

Effect of probiotics supplementation on immuno-competence and in prevention of experimental *Salmonella gallinarum* infection in broiler chicken

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Abstract

The efficacy of supplementing probiotics on immuno-competence and experimental *Salmonella gallinarum* infection in broiler chickens was studied. Forty, day old broiler chicks were randomly divided into two groups of 20 each. Chicks in group I were fed probiotics @ 1g/l of drinking water daily up to 7 weeks of age, while chicks of group II served as control. All the chicks were vaccinated with Newcastle disease vaccine 'F strain' at age of 5 days. After 6th week, 12 birds from both groups were challenged with *Salmonella gallinarum* infection and were observed for one week. Probiotics supplementation did not influence feed consumption and body weight. The HI titer against Newcastle disease vaccine, serum globulin and lymphocyte count was also not affected. However, the chicks fed probiotics were less susceptible to *Salmonella gallinarum* infection. There was only 10% mortality in Chicks of group I, whereas in-group II 50% chicks died. Histopathologically septicemic lesions were more severe in birds not fed probiotics, however, no difference was observed in the weight of bursa and spleen due to probiotics supplementation.

Key Words: Probiotics, immuno-competence, *Escherichia coli*, broiler

Introduction

Probiotics preparations may consist of single strain or more and even up to 8 strains and multiple strains are active against a wide range of conditions (Fuller, 1988). Probiotics also improve the productive performance of poultry (Sharma *et al*, 2001). On the basis of these informations, the present investigation was undertaken to study the effect of probiotics supplementation on immuno-competence and in prevention of experimental *Salmonella gallinarum* infection in broiler chickens.

Materials and Methods

Day old, 40 commercial broiler chicks were distributed in to two groups of 20 each. The chicks were reared under strict hygienic conditions and were maintained on commercial broiler mash having aflatoxin contents less than 30ppb, from 1st day till the end of experiment *ad-lib*. Chicks in group-I were fed probiotics @ 1g/l of drinking water daily up to 7 weeks of age, while chicks of group-II served as control. All the chicks were vaccinated with Newcastle disease vaccine 'F strain' at age of 5 days. After 6th week 12 birds from both groups were challenged *Salmonella gallinarum* infection, and were observed for one week. From rest of 8 birds of each group blood was collected at 6th and 7th week to study various parameters i.e. serum protein, albumin, globulins, lymphocyte count and antibody titer against Newcastle disease vaccine using Haemagglutination inhibition technique. The body weight of chicks and feed conversion ratio (FCR) were also determined at 6th and 7th week. At 7th week birds were sacrificed and comparative size of spleen and Bursa of fabricius were observed and weight of these organs was also taken.

The birds given *Salmonella gallinarum* infection were observed daily for clinical signs and mortality for seven days. The birds which died during the experiment were subjected to thorough post mortem examination and gross lesions were recorded. Representative tissue samples from liver and heart were collected in 10% buffered formal saline for histopathological examination.

Results and Discussion

The various parameters at 6th and 7th week are presented in table.

Table: Values of different parameters in both groups at 6th and 7th week \pm S.E.

Parameter	Week	Group-I	Group-II
Body weight (g)	6 th	733.20 \pm 15.51	723.20 \pm 15.51
	7 th	925.00 \pm 16.12	911.23 \pm 17.82
FCR	6 th	3.52	3.12
	7 th	2.89	3.00
Total protein (g/100ml)	6 th	3.92 \pm 0.16	4.22 \pm 0.26
	7 th	4.12 \pm 0.13	4.13 \pm 0.08
Albumin (g/100ml)	6 th	2.28 \pm 0.14	2.30 \pm 0.15
	7 th	2.46 \pm 0.11	2.44 \pm 0.11
Globulin (g/100ml)	6 th	1.68 \pm 0.08	1.92 \pm 0.04
	7 th	1.66 \pm 0.08	1.69 \pm 0.14
HI titer (log ₂)	6 th	6.80 \pm 0.37	6.80 \pm 0.37
	7 th	7.20 \pm 0.20	7.00 \pm 0.45
Lymphocyte count (10 ³ /cmm)	6 th	15.47 \pm 0.73	16.06 \pm 0.37
	7 th	16.13 \pm 0.49	16.22 \pm 0.70
Bursa weight (mg/100g body wt.)	6 th	343.83 \pm 6.35	352.74 \pm 4.89
	7 th	298.92 \pm 7.96	293.75 \pm 2.78
Spleen weight (mg/100g body wt.)	6 th	143.23 \pm 4.21	149.83 \pm 4.72
	7 th	149.59 \pm 4.02	146.62 \pm 4.70

From present results it is clear that probiotics used neither influenced body weight, FCR, nor acted as immuno-modulators. The HI titer against ND vaccine, serum globulin, lymphocyte count and weight of lymphoid organs were not affected as compared to control. Similarly, Panda *et al* (2000) also reported that in broilers fed probiotics, there was no significant difference in parameters like body weight, weight of spleen and Bursa, FCR and feed consumption. However, chicks started showing signs of dullness, depression, drooping and huddling after giving *Salmonella gallinarum* infection. The feed and water intake was drastically reduced. These symptoms were observed as early as 12-14 h after giving *Salmonella gallinarum* infection in group-II, but the clinical symptoms in group-I were mild and started appearing 48h post infection. Similarly, in week time there was only 10% mortality in chicks of group-I, whereas in group-II 50% chicks died. Bhatt *et al* (1977) has also reported minimum chick mortality in broilers fed probiotics.

The gross pathological changes included presence of fibrin layer over heart and liver, which was thick in group-II chicks, whereas in group-I changes were minute. Histopathologically also liver and heart showed mononuclear cell infiltration and fibrinous layer in group-II chicks whereas group-I chicks showed only granulomatous lesions in liver and slight hemorrhages in heart.

Several mechanism have been suggested for inhibition of growth or reduction in the number of micro-organisms by probiotics. Competition for attachment sites may be important in prevention of *Salmonella gallinarum*, because attachment to epithelium is pre-requisite for colonization of organisms (Stavric *et al*, 1993). The probiotics contained various non-pathogenic microorganisms, which probably formed a physical barrier thus preventing the

attachment of *Salmonella gallinarum* to the caecal wall as also reported by Hakkinen and Schneitz (1998).

It is concluded from present investigation that the probiotics used though not act as immuno-modulator but are very effective in controlling intestinal pathogens.

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