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EFFECTS OF PROBIOTICS SUPPLEMENTATION ON GROWTH PERFORMANCE AND CERTAIN HAEMATO-BIOCHEMICAL PARAMETERS IN BROILER CHICKENS

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ABSTRACT

The study was carried out to know the effects of probiotics (Protexin® Boost) supplementation on growth performances and haemato-biochemical parameters of "Shaver Star Bro" broiler chickens during the period from September to October 2003. A total of 20, day-old broiler chickens were randomly assigned into four equal groups (n = 5) as A, B, C and D. Group A was considered as control fed with commercial ration while group B, C and D were fed with commercial ration with the addition of 1 g, 2 g and 3 g probiotics / 10 litres drinking water respectively up to 35 days of age. The results showed that the body weight gains corresponding to the different treatments were differed significantly ($p < 0.01$) at the 1st, 2nd, 3rd, 4th and 5th weeks of age. The meat yield characteristics corresponding to the different treatments did not differ significantly ($p > 0.05$) whereas bursa weight differed significantly ($p < 0.05$) among the different groups. The mean values of Hb, PCV and ESR corresponding to the different treatments were significantly ($p<0.01$) differ. Triglycerides, HDL, LDL, SGPT and SGOT values corresponding to the different treatments were also differed significantly ($p < 0.01$). The findings suggest that supplementation of probiotics has significant effects on live weight gain and haemato-biochemical parameters of broiler chickens.

Key words : Probiotics, effects, growth, haemato-biochemical parameters, broiler chickens

INTRODUCTION

There is a public disapproval of using antibiotics and growth hormones in poultry production due to their residual effects in meat tissues. This has encouraged the use of probiotics in poultry feeding in many countries of the world (Hose and Sozzi, 1991). The use of dietary additives such as probiotics is gaining momentum because of their beneficial effects on growth rate and food efficiency (Dilworth and Day, 1978) and in the prevention of intestinal infections (Fuller, 1982). Mudalgi *et al.* (1993) recorded higher body weight, better feed efficiency and lower mortality rate of birds due to feeding of lactobacillus (Probiotics) to them but reports on effects of probiotics in broiler chickens in Bangladesh are very limited in inland literatures. Therefore, in view of the potentially beneficial effects of probiotics supplementation, the present study was undertaken to find out the effect of probiotics supplementation on the growth performance and certain haemato-biochemical parameters in broiler chickens.

MATERIALS AND METHODS

The present research was conducted during the period from September to October 2003 in the Department of Physiology, Bangladesh Agricultural University, Mymensingh. A total of 20 day-old broiler chickens of "Shaver Star Bro" strain were purchased from Kazi Farms Ltd., Dhaka. The birds were randomly assigned into four equal groups as A, B, C and D, each consisting of 5 chickens and were reared in well partitioned area in a room under strict hygienic management in the experimental poultry shed of the Department of Physiology, BAU, Mymensingh. The birds of Group B, C and D were fed with commercial ration (Quality Feeds Ltd., Bangladesh) with the addition of 1 g, 2 g and 3 g probiotics (Protexin® Boost, Novartis, Bangladesh) per 10 litres of drinking water respectively from day-old to 35 days of age whereas group A served as control fed only with commercial ration (Quality Feeds Ltd., Bangladesh) and fresh drinking water *ad libitum*. Vaccination schedule for Newcastle and Infectious Bursal diseases was maintained properly. The body weight of each bird of all the four groups was weighed weekly during the 35 days experimental period. All the birds from each group were sacrificed to calculate the meat yield and organ characteristics at the end of the experiment at 35 days of age. Birds were dissected according to the procedure of Jones (1984) and to facilitate slaughtering, all the birds had their feed and water withdrawn 12 hours prior to sacrifice. Breast meat with keel bone, thigh meat with thigh bone, drumstick meat with drumstick bone and wing meat with wing bone were separated from the carcasses. Weights of the meat and internal organ were taken by electrical weight machine and expressed in percentage of the live weight. Blood sample for haematologic and serum analyses were collected at the end of the experimental period in double-oxalate containing and plain tubes, respectively.

The haematological studies were performed within two hours of blood collection. Total erythrocyte count (TEC) and haemoglobin (Hb) were determined by Haemocytometer and Hellige Hemometer (Sahli type) respectively and packed cell volume (PCV) and erythrocyte sedimentation rate (ESR) were measured by Wintrobe haematocrit tube as described by Lamberg and Rothstein (1977).

Serum biochemical (Total cholesterol, Triglycerides, High density lipoprotein and Low density lipoprotein cholesterol) analyses were performed colorimetrically using Humalyzer 2000 (Human type, Germany). Serum glutamate oxalo-acetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) values were measured by using Reflotron® analyzer (Imahnheim, Boehringer, Germany).

Analysis of variance was done with the help of computer package MSTAT-C. The mean differences among the results of different treatments were determined as per Duncan's Multiple Range Test (Gomez and Gomez, 1984).

RESULTS AND DISCUSSION

Effect of probiotics on body weight gain is shown in Table 1. The body weight gains corresponding to the different treatments were differed significantly ($p < 0.01$) at the 1st, 2nd, 3rd, 4th and 5th week of age (Table 1). Highest body weight gain was recorded in group C (2 g probiotics / 10 litres of drinking water) at all the levels of age (Table 1). The results obtained coincide with the findings of Singh *et al.* (1999), Pradhan *et al.* (1998) and Cavazzoni *et al.* (1998). But the present findings differ from the findings of Panda *et al.* (1999) who stated that the body weight gain at the 6th week of age were similar in all the groups of dietary treatments.

Table 1. Effect of probiotics (Protexin® Boost) supplementation on body weight gain in broiler chickens

Age of chickens	Groups of broiler chickens (n = 5)				Level of significance
	A (Control)	B (1 g probiotics supplemented)	C (2 g probiotics supplemented)	D (3 g probiotics supplemented)	
1st	131.50 ± 6.63	140.40 ± 6.63	152.94 ± 6.63	137.32 ± 6.63	**
2nd	415.80 ± 15.77	476.40 ± 15.77	504.60 ± 15.77	482.00 ± 15.77	**
3rd	814.34 ± 18.85	780.22 ± 18.85	949.88 ± 18.85	896.18 ± 18.85	**
4th	1100.00 ± 43.17	1119.80 ± 43.17	1372.00 ± 43.17	1157.40 ± 43.17	**
5th	1282.00 ± 51.09	1292.00 ± 51.09	1605.00 ± 51.09	1388.60 ± 51.09	**

**Indicates significant at $p < 0.01$.

The meat yield characteristics and organ traits of different groups are presented in Table 2. From the Table 2, it was evident that the meat yield characteristics corresponding to the different treatments did not differ significantly ($p > 0.05$), but the percentages of meat yield in the birds of group C that were fed with 2 g proboitics in addition of commercial feed increased mathematically. The results found in the study are in agreement with the earlier reports of Baidya *et al.* (1994) and Mandal *et al.* (1994) who observed that probiotics feeding did not have any influence on the carcass yield. The present findings also revealed that there was no significant ($p > 0.05$) differences in the weight of liver, heart, gizzard and spleen among the different groups but a significant ($p < 0.05$) difference in bursa weight was found (Table 2). On an average, bursa weight was highest (0.34 ± 0.01 g) in group C. This finding partially supports the finding of Mohan *et al.* (1996) who found that supplementation of probiotics had no effect on weight of internal organs.

The results of haemato-biochemical parameters are summarized in Tables 2 and 3. The mean values of Hb, PCV and ESR corresponding to the different treatments were significantly ($p < 0.01$) differed (Table 2). The total erythrocyte count also differed significantly ($p < 0.05$). The highest mean values of TEC (2.54 ± 0.06 10^6 / mm^3), Hb (8.00 ± 0.22 g%) and PCV (33.40 ± 0.81%) were recorded in chickens of group D that were supplemented with 3 g probiotics (Protexin® Boost) in addition to the commercial feed. From the Table 3, it was revealed that erythrocyte number decreased significantly ($p < 0.05$) in group C (2.32 ± 0.03 10^6 / mm^3) as compared to that of control (2.49 ± 0.09 10^6 / mm^3). Haemoglobin concentration increased insignificantly ($p > 0.05$) in group D (8.00 ± 0.22 g%) as compared to that of control (6.20 ± 0.71 g%). Erythrocyte sedimentation rate of the broiler chickens increased significantly ($p < 0.05$) in group C (1.80 ± 0.20 mm in 1st h) as compared to that of control (0.80 ± 0.20 mm in 1st h). Packed cell volume of D increased (33.40 ± 0.81%)

Table 2. Effects of probiotics (Protexin® Boost) on meat yield, organ weight and certain haemato-biochemical values in broiler chickens

Parameters	Groups of broiler chickens				Level of significance
	A (Control)	B (1 g probiotics supplemented)	C (2 g probiotics supplemented)	D (3 g probiotics supplemented)	
Meat yield (% of total body weight)					
Breast	19.80 ± 0.03	19.36 ± 3.24	20.25 ± 0.07	17.11 ± 0.88	NS
Thigh	13.03 ± 2.77	11.96 ± 2.75	13.70 ± 2.67	10.99 ± 5.13	NS
Drumstick	09.78 ± 0.52	07.65 ± 0.95	10.55 ± 0.49	08.03 ± 0.49	NS
Wing	06.51 ± 1.68	05.96 ± 0.84	06.54 ± 1.96	05.27 ± 1.34	NS
Organ weight (% of total body weight)					
Liver	2.54 ± 0.16	2.33 ± 0.21	2.20 ± 0.15	2.26 ± 0.13	NS
Heart	0.56 ± 0.01	0.58 ± 0.04	0.52 ± 0.03	0.52 ± 0.02	NS
Gizzard	3.44 ± 0.16	3.76 ± 0.29	3.28 ± 0.25	3.39 ± 0.14	NS
Spleen	0.09 ± 0.01	0.09 ± 0.01	0.07 ± 0.05	0.08 ± 0.05	NS
Bursa	0.23 ± 0.02	0.33 ± 0.08	0.34 ± 0.01	0.30 ± 0.02	*
Haemato-biochemical					
TEC (10^6 / mm^3)	2.49 ± 0.09	2.35 ± 0.04	2.32 ± 0.03	2.54 ± 0.06	*
Hb (g%)	6.20 ± 0.71	7.70 ± 0.12	6.70 ± 0.30	8.00 ± 0.22	**
PCV (%)	32.20 ± 0.37	31.80 ± 0.37	32.00 ± 0.32	33.40 ± 0.81	**
ESR (mm in 1st h)	0.80 ± 0.20	1.20 ± 0.37	1.80 ± 0.20	1.40 ± 0.24	**
Total serum cholesterol (mg / dl)	137.52 ± 1.72	135.92 ± 1.19	138.46 ± 0.94	131.56 ± 5.22	NS
Triglycerides (mg / dl)	92.14 ± 1.67	86.74 ± 1.80	68.28 ± 2.65	82.16 ± 3.23	**
HDL (mg / dl)	54.53 ± 1.13	103.02 ± 0.27	106.98 ± 2.81	112.00 ± 3.15	**
LDL (mg / dl)	36.93 ± 0.93	15.71 ± 0.75	10.15 ± 3.10	26.12 ± 1.65	**
SGPT (U / L)	4.76 ± 0.23	19.02 ± 0.74	16.28 ± 0.81	14.79 ± 1.15	**
SGOT (U / L)	187.32 ± 3.71	261.52 ± 2.06	289.66 ± 9.77	284.02 ± 5.76	**

*Indicates significant at $p < 0.05$, **Indicates significant at $p < 0.01$, NS = Non significant at $p > 0.05$.

Table 3. Individual comparison of the mean values of certain haemato-biochemical parameters corresponding to the treated groups with the mean of control group

Parameters	t-value and corresponding p-value for the treated groups		
	Group B (1 g probiotics supplemented)	Group C (2 g probiotics supplemented)	Group D (3 g probiotics supplemented)
TEC (10^6 / mm^3)	1.03^{NS} (0.363)	2.75* (0.051)	-0.337^{NS} (0.753)
Hb (g%)	-2.03^{NS} (0.112)	-0.99^{NS} (0.379)	-2.43^{NS} (0.072)
PCV (%)	0.59^{NS} (0.587)	0.34^{NS} (0.749)	-2.45^{NS} (0.070)
ESR (mm in 1st h)	-1.00^{NS} (0.587)	-3.16* (0.034)	-2.45^{NS} (0.070)
Total serum cholesterol (mg / dl)	1.42^{NS} (0.230)	-0.61^{NS} (0.577)	1.03^{NS} (0.362)
Triglycerides (mg / dl)	3.04* (0.038)	6.55** (0.003)	19.26* (0.041)
HDL (mg / dl)	-51.87** (0.000)	-15.29** (0.000)	-15.10** (0.000)
LDL (mg / dl)	13.70** (0.000)	7.15** (0.002)	9.07** (0.001)
SGPT (U / L)	-16.12** (0.000)	-16.20** (0.000)	-8.380** (0.001)
SGOT (U / L)	-14.18** (0.000)	-9.64** (0.001)	-43.66** (0.000)

*Indicates significant at $p < 0.05$, **Indicates significant at $p < 0.01$, NS = Non significant at $p > 0.05$.

insignificantly ($p > 0.05$) as compared to that of control (32.20 ± 0.37%). The results of haematological parameters are contrary to Mohan *et al.* (1996) who reported that the packed cell volume did not show any variation as a result of probiotic supplementation but there was a significant ($p < 0.05$) reduction in haemoglobin content by the addition of probiotics.

From Table 2, it was evident that there was no significant ($p > 0.05$) difference of cholesterol values among the groups. Triglycerides, HDL, LDL, SGPT and SGOT values corresponding to the different treatments were differed significantly ($p < 0.01$). From Table 3, it can be inferred that triglycerides values of broiler chickens reduced significantly ($p < 0.01$) in group C (68.28 ± 2.65 mg / dl) and also reduced significantly ($p < 0.05$) in group D (82.16 ± 3.23 mg / dl) and group B (86.74 ± 1.80 mg / dl) respectively than that of the control (92.14 ± 1.67 mg / dl). But LDL values reduced significantly ($p < 0.01$) in groups C (10.15 ± 3.10 mg / dl), B (15.71 ± 0.75 mg / dl) and D (26.12 ± 1.65 mg / dl) respectively than that of the control (36.93 ± 0.93 mg / dl). HDL values increased significantly ($p < 0.01$) in groups D (112.00 ± 3.15 mg / dl), C (106.98 ± 2.81 mg / dl) and B (103.02 ± 0.27 mg / dl) than that of the control (54.53 ± 1.13 mg / dl). SGPT values increased significantly ($p < 0.01$) in groups B (19.02 ± 0.74 U / L), C (16.28 ± 0.81 U / L) and D (14.79 ± 1.15 U / L) than that of control (4.76 ± 0.23 U / L). SGOT values increased significantly ($p < 0.01$) in groups C (289.66 ± 9.77 U / L), D (284.02 ± 5.76 U / L) and B (261.52 ± 2.06 U / L) than that of control (187.32 ± 3.71 U / L). The present finding resembles to Kwon *et al.* (2002) who reported that total cholesterol was not significantly differed among the treatment. But the present result is contrary to Mohan *et al.* (1996) who found that the serum cholesterol was significantly ($p < 0.01$) reduced from 132.2 mg / 100 ml in the control group of birds to a mean value of 94 mg / 100 ml in the probiotic supplemented groups. The present findings also differ from Joy and Samuel (1997) and Kwon *et al.* (2002) who stated that triglyceride, HLD, and LDL cholesterol were not significantly differed among the probiotic treated groups.

From the present study, it was appeared that there was better growth performance of broiler chickens with the supplementation of probiotics @ of 2 g / 10 litres drinking water. The present study suggests that supplementation of probiotics has significant influences on weight gain and haemato–biochemical parameters in broiler chickens.

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