performance. Probiotics have been shown in studies to enhance the fatty acid profile of meat, which may benefit consumers' health by reducing harmful cholesterol levels. Probiotics have been shown to improve milk composition and yield in the dairy industry by promoting a healthy rumen environment, which in turn improves nitrogen flow and the generation of volatile fatty acids. Furthermore, probiotics improve growth performance and nutrient synthesis, which eventually improves muscle production and carcass weight. The proof that probiotics are beneficial There is strong evidence to support the use of probiotics in animal feeding, with studies showing steady improvements in output and product quality. Probiotics are becoming more and more crucial in promoting ethical and effective livestock production as the demand for animal feed rises worldwide.

IV. PROBIOTICS IN DISEASE PREVENTION

As a first line of defence, probiotics strengthen the animals' innate immunity and act as a barrier to keep harmful germs out. It has been demonstrated

that probiotics are essential for preventing illnesses such bovine mastitis, a prevalent and expensive condition affecting dairy animals. Probiotics support animal health and wellbeing by boosting the immune system and making the environment unfavourable for infections. Probiotic supplementation has been linked to a decrease in the prevalence of respiratory ailments, gastrointestinal disorders, and other infections that frequently affect livestock. The process of competitive exclusion is one of the main ways that probiotics prevent illness. Probiotics successfully prevent the growth and colonization of harmful bacteria by competing with them for resources and attachment sites. This procedure is essential for preserving a healthy gut flora and delaying the onset of illness. Probiotics can also generate antimicrobial compounds that directly target pathogens, which lowers the risk of infection even more. Probiotics save cattle producers money by decreasing the incidence of sickness and the requirement for antibiotics and medical treatments. Additionally, healthier animals result in higher output and higher-quality products, both of which can boost livestock businesses' profitability. Research has indicated that the use of probiotics can result in significant healthcare cost savings as well as increased productivity by lowering absence from illness. Livestock illness prevention can be achieved in a variety of ways with probiotics. Livestock illness prevention can be achieved in a variety of ways with probiotics. They have the potential to be a sustainable substitute for conventional antibiotics because of their capacity to strengthen the immune system, competitively exclude harmful microorganisms, and provide economic benefits.

V. CHALLENGES IN PROBIOTIC APPLICATION

A number of variables can affect the viability of probiotics while they are being processed and stored. One important consideration is temperature; probiotics need to be maintained within particular temperature ranges in order to stay active. Lactic acid bacteria, for example, which are frequently found in probiotics, are susceptible to high temperatures, which can denature their proteins and cause cell death.

According to a study by Champagne et al. (2005), probiotics' survival rate throughout storage and gastrointestinal transit was considerably raised by microencapsulation. The full potential of probiotics can be realized, leading to better health outcomes, by addressing the variables that affect probiotic survival and using strategies to increase stability.

Because of the wide variety of microbial strains and their distinct interactions with the host's microbiome, figuring out the ideal probiotic dosage is a complex task. Every strain has unique qualities and health advantages that call for a customized dose strategy. The microbiome's dynamic nature, which might change the probiotic's effectiveness and dosage requirements, adds to the complexity.

Larger and better-designed clinical studies are needed to offer the solid proof needed for therapeutic claims. More investigation is required to determine the best strains for particular illnesses and to comprehend the mechanisms of action. Although probiotic therapy is still in its early stages, the current status of applications is encouraging. Research on probiotics' potential applications for other illnesses is lacking, despite the fact that some of them are successful in treating ailments like irritable bowel syndrome and diarrhoea. To investigate the therapeutic potential

of probiotics in a broader range of illnesses and to identify the best strains, doses, and treatment durations, further study is required.

VI. CONCLUSION

Probiotics have emerged as a promising and sustainable alternative to traditional antibiotics in livestock management. By enhancing animal immunity, improving feed efficiency, and promoting overall health, probiotics offer significant economic and health benefits to the livestock industry. However, challenges remain in optimizing probiotic use, particularly regarding strain selection, dosage, and ensuring stability during storage and transit. The dynamic nature of the microbiome and the complex interactions between probiotics and host organisms require further investigation. While current research shows promising results, more large-scale clinical studies are needed to solidify the therapeutic claims and explore the full potential of probiotics for various animal diseases. With continued research and development, probiotics have the potential to revolutionize livestock nutrition and disease prevention, contributing to more sustainable, ethical, and efficient farming practices in the future.

VII. REFERENCES

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