



IMPACT OF PROBIOTICS, PREBIOTICS AND ENZYMES (GUTBLOOM) IN POULTRY: A REVIEW

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ABSTRACT

Probiotics: The novel feed supplements are naturally occurring beneficial live microbes including bacteria, yeast, and fungi. In general, probiotics are proven to improve the health of animals, birds and human beings. Addition of probiotics to poultry feed/diet also improves egg production in layers, healthy GUT in layers and broilers. Generally, live apathogenic microbial strains, singly or as multi-strain probiotics, belonging to genus *Lactobacillus*, *Streptococcus*, *Bacillus*, *Aspergillus* and *Saccharomyces* are used in poultry. **Prebiotics:** Prebiotics are a group of nutrients that are degraded by gut microbiota. Fructo oligosaccharides and Mannan oligosaccharides are the two important groups of prebiotics with

beneficial effects on poultry health. **Enzymes:** The biggest single expense in any system of poultry production is feed accounting for up to 70% of total production cost per bird. Poultry naturally produces enzymes to aid the digestion of feed nutrients. However, they do not have enzyme to break down fiber completely and need exogenous enzymes in feed to aid digestion. The present article reviews the beneficial effects and potential applications of probiotics, prebiotics and enzymes on health, immunity and production performances in poultry.

KEYWORDS: Probiotics, Prebiotics, Enzymes, Poultry, Production, Health, Immunity.

INTRODUCTION

In last few decades poultry farming has emerged as a dynamic industry in the country. In terms of egg, broiler and poultry meat production at global level India ranks amongst the first five countries. The poultry feed accounts for about seventy percent of the total production cost and therefore, this aspect needs to be carefully examined to ensure proper growth of poultry industry.

The use of antibiotics as growth promoting agents in poultry has been banned in Europe. Probiotics have been gradually replaced due to several negative effects of antibiotics on poultry health.

The term Probiotics is derived from Greek word "*probios*", meaning "for life". It is beneficial microorganism or combination of such microorganisms, which would quickly establish in the gut to suppress colonization and growth of harmful bacteria.

Probiotics improve the microbial environment of a bird's intestinal tract by displacing harmful bacteria. Probiotics compete for receptors on the gut mucosa necessary for the attachment and proliferation of the microorganism. Probiotics can be used alone or in combination with other feed or drinking additives, generally regarded as safe.

Prebiotics are health-promoting substrates for microbes, encompassing fiber, polyphenols, polyunsaturated fatty acids, and conjugated linolenic acid. The incorporation of dietary probiotics, prebiotics and enzymes can enhance the intestinal microbiota composition. When administered at effective dosages, these compounds have the potential to optimize the microbial equilibrium within the GI system of poultry hosts. Thereby enhancing digestion and promoting overall well-being as well as protection against detrimental bacteria and pathogens. These strategies not only contribute to minimize the use of additives and ingredients associated with health disorders but also enhance the overall nutritional value of poultry products.

Probiotics, prebiotics and enzymes significantly reduce antibiotic usage, enhance poultry meat quality, to improve fat profile, prevent spoilage, extend the shelf life of fermented poultry products, and add health benefits to poultry meat.

Availability of good quality feed on sustainable basis at stable prices is the the biggest challenge of commercial poultry production. In spite of this challenge, commercial

poultry production ranks among the highest source of animal protein. The increase in the size of the poultry industry has been faster than other food-producing animal industries. The trade volume of poultry products has also increased parallel to the rapid growth of egg production and global poultry meat. The poultry meat industry has been more dynamic compared with the egg industry over these years.

As consumer demand has grown, the volume of poultry meat and eggs produced has also expanded to match this rise in retail demand. As a result, marketable poultry operations evolved into vertically integrated large corporations which encompassed all aspects of poultry production from breeder flocks to retail marketing. The commercial poultry industry experienced tremendous changes in growth of all phases from the hatchery to broiler and layer farm practices along with meat and egg processing technological advances for long distance retail distribution.

Feed is the major element of the total cost of production for meat and egg production in the poultry industry. With improved stock, broiler birds can attain a weight of 2-3 kg within five to six weeks. However, this production capacity is subject to availability of good quality feed and disease control. With the current advent of excluding antibiotic growth promoters in poultry production in Asia, Europe and America. The issue of controlling enteric infections caused by pathogenic bacteria without the use of antibiotics becomes challenging. Mortality caused by infection is a major problem in the poultry industry. Such infections are responsible for reduced growth rates and consequent economic losses in poultry.

Enzymes are one of the many types of protein in biological systems. Their essential characteristic is to catalyze the rate of a reaction but is not themselves altered by it. They are involved in all anabolic and catabolic pathways of digestion and metabolism. It is common practice to name enzymes by adding the suffix “ase” to the name of the principal substrate. For example, β -glucanase is an enzyme that splits β -glucans, and proteases break protein. In last fifty years feeding of enzymes to poultry is major nutritional advances. The poultry industry readily accepts enzymes as a standard dietary component, especially in wheat and maize based rations.

Sources of enzymes: Enzymes were used in the preparation of foods long before there was any awareness of enzymes as such, possibly as long ago. Most of the enzymes

currently used in the food are from natural and synthetic.

Enzymes in poultry nutrition: The use of enzymes in animal feed is of great importance. Consistent increase in the price of feed ingredients has been a major constraint in most of the developing countries. Poultry do not produce enzymes for the hydrolysis of non-starch Polysaccharide present in the cell wall of the grains and they remain un-hydrolyzed.

Benefits of enzymes

1. Reduction in digesta viscosity (Diarrhoea)
2. Increase in available energy
3. Improvement in nutritional development
4. Health improvement

In animal production systems, GUTBLOOM is frequently used for improving the health status as well as production performances, feed conversion efficiency and immune responses especially in poultry (Layer & Broiler).



Fig. No. 1: Image of GUTBLOOM.

Application of probiotics (GUTBLOOM) in poultry

Probiotics maintain the proper balance of useful microbial population in the intestine of bird, which is important for the efficient feed conversion, growth, productivity and stimulation of birds' immune mechanisms to combat pathogens. The mechanism of action of probiotics in poultry production system includes establishing and maintaining healthy gut microflora, improving digestion and utilisation of nutrients, competitive exclusion of harmful bacteria/pathogens, decreases pH and releases various antibacterial substances, neutralization of toxins, competition for nutrients with pathogens, reduction in ammonia production and stimulation of the immune system. It has been proved that effective probiotics help to accelerate development of normal microflora in chicks and poultry. As feed additive, probiotics show a good impact on the poultry performance.

GUTBLOOM in Improving Digestion, Nutrient Metabolism and Utilisation of Nutrients

Probiotics help improving digestion, nutrient metabolism and utilisation of nutrients by offering digestible proteins, vitamins, enzymes and other important co-factors and by decreasing gut pH by production of lactic acids. As 'live enzyme factory' (Amylase, protease, lipase) enhances digestion and absorption of carbohydrates, proteins and fats, which also increases the feed conversion efficiency. Probiotics help in metabolism of minerals and synthesis of vitamins (Biotin, Vitamin-B1, B2, B12 and K), which are responsible for proper growth and metabolism. The effect of *Aspergillus oryzae* on macronutrients metabolism in laying hens might be of practical relevance. It is imperative to evaluate the interaction between indigenous digestive enzymes and the microbial metabolites used as probiotics, to better understand the mechanism action with respect to digestion process.

Effects of GUTBLOOM as growth promoters

As a group of growth promoters, the addition of probiotics to the diet of poultry has been found to improve growth performance, increase feed conversion efficiency and improves immune responses. A multispecies and chicken-specific probiotic (GUTBLOOM) preparation in powder form, consisting of *Aspergillus oryzae*, *Bifidobacterium bifidum*, *Bacillus subtilis*, *Bacillus coagulant*, *Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus bulgaricus*, *Lactobacillus delbruecki*, *Lactobacillus sporogens*, *Streptococcus thermophilus*, *Saccharomyces boulardii*, *Saccharomyces cerevisiae*, *Lactobacillus plantarum*, species isolated from the digestive tract of chickens was

recently developed for application in broiler production.

GUTBLOOM on immune response

Probiotics as an alternative to ABs are considered to improve the health status and immunity in poultry birds demonstrated that T cell immune system was improved by probiotics without compromising the growth performance of broilers. It is also proved that *Lactobacillus* influenced the chemokine gene expression and cytokines production in chicken. LAB improved the production of anti- and pro-inflammatory cytokines in the intestinal epithelium of broiler chicken. The cytokines production influences the overall immune system.

Effect of GUTBLOOM on egg production

Production and egg weight has been enhanced in layers supplemented with liquid or powder probiotics containing two types of microorganism., *Lactobacillus* and *Bacillus species*. GUTBLOOM contains both *lactobacillus* and *bacillus* species. As indicated by the supplementation probiotic increased egg production and decreased percentages of damaged egg in different layer farms. On the other hand, significant improvement in egg production was observed in hens fed with a mixed culture of probiotic (GUTBLOOM) preparation in powder form, consisting of Probiotics *Aspergillus oryzae*, *Bifidobacterium bifidum*, *Bacillus subtilis*, *Bacillus coagulant*, *Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus bulgaricus*, *Lactobacillus delbruecki*, *Lactobacillus sporogens*, *Streptococcus thermophilus*, *Saccharomyces boulardii*, *Saccharomyces cerevisiae*, *Lactobacillus plantarum*, Prebiotic [MOS & FOS] Enzymes (Xylanase, Protease, Pectinase, Phytase, Lipase, Beta glucoamylase, Cellulase acid) showed greater egg production than normal diet.

Increase of feed Intake and Digestion

Hen's intestinal bacterial flora plays a significant role in feed absorption and digestion. They participate in the metabolism of nutrients such as carbohydrates, proteins, lipids and minerals, as well as in the synthesis of vitamins. Adding *lactobacillus* in corn diet stimulates appetite and increases fat, nitrogen, calcium, phosphorus, copper, manganese, and their retainment in layers. In vitro studies have shown that digestive enzymes of *Lactobacillus* species are enriched in the intestine. It has been reported that *Lactobacillus* strains separated from a male chick showed amylase activities.

Prebiotics- General Concept and Mechanism

Prebiotics traditionally were represented by a limited set of carbohydrates and related compounds with Fructo oligosaccharides (FOS) and Mannan oligosaccharides (MOS) being among the more commonly employed in poultry research. These compounds are not utilized by the host animal or human consuming them but can serve as substrates by Particular bacteria such as bifidobacteria and lactic acid bacteria, increases the amount of lactic acid producing bacteria increases the amount of short chain fatty acids, activates carbohydrate receptor immune cells. It increases immune response.

Benefits and Usage recommendations of GUTBLOOM

GUTBLOOM should be used timely and regularly in drinking water and in feed in order to maintain a healthy balanced microflora to enhance both the health and productivity of birds. Specifically, the use of GUTBLOOM is recommended in the newly hatched chicks, stressful conditions, during antibiotic therapy, and as an alternative to antibiotic growth promoters. These could prevent diseases like early chicks mortality, GI disturbances like scouring, loss of appetite,improper digestion and poor absorption.

Antibiotics are often used as feed additives to suppress or eliminate harmful bacteria in intestine, and improve growth, feed efficiency and production performances. Antibiotics administered in disease conditions not only kill the targeted pathogenic bacteria but also destroy the general microflora of host which sometimes result in bacterial dysbiosis leading to diarrhoea and secondary infection that are even difficult to treat. Using probiotics with antibiotics maintains the required intestinal balance of microflora and reduces diarrhoea, without affecting the efficacy of antibiotics.

For optimum benefits probiotics must be given right from day 1 on a regular basis. The birds are always under stress and amidst of high infectious pressure, so, it would be better to supplement probiotic (GUTBLOOM) continuously. Booster dose is necessary to give during periods of stress. Probiotic (GUTBLOOM) should be given in feed or water by oral route and need be applied via drinking water in case of already pelleted feed.

CONCLUSION

GUTBLOOM contains numbers of probiotics, prebiotics and enzymes. Currently GUTBLOOM is widely used as probiotics in poultry to improve health, and reduce enteric pathogens in poultry. GUTBLOOM is available in pack size of 500 gm and 1 kg.

GUTBLOOM constitute a cost-effective alternative to antibiotic Growth promoters, and GUTBLOOM is generally recognised as safe without any reported side effects, shows no residue carry-over in eggs or meat and thereby no health hazards unlike use of antibiotics as feed supplement /growth promoters and reduces expenditure on therapeutics (Medicines/Antibiotics). Adding GUTBLOOM to the feed and drinking water the host receives a 'boost' to establish a proper microbial population in its gut which is responsible for developing natural resistance in birds to fight against various pathogens. With multiple utilities, these 'desirable microbes' hold much promise to function as an effective agent to maintain growth, production, diarrhoea and health in poultry operations.

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