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Study of Probiotic advantages for Chickens Raised without Antibiotics

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Abstract - Most emerging countries rely heavily on revenue from the poultry industry.There's a long history of using antibiotics to encourage growth. They help birds develop a stronger immune system and fight off sickness, and they also boost growth. Immunocompetence is defined as the capacity of an organism to mount a proper immunological response in reaction to antigen exposure. Since the 1940s, they have been widely implemented as feed additives in the industry of animal agriculture. It has been hypothesised that this impact arises from a complex biological relationship with intestinal microflora. The use of antibiotics as supplements in animals for the purpose of disease prevention and, in some instances, efficiency improvement, was legalised by the Food and Drug Administration in the US in 1951. Yet, antibiotic use can lead to drug-resistant microorganisms. As a result, antibiotic use has been reduced in favor of nutritional supplements like probiotics, which have been shown to have beneficial effects on growth and the immune system.This review paper compares the use of probiotics in chickens feed to the use of antibiotics, explains how probiotics work, and the cost-effectiveness of include them in poultry nutrition.

Keywords - Probiotics,Immuno competence , Poultry Industry , Intestinal Microflora , Antibiotics

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1. INTRODUCTION

"Probiotics" are the living bacteria that may be found in fermented beverages and foods like kombucha and yoghurt. Consuming probiotics, especially those belonging to the Lactobacillus and Bifidobacterium families (in sufficient quantities), has been linked to a variety of health benefits, including the maintenance of a healthy balance between the hundreds of good and harmful bacterial species resident in the gut. For more than 60 years, dietary antibiotics have been used to boost feed efficiency and growth performance in addition to controlling infectious diseases ***(Gadde et al., 2018)***. Long-term usage of antibiotics as feed additives may contribute to the emergence of bacteria that are resistant to antibiotics, which pose a risk if they are transmitted to humans. Government organisations in the United States, including the **Food and Drug Administration (FDA), testified in 2009** that the use of antibiotics to promote growth should be discontinued (FDA, 2009). Probiotics have not yet received FDA approval, though. Although this medicine is safe and effective, neither hospital formularies nor the standard of care may include it ***(Janvier et al., 2013).***

1.1 Probiotics Work With or Without Antibiotics

The idea that antibiotics have a performance-enhancing effect solely due to their ability to kill microorganisms is a MYTH. Therefore, taking both an antibiotic and a probiotic at the same time will not result in any additional health benefits of any kind. The widespread belief is that the mechanisms of action for each of the products are comparable, and that the use of probiotics is superfluous when antibiotics are being administered.

The second urban legend is that taking both the antibiotic and the probiotic at the same time will result in the antibiotic rendering the probiotic ineffective because of its antimicrobial properties. In regard to the probiotic bacteria's susceptibility to the antibiotic, this is another misconception or an oversimplification of the situation. Particularly, the spore-forming bacteria that make up probiotics are inherently resistant to the damaging effects of chemical agents (acids) as well as thermal stress. It's possible that the probiotics that don't form spores, like those based on lactobacillus, are the ones that are sensitive. Studies of the germinated probiotic bacteria's Minimum Inhibition Concentration (MIC) can be conducted in order to conduct additional sensitivity verification.

The TRUTH of the matter is that Chr. Hansen conducted in-depth research on this topic many years ago. Chr. Hansen has carried out a multitude of research studies over the course of the past decade to investigate the additive value of combining the use of a probiotic based on Bacillus with an antibiotic that is used as a feed additive. These results demonstrate Chr. Hansen probiotics are beneficial to performance whether or not an antibiotic feed additive is used concurrently, and regardless of the type of antibiotic that is fed to the animal (Table 2).

The ACTUAL explanation lies in the various and one-of-a-kind mechanisms of action that are exhibited by Bacillus-based probiotics that are both effective and ethical.

The following are some of the mechanisms of action that have been demonstrated to be associated with these products: competitive exclusion (direct and/or indirect), immuno-modulation, production of bacteriosin, and production of enzymes.

- **Exclusion from the Competition:**

The probiotic mode of action known as competitive exclusion can take place as a result of a wide variety of different mechanisms. The probiotic has an effect on intestinal cells in which it primarily occupies space, and this is the direct mechanism. The end result is that there is less room for harmful bacteria to populate the gut. The production of secondary metabolites, which have an effect on the probiotic bacteria's immediate environment, is the indirect mechanism. The proliferation of bacteria that produce lactic acid as a result of these metabolites is beneficial to the intestines.

- **Bacteriocin or antimicrobial peptide production:**

Bacillus-based probiotics that are effective at inhibiting the growth of pathogens produce antimicrobial substances. On the basis of in vitro research conducted on a variety of probiotic bacteria, it has been described that certain poultry pathogens are susceptible to probiotic bacteria's growth inhibiting and/or bacteriocidal effects. It has been demonstrated that certain Bacillus species, which are used in probiotics, are particularly effective (Svetoch et al., 2005; Teo and Tan, 2005; Latorre et al., 2016; Poormontaseri et al., 2017).

1.2 In OVO Injection Technology in Chicken's Researches

- The inovovaccination for Marek's vaccine was
- The first application for inovoinjectionand
- That was by Sharma and Burmesterin1982
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"Providing supplemental nutrients or vaccines to embryos of chickens". Inovoinjection (inovofeeding) of nutrientshas been developed byUni and Ferket.

Previous studies ofinovoinjection were conducted basedonthe following Assumption

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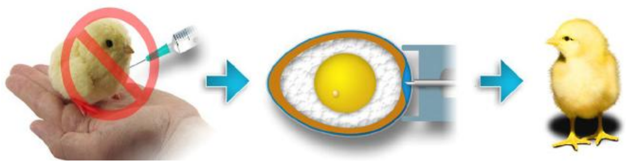
1) Selection for fast growth in broilers had a negative effect on immune function.
2) Thus , in ovo injection of nutrients (Amino Acids , Vitamins , Carbohydrates , Trace Minerals) could be a more effective option. Optimal performance of broiler at market age.

   Immediate access to feed and water.
3) In ovo vaccination was only a new idea.



In ovo vaccination against Market's disease , we can find machines capable of inject up to 70k eggs/hr. A good start for the chick at hatchery is at important factor in maximizing profits.

1.3 Advantages of in ovoInjection

1. In Ovo Injections have created new opportunities to improve the health and development of broiler chickens.
2. Promotes early gut maturation.
3. Improves posthatch immune status.

Numerous studies have examined how probiotics, such as Lactobacillus, Bifidobacterium, Bacillus, Streptococcus, Pediococcus, and Enterococcus, as well as yeast like Saccharomyces cerevisiae, affect a variety of chicken performance parameters, including immune function and feed efficiency in broilers. There have been reports of weight gain and increased food intake as a result of dietary probiotic supplementation. For instance, ***Mountzouris et al. (2007)*** supplemented broiler chicks from 1 to 42 days of age with a probiotic mixture at 1 g/kg of feed. Microorganisms that were obtained from the guts of healthy hens were incorporated in the probiotic mixture. These included Lactobacillus salivarius, Lactobacillus reuteri, Enterococcus faecium, Bifidobacteriumanimalis, and Pe-diococcusacidilactici. The total number of bacteria in the probiotic product, measured in colony-forming units (CFU), was $2*10^{12}$ CFU/kg of product.***Palamidi***

et al. (2016) recently examined the impact of avilamycin (AV), a growth promoter, and dietary viable or heat inactivated probiotic forms (PF) on broiler growth performance, nutrient digestibility, digestive enzyme activities, and gene expression associated with immune response. 450 Cobb male broilers that were one day old were used by the authors. They were divided into 6 treatments using a 3*2 factorial design with 5 replicates of 15 broilers. The findings of their study demonstrated that both viable and inactivated probiotics, alone or in combination with avilamycin, enhanced nutrient digestibility, and that dietary supplements had a positive impact on growth performance and induced an anti-inflammatory response at the ileal level.

- Inovoinjection (inovofeeding) of nutrients
- Has been developed byUni and Ferket.

In a different study by ***Hutsko et al. (2016)***, the authors hypothesised that probiotic and prebiotic supplementation (mannan oligosaccharide) would have a favourable impact on the intestinal microenvironment. The transcription of MUC2, the main mucin protein made by goblet cells in the small intestine, was examined after the authors gave young turkeys supplements of two commercial probiotics or a commercial mannan oligosaccharide. Additionally, from the moment of hatch until day 11, the intestinal morphology was examined. According to the study's findings, adding probiotics and prebiotics to a diet increased the villus' height and surface area.

- **Mechanism of Action of Probiotics**

The microbial ecology of the gut is maintained because the microenvironment of the gut has an effect on the nutrition, feed conversion, and disease of the host ***(Guarner and Malagelada 2003).*** It is common for the gut flora to shift in favour of potentially harmful bacteria during times of stress, illness, or treatment with antibiotics. These bacteria can cause symptoms such as diarrhoea and loss of appetite ***(Cremonini et al. 2002; Harish and Varghese 2006).*** Inflammatory, immunological, neurological, and endocrinological issues can arise as a result of an overgrowth of the harmful bacteria and the subsequent invasion of the system by those bacteria. The promotion of the growth of bacteria that are advantageous to health is one of the potential approaches that can be taken to restore equilibrium to the patient's physical state. The introduction of viable bacterial cells into the host organism could accomplish this goal. It is possible for probiotics to assist in the establishment of beneficial bacterial flora in the intestinal tract while simultaneously preventing the growth of pathogenic bacteria. These bacteria also secrete some digestive enzymes, which aid in the process of breaking down the feed ***(Jean et al. 2003)***. It has been demonstrated that there is a beneficial effect on the health of the host when 10^9–10^{10} colony forming units (CFU) of viable cells are consumed on a daily basis. There are a wide variety of species of microorganisms that have the potential to act as probiotics; however, the species of Lactobacillus and Bifidobacterium are the ones that are utilised the most frequently. Probiotics are living microorganisms that are thought to confer health benefits on the organism that consumes them. According to the definition that has been currently adopted by the FAO and WHO, probiotics are defined as live microorganisms that, when administered to a host in sufficient quantities, confer a health benefit on the host. In addition, non-pathogenic species of Saccharomyces, Streptococcus, and Lactococcus are also utilised in the production of probiotics. Beneficial effects of probiotics on the host can be either direct or indirect. These effects include improved barrier function, modulation of the mucosal immune system, production of antimicrobial agents, enhancement of digestion and absorption of food, and modification of the intestinal microflora (Fig. 1). **(Jean et al. 2003).**

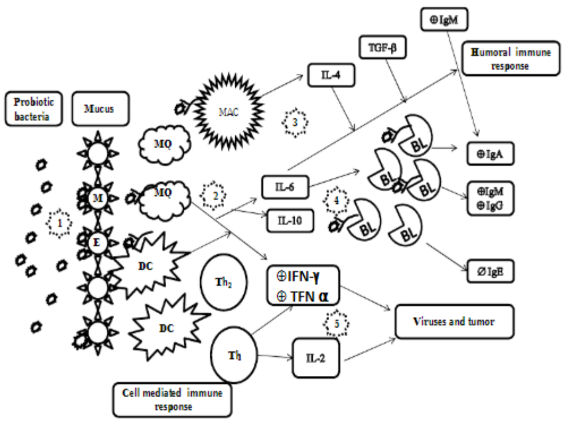


Figure 1: Hypothesised mechanism of immunomodulation by probiotics

Competition for colonisation sites on the intestinal epithelium, competition for nutrients, production of toxic compounds such as volatile fatty acids and bacteriocins, and modulation of the immune system are some of the proposed mechanisms by which indigenous intestinal bacteria inhibit pathogens. Other mechanisms include modulation of the immune system. It is possible for the inhibition process to involve one, many, or all of these processes in an equal and appropriate manner ***(Rolfe, 1991).*** In the following, a concise discussion of these mechanisms will be provided. Components including polysaccharides that are linked to the cell wall serve as the medium through which the mechanism of competition for colonisation sites on the intestinal epithelium is communicated ***(Soerjadi et al., 1982).*** The adherence of common bacteria to one another and to the intestinal epithelium is mediated by an acidic polysaccharide cell wall component. This prevents other bacteria from sticking to the epithelium, which in turn blocks all receptor sites (Fuller, 1975). The fight between beneficial probiotic bacteria and harmful pathogenic bacteria is a complicated and intense one. The pH of the luminal contents is another factor that plays a role in determining the competitive environment for accessible binding sites on the intestinal mucosa. Additionally, ***Fuller (1977 and 1978***) found that bacteria that thrive in acidic environments, such as lactobacilli, have a better chance of survival in environments with a pH that is lower than 7.

According to the findings of ***Dalloul et al. (2004),*** a probiotic treatment based on Lactobacillus that was administered to chickens that were challenged with Eimeriaacervulinasporulatedoocysts resulted in a greater number of IEL $CD3^+$, $CD4^+$, and $CD8^+$ cells than that which was administered to chickens that were fed a control diet. The chickens that were given probiotics had a significantly lower number of faecaloocysts compared to the control group. In addition, ***Haghighi et al. (2006)*** found that hens' blood and gut antibodies increased after being given probiotics. These findings were published in the journal Animal. Additionally, treatment with mannan-oligosaccharide and probiotics increased the levels of immunoglobulins G and M in turkeys and broiler chickens (***Cetin et al., 2005***). (Alavi et al., 2012). On the other hand, it has been hypothesised that certain effects of probiotics and prebiotics may be brought about by a modification of the quantity and type of chemical mediators known as eicosanoids. This theory has been put forward as a possible explanation. The synthesis of cytokines, which determine the kind and severity of inflammatory immune responses, is regulated by eicosanoids, which in turn regulate the production of cytokines ***(MilesandCalder,1998).*** Researchers from ***Munyaka et al. (2012)*** looked into the impact that yeast-derived carbohydrates (YDC) had on the performance of broiler chickens as well as their innate immunological responses. The scientists employed a conventional broiler diet that contained monensin (as a control), monensin in combination with bacitracin methylene disalicylate, and YDC therapy at concentrations of 0.02%, 0.01%, and 0.005% for starter, grower, and finisher, respectively.

1.4 Advantages of Probiotics for Chickens

Probiotics, like those in yoghurt, sauerkraut, kimchi, pickles, and other fermented foods, are just as good to human health as they are to fowl intestinal health. Adding some probiotics to your chickens' diet can help keep those butts fluffy! Chickens, ducks and geese all benefit from added probiotics in their diet from hatch right up to laying age and beyond. Probiotics help ***boost good bacteria*** levels in the intestines and maintain optimal health. They also ***aid in digestion*** and assist in nutrient absorption which will result in a ***better feed conversion ratio***, meaning your flock will need to eat less to get the same nutrients out of their feed.Probiotics help ***reduce fly problems*** in your coop and run area because the feces of flocks that consume probiotics ***smells less.***Poop from flocks that have probiotics added to their regular diet ***creates less ammonia***, thereby making for improved bedding and air quality in your coop. Probiotics also ***aid in composting,*** allowing bedding materials and other waste to break down more quickly.Probiotics form a barrier that ***prevent bad bacteria from attaching*** to the intestinal walls. They support beneficial microflora in the intestines and ***inhibit pathogen growth.*** Theyalso help boost egg productivity. They support the immune system in general and increase growth rates in poultry.

Probiotics have the potential to be categorised as functional foods. Functional foods are defined as those that have an effect on the body's functions in a way that is beneficial to the health of the individual, or if the effect of the food extends to the physiological or psychological levels in addition to the traditional nutritional effect. Probiotics are living microorganisms that, when administered to a host in sufficient quantities, have the potential to improve that host's overall state of health. The most prevalent kinds of probiotics include lactic acid bacteria (LAB), bacillus, and bifidobacteria***(Parvez et al., 2006; Roberfroid, 2000).*** The probiotic bacteria exert a competitive effect in the digestive tract and create bacteriocins, which inhibit the growth of other bacteria through an antibiotic mechanism ***(Patterson and Burkholder, 2003).***

1.5 Influence of probiotics on quality of chicken meat

Because it is packed with high-quality proteins and essential amino acids, as well as lipids and essential fatty acids, vitamins, and minerals, chicken meat plays an important part in human nutrition ***(Givens, 2005).*** More attention is being paid to chicken meat production in addition to the quality that is expected. Because it is quicker and cheaper than the production of other meats (pork, beef, etc.), because there are no religious or cultural restrictions for consumption, because it has desirable sensory parameters, because it has a positive aspect on human health (chicken meat has a low fat and high protein content), and because it is the most popular type of meat consumed in the world. One of the most significant obstacles that the chicken industry must overcome in developing nations is the raising of production efficiency, but first and foremost, the raising of feed conversion, which necessitated the addition of antimicrobial agents.substances, along with other naturally occurring products ***(Paryad et al., 2008).*** The use of probiotics is the most recommended strategy for expansion. stimulation through the utilisationof physiological potentials and mechanisms that are present in the host animal. By making use of probiotics, It is possible to achieve similar effects to those achieved by using antibiotics, but the only difference is that unintended consequences are not experienced. (leftovers, hold time, resistance, allergy triggers, and such as genotoxicity, etc) ***(Sinovec et al., 2000).***There is a lack of consensus regarding the mechanisms by which probiotics exert their effects. Probiotics, according to some authors, work in a manner that is analogous to that of the normal microflora of the digestive tract in one or more ways, such as by inhibiting the growth of microflora, neutralising toxins, causing metabolic disorders in other bacteria, forcing competition for adhesive sites, and stimulating the immune system. In addition to these, we must not disregard the production of vitamins or the restoration of normal intestinal micro flora after treatment with antibiotics ***(Fuller, 1989*)**. Economy, that is, the increase in productivity is primarily defined as probiotics as being based on the increased digestibility and absorption of lipids, proteins, and carbohydrates. Probiotics are defined as live organism nutrition.

There haven't been many studies done on how dietary supplementation with probiotics affects the modulatory effect it has on the lipid profile of broilers. According to ***Salma et al. (2007),*** the addition of bacteria (Rhodobactercapsulatus) to the diet of broilers may help improve their fatty acid profile. According to the findings of Yang et al. (2010), ingesting Clostridium butyricum at a concentration of 1.6 x 10^{10}cfu/g moderately reduced the ratio of n-6: n-3 fatty acids in breast muscles while simultaneously increasing eicosapentaenoic acid (EPA) and total n-3 fatty acids. In the same research, adding C. butyricum to the diet of broiler birds significantly decreased the amount of shear force the meat exhibited. This study found that there is a positive correlation between the amount of intramuscular fat present in breast muscle and the amount of shear force. Broilers were given oligosaccharide prebiotics and Lactobacillus fermentum probiotics at a dose of 10^9cfu/g in a study that was carried out by ***Ma- teova et al. (2008).*** The researchers found that the broilers' serum cholesterol levels and total lipids dropped after receiving this treatment. Similar findings were reported by ***Jin et al. (1998),*** who found that the serum cholesterol levels of broilers that were given diets that were enriched with Lactobacillus cultures had significantly lower levels of cholesterol.

1.6 Oxidative Stress in the Poultry Gut : Potential Challenges

- **Stress Due to Oxidation**

The environmental, nutritional, microbiological, and management factors that have a negative impact on poultry health and production are the causes of stresses that occur in commercial poultry operations. Oxidative stress is the culmination of all of these other stresses. An imbalance between the production of free radicals and the body's endogenous antioxidant defence can cause oxidative stress in the cells and tissues of the body. This stress can result in lipid peroxidation, protein nitration, damage to DNA, and apoptosis. Free radicals are constantly bombarding cells because of the physiological oxygen metabolism that they are a part of .At specific concentrations, reactive oxygen species (ROS) and reactive nitrogen species (RNS) can function as signalling molecules that are important to homeostasis. However, oxidative stress can be caused by either an excessive amount of ROS and RNS being produced or an inefficient amount of their being scavenged. ROS, which include superoxide, hydrogen peroxide, and the hydroxyl radical radicals, are generated by oxygen metabolism and further balanced by the rate of oxidant formation and the rate of oxidant elimination. ROS can be thought of as a family of reactive oxygen species (ROS). Catalase is responsible for the breakdown of H_2O_2 into water and oxygen. However, superoxide dismutase (SOD1 and SOD2) are responsible for the reduction of lipid hydroperoxides by incorporating glutathione .Selected cells in the intestinal mucosa and sub-mucosal regions are the ones that express the RNS, which are by-products of the nitric oxide synthases (NOS).

1.7 Stress Due to Oxidation Associated With Heat Stress From the Environment

The high temperature is one of the most difficult environmental stressors that are associated with the production of poultry . Because it causes a redox imbalance between the pro- and anti-oxidants in favour of the prooxidants, heat stress is one of the most important contributors to the overall level of oxidative stress in the body. It has been demonstrated that heat stress can cause changes in the amount of feed consumed, poor growth performance, immunosuppression, hypoxia, and high mortality. The quality of the chicken's meat can also be diminished by heat stress .Birds that are subjected to cyclic heat stress have smaller crypt depths, mucous areas, and villus heights in their small intestines ,which has a negative effect on the amount of nutrients that are absorbed. Intestinal epithelial cells can be damaged by heat stress, and apoptosis can contribute to intestinal hyperpermeability, which in turn causes the influx of bacterial products from the intestinal lumen into the circulatory system, which in turn affects organ systems. Heat stress can also cause apoptosis. The mitochondria are responsible for the production of the reactive oxygen species (ROS) components, which include superoxide anions, hydrogen peroxide, and hydroxyl radicals. These ROS components serve as signaling intermediates. Under physiological conditions, the ROS that are produced are swiftly eliminated by the antioxidant enzymes that are generated. There have been a number of studies that link oxidative stress with heat stress or lipopolysaccharide (LPS). These studies suggest that there is a synergistic augmenting of cell death and increased ROS generation in specific cells . The chicken hypothalamus, pituitary, and adrenal axis are also activated by heat stress. This activation leads to an increase in serum corticosterone, which, in turn, leads to a reduction in food intake, body weight gain, relative immune organ weight, and innate immunity.

Heat stress did not have any effect on the serum concentrations of copper, zinc, or manganese in the birds when compared to those in the thermoneutral group. However, the concentrations of all of the trace minerals were raised by the MOS. It was determined that supplementation with MOS or PM, either on their own or in combination, might mitigate some of the negative effects of heat stress. Additionally, it was discovered that the prebiotic mannano-ligosacharide, when combined with a variety of different probiotics, increased body weight, decreased feed consumption, and improved the immunity of the gut in broiler chickens that were subjected to chronic heat stress ***(Sohail et al., 2012)***. Similarly, ***Ashraf et al. (2013)*** found that the number of intraepithelial lymphocytes, the number of goblet cells, and the differentiation of intestinal microflora were all improved in broilers that had been reared under cyclic heat stress.

1.8 The application of financial evaluation(cost-effectiveness) to the use of probiotics

Encouraged by the widespread desire among consumers for faster and more substantial gains in body weight from commercial broilers within the shortest amount of time possible, the researchers to develop broilers that have high yields strains. Researchers are making significant strides in improving gain in body weight while maintaining the lowest possible feed conversion ratio (FCR). The possession of such genetically enhanced stocks, with additional improvement achieved through dietary.The focus is currently on intervention. The application of the variety of feed additives and/or the amount of growth. A long time ago, the use of promoters became common practise. Several levels of antibiotics that fall below the therapeutic threshold in dietary habits were the primary contributors to the improvement in growth despite widespread condemnation of their application because of to microbial resistance ***(Menten, 2001; Sinol et al., 2012)***. Because of this, people are now turning to alternative methods as an alternative to antibiotics in the nutrition of poultry. Included in the alternatives, probiotics are currently being considered all over the world as safe ***(Roy, 2018; Junaid et al., 2018).***

Naturally, the effects that they have on productive characteristics are going to vary depending on a variety of different factors. The survival and consistency of probiotic organisms, the strain, the host specificity, the manufacturing process, the dose frequency, the health and nutritional status of birds, the age, the physiological stress level, and the genetics of the host are some of these factors ***(Chichlowski et al., 2007; Aalaei et el., 2018).*** The administration of probiotics was found to have beneficial effects by a number of authors ***(Corrêa et al., 2003; Vargas et al., 2002),*** while others found that the use of probiotics had no effect on the condition being studied ***(Yong et al., 2016; Hossain et al., 2012).*** Recent findings from an experiment carried out by ***Al-Khalaifa et al. (2019)*** indicate that the inclusion of Bacillus coagulans and Lactobacillus in the diet of birds has no impact on the productive performance of the birds. It is obvious that the inclusion of probiotics in the diet will drive up the cost of the feed, but there is a dearth of financial data in the published research .According to ***Rosen (1995),*** adding bacitracin probiotic to the diet of broiler chickens led to an increase in their live weight of between 1.5 and 2.6 kilogrammes during weeks 5 to 8 of the growth period. As a result, the annual net profit per thousand birds increased by £60. In addition, ***Gutierrez-Fuentes and colleagues (2013)*** investigated the impact of a commercial probiotic containing lactic acid bacteria (FloraMax-B11) on the growth performance, bone qualities, and morphometric analysis of broiler chicks. The authors also calculated the potential cost savings associated with including this probiotic in their research. The use of the probiotic led to both an increase in total body weight as well as an improvement in the ratio of body mass to feed consumed. The cost benefit analysis revealed that the increase in body weight of 100 g, when converted to a cost benefit ratio, suggested that there was a cost benefit of 1:22.57 for every dollar spent on this probiotic. This was determined by dividing the increase in body weight by the amount spent on the probiotic.

1.9 Future Probiotics in Poultry Properties

Animal nutrition standards have undergone significant changes as a result of EU legislation. Additionally, producers of chicken have been pushed to stop using traditional anti-microbial treatments due to increased customer knowledge. Probiotics are now a great tool for preventing the spread of harmful bacteria and germs that are resistant to antibiotics [163]. Due to the push to increase bird mass gain, the starting point in practise was muscle mass gain. Understanding the incredibly intricate ecosystem in the intestines was necessary for a breakthrough in this form of therapy. Breeders are currently concentrating on limiting and stopping the spread of harmful bacteria. The feed additive market may in the future emphasise the advantages, such as the maintenance of normal microflora or more careful selection.

2. CONCLUSION

In conclusion, the data from the economic analysis that were obtained from the probiotic studies in broilers indicated that the probiotic supplementation may not always be more feasible and economical to obtain maximum profitability from broiler production. As a result, additional research in the field is currently being conducted.This review on using probiotics as feed additives confirms that they are worthy successors to AGP, reproducing their positive effects on the raw material obtained. Meat parameters, such as cholesterol, fatty acid profile, and oxidative stability of the meat are all improved by the addition of probiotics. Egg shells are less susceptible to injury, the weight of eggs, and their size is increased, as well as the laying itself. The use of probiotics also has a therapeutic basis, due to its bactericidal and bacteriostatic properties. This is due to competitive interactions between probiotic and pathogenic bacteria and innate immune stimulation. Probiotics help to prevent campylobacteriosis, coliobacteriosis, and salmonellosis, which are among the leading zoonoses. In addition to probiotic immunomodulation, these feed additives leave a positive impact on the gastrointestinal morphology itself, especially the villi and intestinal cups of the intestines. During heat stress, the overall homeostasis of the body is disturbed, leading to abnormal metabolism caused by of abnormal levels of thyroid hormones. The effects are visible at the molecular level by changing the expression of genes, such as heat shock proteins. The addition of probiotics in chicken feed significantly decreased fat and increased the water content in drumstick and breast meat.The addition of probiotics in chicken feed caused big differences in acid value and acidity indicating that probiotics could have effect on fatty acid oxidation and change the taste of the meat. The use of probiotics and prebiotics may not always provide a positive response in poultry production. In contrast to the above, laying hens and broilers infected with salmonella entericaserovarEnteritidis (SE) were divided into groups fed control, probiotics, prebiotics and synbiotics. The results showed that laying hens and broilers fed probiotics and synbiotics did not influence SE infection. Probiotics support beneficial microflora in the intestines and inhibit pathogen growth. They also help boost egg productivity. They support the immune system in general and increase growth rates in poultry. Overall, hens who are fed probiotics maintain healthy weights and lay larger, better quality eggs with stronger shells.

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