Role of Probiotics in Control of Avian Coccidiosis

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Abstract: Fermented cereals products by lactic Acid bacteria are among the oldest fermented foods first documented in Egypt and Iraq 2000 to 3000 B.C. This subject of fermentation was first observed and then put on scientific basis by a great scientist named Elie Metcnikoff in 1907. Than in late 1940,s intensive attention was drawn on exploration of composition of gut bacteria. And by FAO and WHO in 2006 a complete definition of probiotics was given as live micro organisms giving beneficial health effects when given in feed. Now Lactobacillus,streptococcus and Bifidibacterium are used as an essential part of probiotic preparations for the treatment of parasitic disease of poultry sector called Coccidiosis caused by seven spp of Eimeria resulting in deadly destruction of GastroIntestinal Tract (GIT) epithelium and diarrhea which could be timely and impressively cured by probiotics preparations used in feed supplementations.

Keywords: Poultry • Coccidiosis • Probiotics

INTRODUCTION

Poultry, the domesticated species of birds including chickens, geese, duck and guinea fowl, are reared for meat and eggs. Poultry industry is a flourishing industry of livestock which contributes 2 % in national GDP of Pakistan (2008). It played a main role in the stability of mutton and beef prices. Commercial poultry in Pakistan was started in 1963 [1].

Avian coccidiosis is a major disease of poultry caused by parasite called Eimeria and Seven different spp of Eimeria are reported to cause coccidiosis not only in poultry but also in cattle and small animals like dogs and cats but the terrific economical impacts are being seen in poultry sectors. Several Eimeria species including E. acervulina, E. necatrix, E. miti, E. tenella, E. brunette and E. maxima are etiology of coccidiosis [2].

Birds mostly of younger ages become infected by accidental ingestion of oocysts of Eimeria that eventually excyst in the upper intestinal lumen into sporozoites. Passing through different developmental stages oocysts are shedded in feces which are resistant to environment Enterocyes are destroyed by Eimeria species, which results in enteritis and blood in diarrhea but the disease severity is species dependant. However it also causes immunosuppression and secondary infections, coccidiosis which is controlled mostly by chemotherapeutic, biological agents and by improving management [3]. Life cycle is short (4-6 days) and direct with sexual and asexual stages. In asexual life cycle, trphozoites develop into schizonts and merozoites termed as schizogony and merogony. Sexual phase starts when motile microgametes ooze out and fuse with macrogametes yielding zygote. This zygote develop into oocyst which is extracted to exterior in feces from the host [4].

Infections occur after viable oocyst ingestion from contaminated water, food or dust. Followed by oocysts swallowing, these are exposed to enzymatic actions in intestine and grinding in gizzard thus leading to liberation of sporozoites termed as excystation. Then sporozoites penetrate epithelial tissues of small intestine, transported by macrophages to depth of intestinal glands where advanced development start over [5].
Oocyst of Eimeria is hard and has persistent structure. It is resistant to chemical and mechanical as well as proteolytic degradation. In unsporulated form oocyst is non-infective which can survive up to 7 months in cecal tissues, it becomes infective on sporulation. Control measures for Eimeria include the medicinal strategies (with alternative higher doses of amprolium and polyester ionophores) and vaccine control using live preparations of either attenuated and non attenuated strains. Anticoccidials are categorized into two groups; ionophores that interfere passage of ions through cell membrane of parasite and cause its death and synthetic drugs or chemicals which inhibit various biochemical pathways of parasite [6]. But the draws backs of above described strategies are also reported because birds have now become resistant to the massive administrations of drugs and no other medicine is introduced for many years. Its substitute option was birds’ vaccination by live Eimeria oocysts, but poor management may induce severe reactions which may decline the performance of broiler flocks [7].

Attenuated vaccines were developed but these were expensive to be produced. Alternative strategies being sought for safer and effective control of Eimeria are use of botanicals and herbals. These are natural product and consist of new therapeutic ingredients against which resistance has not accomplished still [8]. While in case of vaccination a low safety margin with expensive cost productions are being reported. So now in the alternative remedial approaches for avian coccidiosis different probiotic products are used. probiotics are either nano or mixed cultures of live microorganisms used to improve the indigenous microflora of host when are applied to them. They enhance immunity and intestinal microflora resulting in proper digestion, proper feed intak, good feed conversion ratios and safe removal of environmental resistant oocysts of the parasite.

**Review of Literature:** The scientific studies have addressed through experimentation that commercially available preparation of Lactobacilli by trade name of primalac by its property of increasing interepithelial lymphocyte production is quite effective in the significant reduction of acervulina oocysts in coccidiosis when given to chickens from birth to six weeks latter [9].

Similarly another experiment was designed by parasitologists on birds infected with coccidial parasites using commercially available preparation of Mitomax (combination of saccharomyces and pedicoccus starins) which gave promising effect against E. tenela and acervulina by reducing the oocysts from 10 to 38%. While Mitogrow is also found to be good because it causes marked elevation in antieimerial antibodies. Tierney was a scientist who made investigations on interactions of Eimeria and chicken derived gut friendly microbial starins mainly of Lactobacilli which he extracted from different parts of chicken gut and put them for invitro testing. He concluded that all strains showed inhibition to the invasion of parasite by competitive exclusion mechanism. Similarly further researches of great scientists have shown tremendous effects of pedicoccus-based acidilacti probiotics use in feed supplementation. They effectively reduce the resistance of birds against medication and also helpfull in reducing the negative growth potential seen in coccidiosis of birds. The action mechanism working behind this fact is that probiotics inhibit pathogens in gut by producing antagonistic substances like ammonia, hydrogen peroxide which subdue the growth of harmful microbes in gut. Probiotics in past were used in the all poultry industry, because probiotics help inimmaintenance of the intestinal microflora, also improve feeding intake digestion and immune system stimulatints. Numbers of the studies have addressed the protection effects against *Eimeria* species which is responsible for poultry coccidiosis [9].

Commercially available preparations of probiotic (Mitomax, *Saccharomyces boulardii* and Mitogrow, *Pediococcus acidilactici*) are tested in the chickens subsequently in the patients infected with *E. acervulina*, *E. tenella* by using the experimentally described by Dalloul et al procedures. However Mitomax causes 10–38% reduction shed in oocysts, which are accompanied by an elevated level of the anti-*Eimeria* antibodies, Mitogrow causes elevation of the anti-*Eimeria* antibodies. Now a days evidence gave ideas that probiotics enhance the host immunity by improving vaccine response and influence of bacteria on host immunity as well as intestinal integrity which is against parasites [9]. Streptococcus, Saccharomyces, Enterococcus used as probiotics in avain [10, 11].

Klaenhammer [12] judged that *Pediococcus acidilactici* is a good source of probiotics, as belonging to the homofermentative gram- positive bacteria, which improve pH, osmotic pressures, temperatures and, able to colonized by inhabiting the digestive tract.

**CONCLUSIONS**

The most remarkable sign of avian coccidiosis is weight loss and growth retardation. So pedicoccus
Acidilacti-based probiotics are thought to be the best alternative remedial strategy. Through a series of experiments these have shown their worth in marked elevation of weight gain. These preparations provide protective immunity against several ssp of Eimeria. Some other probiotics are responsible of production of proteins peptides which cause reduction in pathogenic bacteria of gut and producing antiparasitic antibodies thus giving immunity against the parasite attack. So it is now wisely advisable to use these beneficial bacteria in feed supplementation of younger birds before and after attack of deadly parasite so that massive economic losses could be avoided in poultry industry.

REFERENCES