



# Probiotics Role in Control of Avian Coccidiosis



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## Abstract

Cereal products fermented by lactic acid bacteria are documented first in Egypt and Iraq during 2000-3000 B.C. These are one of the oldest fermented foods. In 1907, Elie Metchnikoff was the first scientist who not only observe but also put forward the scientific basics of fermentation. Then to explore gut bacteria intensive researches were made in late 1940s. In 2006 FAO and WHO give the complete definition of probiotics, living microbes beneficial for health provided in feed. For treatment of Coccidiosis probiotic combinations of different microbes such as Lactobacillus, Bifidobacterium and Streptococcus are used now a day. Coccidiosis, a parasitic disease mainly of poultry sector, caused by Eimeria species. Coccidiosis causes serious damage to the intestinal epithelium resulting in diarrhea. This problem can be effectively controlled by the use of feed probiotics.

**Keywords:** Cereal; Fermentation; Probiotics; Coccidiosis; Bifidobacterium; Lactobacillus; Streptococcus; Diarrhea; Geese; Duck; Sporozoites; Parasite; Hydrogen peroxide; Ammonia; Pedicoccus; Chemotherapy

## Introduction

Poultry include duck, geese, chicken and guinea fowl as domesticated birds which are mainly raised for eggs and meat purpose. Now days in Pakistan, poultry industry is flourishing with its maximum as layer population has been increased from 9.5 million (1995) to 27.50 million (2010). Similarly, broiler production has been increased from 72.80 million (1991) to 785 million (2010). These facts and figures shows how effectively and efficiently poultry industry is flourishing in Pakistan [1]. Eimeria, apicomplexan parasite, major cause of avian coccidiosis. There are about seven different species of Eimeria which not only cause disease in poultry but also in different domestic animal species such as cattle, dogs and cats. But it causes major economical loss to the poultry industry in Pakistan. Species of Eimeria causes coccidiosis in poultry industry are E. necatrix, E. miti, E. acervulina, E. tenella, E. maxima, and E. brunette [2].

Most of the times accidental ingestion of Eimeria oocysts cause disease in younger birds. Oocyst excyst into sporozoites in lumen of upper intestine. Shed in feces as environmental resistant oocyst after different developmental stages in host. As Eimeria species affect intestinal epithelium resulting into enteritis and diarrhea. Severity of this dependent upon specie of the Eimeria. Coccidiosis also lead to secondary infection due to immune suppression cause by it. Most of the time it is controlled

by management, chemotherapy and biological agents [3]. Life cycle of coccidiosis is very short almost of about 4-6 days. There are both sexual and asexual stages in life cycle of Eimeria. In asexual stages of the life cycle, trophozoites advance to shizonts and then merozoites respectively known as as shizogony and merogony. Sexual stage includes the formation of zygote by fusion of micro and macro gametes. This zygote further yields environmental resistant oocyst released in feces [4].

Infected water or feed ingestion lead to development of coccidiosis. Enzymatic action in intestine after swallowing of oocyst from infected feed or water source lead to the liberation of sporozoites, this process is known as excystation. In intestine sporozoites invade enteric epithelial cells where further invasion to glands takes place by macrophages and further development occur there [5]. Eimeria's oocysts are very hard and resistant to degradation by mechanical and chemical sources. Even proteolytic degradation of oocyst is very difficult. Oocyst can survive up to 7 months in non-infective un-sporulated form. But on sporulation it becomes ineffective [6].

## Control Strategies

Medicinal strategies for Eimeria control involved the use of amprolium along with polyeaster ionophores in higher doses.

Moreover live attenuated or un-attenuated vaccinal strains can also be used for the control of coccidiosis. Anti-coccidials further categorized into ionophores and synthetic chemicals. Ionophores interferes with ions transfer through plasma membrane of the parasite. This lead to the death of the parasite. Synthetic drugs interfere with biochemical pathways in parasite. But due to massive introduction of medicines in different combinations, resistance has been developed in the poultry birds. This is the serious problem as no other drug has been introduced along with above mentioned drugs for the control of coccidiosis. So, to combat this problem live *Eimeria* oocysts have been used as live vaccine. This lead to severe problem in broiler flock due to poor management [7-9]. We use herbals and botanicals as an alternative strategy to control coccidiosis as these are cheaper, effective and safer as compared to attenuated vaccines. As these are naturals so no resistance has been detected against them till yet. Now days we use culture of different microbes in feed in order to improve the indigenous microflora of the host [10].

### Support from Literature

Scientific studies had shown that primalac, lactobacillus preparation, proved effective against *E. acervulina*. As it enhance lymphocyte production in epithelial cells of the host if given six weeks after birth [11]. Parasitologists had also performed experiments by using the commercial preparation, Mitomax, a pediococcus and saccharomyces combination. It provided good results against *E. acervulina* and *E. tenella*. Tierney was the scientist who studied competitive exclusion of *Eimeria* species by lactobacillus bacteria obtained from the guts of the chicken. He performed all these studies in invitroenvironment [12]. Similarly, many other scientists have observed the effect of probiotics contain pediococcs and lactobacilli. These probiotics not only improve the growth of birds effected with coccidiosis but also proved helpful in reducing the resistance against medication. These probiotics actually produce substances like hydrogen peroxide and ammonia which inhibit the growth of these pathogenic microbes [13].

Different commercial preparations of probiotics available in market proved effective against coccidiosis. *Pediococcus acidilactici*, gram positive homo-fermentive bacteria, proved very effective in maintaining the pH of chicken gut. This also inhibit growth of *Eimeria* species there [14].

### Conclusion

Coccidiosis has caused huge economic loss to our poultry industry just due to loss bird's weight or by retarded growth of

the birds. So, in order to control that negative effects probiotics have proved very effective. As resistance had been developed against many drugs. So, it is worthwhile to use probiotics in order to remove *Eimeria* species by competitive exclusion.

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