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EFFECT OF PROBIOTICS AND ANTIBIOTIC SUPPLEMENTATION ON BODY WEIGHT AND HAEMATO-BIOCHEMICAL PARAMETERS IN BROILERS

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ABSTRACT

The study was carried out to know the effects of probiotics (Proetxin® Boost, Novartis Bangladesh Ltd.) and antibiotic (oxytetracycline-Renamycin®, Renata Animal Health) on growth performances and haemato-biochemical parameters of "Shaver Star Bro" broiler chickens during September and October 2003. A total of 20, day old broilers were randomly selected and assigned into four equal groups ,n = 5) as A, B, C and D. Group A was considered as control group fed with commercial ration while groups B, C and D were fed with commercial ration with the addition of 200 mg probiotics / liter drinking water, 100 mg probiotics and 50 mg antibiotic (oxytetracycline- Renamycin®) / liter drinking water and 100 mg antibiotic (oxytetracycline- Renamycin®) / liter drinking water respectively up to 35 days of age. The results showed that the body weight gains differed significantly ($p < 0.05$) at the 2nd, 4th and 5th weeks of age in different treatment groups. The meat yield not differed significantly ($p > 0.05$). The drumstick, wing differed significantly ($p < 0.01$) and spleen weight differed at $p < 0.05$ among different groups. The mean haemato-biochemical values of Hb, ESR, PCV, heterophil, eosinophil, basophil, triglyceride, HDL, LDL, SGPT and SGOT were differed significantly ($p < 0.01$) in different groups. The present findings suggest that supplementation of probiotics has significant effect on growth performance and certain haemato-biochemical parameters of broiler chickens as compared to antibiotic supplementation.

Key words: Probiotics, antibiotic, effect, body weight, haemato-biochemical parameters, broilers

INTRODUCTION

At present there is no alternative but to use antibiotics to prevent the considerable loss to the livestock and poultry industry due to various bacterial and other infection. Among the antibiotic the use of oxytetracycline have been increasing tremendously day by day than others due to their greater effectiveness against livestock and human disease. The possibility of antibiotics ceasing to be used as growth stimulants for farm animals and the concern about the side-effects of their use as therapeutic agents has produced a climate in which both consumer and manufacturer are looking for alternatives. Probiotics are being brought under consideration to fill this gap and already some farmers are using them in preference to antibiotics (Fuller, 1989). The present study therefore was undertaken to evaluate the effect of probiotics brand Protexin® Boost (Novartis Bangladesh Ltd.) and antibiotic (oxytetracycline) brand of Renamycin (Renata Animal Health) on the performance and haemato-biochemical parameters of broilers from day old to 35 days of age.

MATERIALS AND METHODS

The present research was conducted during September and 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. Group A was considered as control group fed with commercial ration while groups B, C and D were fed with commercial ration with the addition of 200 mg probiotics/liter drinking water, 100 mg probiotics and 50 mg antibiotic (oxytetracycline-Renamycin®) / liter drinking water and 100 mg antibiotic (oxytetracycline- Renamycin®) / liter drinking water respectively upto 35 days of age. Vaccination schedule for Newcastle disease and infectious bursal disease was maintained properly. The body weight of each bird of all the four groups was taken weekly during the 35 days of experimental period.

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All the birds from each group were sacrificed to calculate the meat yield and organ characteristics at the end of the experiment. 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. Weight 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). Differential leukocyte count (DLC) was also done by the procedure 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 oxal-acetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) values were measured by using Reflotron® analyzer (Mahnheim, 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 and antibiotics supplementation on body weight gain are presented in Table 1. The body weight gains corresponding to the different treatments were differed significantly ($p < 0.05$) at the 2nd, 4th and 5th weeks of age. It can be inferred that body weight gains were recorded highest in group B (200 mg probiotics/liter drinking water) at all levels of age. The results obtained coincide with the findings of Hamid *et al.* (1994), Manickam *et al.* (1994), Pradhan *et al.* (1998) and Islam *et al.* (2004). But the present findings differ from Ergun *et al.* (2000) who stated that supplementation of probiotic, with or without antibiotic, to the rations has no important effect on live weight gain.

Table 1. Effect of probiotic and antibiotic supplementation on body weight gain in broiler chickens

Age of chickens (week)	Groups of broiler chickens (n = 5)				Level of significance
	A (control)	B (200 mg probiotics supplemented)	C (100 mg probiotics and 50 mg oxytetracycline supplemented)	D (100 mg oxytetracycline supplemented)	
1st	149.50 ± 12.10	152.94 ± 4.67	130.44 ± 8.25	132.82 ± 3.36	NS
2nd	410.80 ± 15.85	496.00 ± 13.95	478.60 ± 29.60	413.20 ± 30.50	*
3rd	792.78 ± 61.70	949.88 ± 20.00	896.18 ± 18.69	817.03 ± 74.86	NS
4th	1100.00 ± 50.40	1376.00 ± 23	1192.01 ± 49.94	1172.82 ± 98.47	*
5th	1332.00 ± 39.67	1607 ± 18.28	1529.00 ± 113.31	1347.40 ± 96.71	*

*Indicates significant at $p < 0.05$, NS = Not significant.

The meat yield characteristics and organ weight of different groups are presented in Table 2. The results indicate that there was no significant ($p > 0.05$) difference among groups A, B, C and D in the weight of breast and thigh. On the other hand, there was a significant ($p < 0.01$) differences among groups A, B, C and D in the weight of drumstick and wing. On an average, the weight of drumstick and wing were recorded highest (5.40±1.7 g and 4.65±1.8 g respectively) in group B. This result is contradictory to the findings of Baidya *et al.* (1994) and Mandal *et al.* (1994) who observed that feeding of probiotics did not have any influence on the carcass yield. Ergun *et al.* (2000) also demonstrated that supplementation of probiotic, with or without antibiotic, to the rations has no important effect on carcass yield.

Table 2. Effect of probiotic and antibiotic supplementation on meat yield, organ weight and certain haemato-biochemical values in broiler chickens

Parameters	Groups of broiler chickens (n = 5)				Level of significance
	A (control)	B (200 mg probiotics supplemented)	C (100 mg probiotics and 50 mg oxyte-tracycline supplemented)	D (100 mg oxytetracycline supplemented)	
Meat yield (% of total body weight)					
Breast	17.72 ± 1.51	22.69 ± 1.68	19.90 ± 0.87	19.22 ± 0.79	NS
Thigh	3.64 ± 0.17	4.47 ± 0.12	4.11 ± 0.30	4.02 ± 0.17	NS
Drumstick	3.60 ± 0.31	5.40 ± 1.7	5.38 ± 0.40	5.01 ± 0.21	**
Wing	4.65 ± 0.62	4.65 ± 1.8	3.53 ± 0.14	3.56 ± 0.26	**
Organ weight (% of total body weight)					
Liver	2.17 ± 0.068	1.98 ± 0.054	2.50 ± 0.098	2.29 ± 0.223	NS
Heart	0.54 ± 0.02	0.48 ± 0.03	0.57 ± 0.04	0.56 ± 0.05	NS
Gizzard	3.15 ± 0.10	2.94 ± 0.09	3.43 ± 0.26	3.15 ± 0.27	NS
Spleen	0.067 ± 0.002	0.09 ± 0.007	0.086 ± 0.005	0.082 ± 0.003	*
Bursa	0.31 ± 0.03	0.31 ± 0.03	0.30 ± 0.03	0.23 ± 0.03	NS
Haemato-biochemical					
TEC (10^6/mm^3)	2.49 ± 0.09	2.31 ± 0.03	2.46 ± 0.09	2.62 ± 0.05	NS
Hb (g %)	6.20 ± 0.71	6.70 ± 0.30	8.30 ± 0.12	8.10 ± 0.10	**
ESR (mm in 1st h)	0.80 ± 0.20	1.80 ± 0.20	2.40 ± 0.24	1.60 ± 0.24	**
PCV (%)	32.20 ± 0.37	32.00 ± 0.31	33.40 ± 0.50	35.60 ± 0.81	**
Heterophil (%)	28.40 ± 0.24	30.80 ± 0.58	29.20 ± 0.37	28.40 ± 0.51	**
Eosinophil (%)	3.40 ± 0.24	0.60 ± 0.24	1.00 ± 0.32	4.00 ± 0.89	**
Basophil (%)	2.60 ± 0.24	0.80 ± 0.20	1.00 ± 0.32	1.60 ± 0.24	NS
Lymphocyte (%)	60.00 ± 0.45	62.60 ± 0.51	62.80 ± 0.37	62.80 ± 2.15	**
Monocyte (%)	5.40 ± 0.24	5.20 ± 0.37	6.20 ± 0.86	6.60 ± 1.21	**
Total serum cholesterol (mg/dl)	137.52 ± 1.71	138.98 ± 0.97	135.44 ± 3.25	136.80 ± 1.19	NS
Triglycerides (mg/dl)	92.13 ± 1.68	70.77 ± 2.85	108.52 ± 1.20	75.82 ± 1.16	**
HDL (mg/dl)	54.53 ± 1.12	107.14 ± 2.83	99.16 ± 2.32	102.58 ± 2.13	**
LDL (mg/dl)	36.92 ± 0.93	25.69 ± 1.56	18.96 ± 0.88	20.36 ± 2.50	NS
SGPT (U/L)	4.66 ± 0.27	16.28 ± 0.80	14.88 ± 0.94	11.06 ± 0.49	**
SGOT (U/L)	187.32 ± 3.71	287.66 ± 7.78	279.64 ± 25.89	258.60 ± 7.23	**

*Indicates significant at $p < 0.05$, **Indicates significant at $p < 0.01$, NS = Not significant.

The present findings also revealed that there was no significant ($p > 0.05$) differences among groups A, B, C, and D in the weight of liver, heart, gizzard and bursa. On the other hand, there was a significant ($p < 0.05$) differences among groups A, B, C and D in the weight of spleen. On an average, the weight of spleen was highest (0.09±0.007 g) in group B. This result is partially supported by Mohan *et al.* (1996) who stated that supplementation of probiotic had no effect on weight of internal organs.

The results of haematological parameters are summarized in Tables 2 and 3. The mean values of Hb, ESR, PCV, heterophil, eosinophil and basophil corresponding to the different treatments were significantly ($p < 0.01$) differed (Table 2). It was shown that erythrocyte number decreased ($p < 0.05$) in groups, haemoglobin concentration increased ($p < 0.05$) in group C, ESR increased ($p < 0.01$) in group C, packed cell volume (PCV) increased ($p < 0.05$) in group D, as compared to that of control (Table 2).

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		
	B (200 mg probiotics supplemented	C (100 mg probiotics and 50 mg oxytetracycline supplemented)	D (100 mg oxytetracycline supplemented
TEC (10^6/mm^3)	2.749* (0.051)	0.711^{NS} (0.517)	-1.096^{NS} (0.335)
Hb (g%)	-0.988^{NS} (0.379)	-2.709* (0.054)	-2.392^{NS} (0.335)
ESR (mm in 1st h)	-3.162* (0.034)	-6.532** (0.003)	-2.392^{NS} (0.099)
PCV (%)	0.343^{NS} (0.749)	-1.633^{NS} (0.178)	-3.470* (0.026)
Heterophil (%)	-4.000* (0.016)	-2.138^{NS} (0.099)	0.000^{NS} (1.000)
Eosinophil (%)	7.483** (0.002)	4.707** (0.009)	-0.739^{NS} (0.501)
Basophil (%)	9.000** (0.001)	-4.000* (0.16)	2.236^{NS} (0.89)
Lymphocyte (%)	-5.099** (0.007)	-7.483** (0.002)	-1.087^{NS} (0.338)
Monocyte (%)	1.000^{NS} (0.374)	-0.930^{NS} (0.405)	-1.17^{NS} (0.305)
Total serum cholesterol (mg/dl)	-1.095^{NS} (0.335)	1.064^{NS} (0.347)	0.374^{NS} (0727)
Triglycerides (mg/dl)	4.831** (0.008)	-13.745** (0.000)	7.776** (0.001)
HDL (mg/dl)	-15.593** (0.000)	-21.716** (0.00)	-18.291** (0.000)
LDL (mg/dl)	5.273** (0.006)	14.074** (0.000)	7.602** (0.002)
SGPT (U/L)	-11.522** (0.000)	-4.144** (0.14)	-15.233** 0.000)
SGOT (U/L)	-17.399** (0.000)	8.628** (0.001)	-9.249** (0.001)

*Indicates significant at $p < 0.05$, ** Indicates significant at $p < 0.01$, NS= Not significant.

The number of heterophil increased significantly in group B, the number of eosinophil decreased significantly in groups B and C, the number of basophil decreased significantly in group B, the number of lymphocyte increased significantly in groups B and C as compared to that of control (Table 2). The results of haematological parameters are in agreement with the findings of Islam *et al.* (2004). But the results of the present study differed with Mohan *et al.* (1996) who reported that the packed cell volume not varied with probiotic supplementation. But there was a significant ($p < 0.05$) reduction in haemoglobin content by the addition of probiotic.

From Table 2, it was evident that there was no significant ($p > 0.05$) difference of cholesterol values among the groups. Triglyceride, HDL, LDL, SGPT and SGOT values corresponding to the different treatments were differed significantly ($p < 0.01$). It can be inferred that triglyceride values of broilers reduced significantly ($p < 0.01$) in groups B (70.77 ± 2.85 mg/dl) and D (75.82 ± 1.16) from that of the control group (92.13 ± 1.68 mg/dl).

Simultaneously triglycerides and HDL values of broilers increased significantly ($p < 0.01$) in groups C, D and B in comparison to control group (Table 3). LDL values of broilers reduced significantly ($p < 0.01$) in groups C, D and B from that of the control group. SGPT values of broilers increased significantly ($p < 0.01$) in D group, C group and B group respectively from that of the control. Similar significant increase also observed in SGOT values. The present findings are in agreement with the findings of Kwon *et al.* (2002) and Islam *et al.* (2004) who demonstrated that total cholesterol was not significantly different among the treatment groups. The findings correlate with the observation of Islam *el. al.* (2004) who stated that the values of triglycerides, HDL, LDL, SGPT and SGOT were differed significantly ($p < 0.01$) among the treatment groups. But the present result was not in agreement with Mohan *et al.* (1996) who found that the serum cholesterol values was significantly ($p < 0.01$) reduced from a mean value of 132.2 mg / 100 ml in control group to a mean value of 94 mg / 100 ml in the probiotic supplemented groups. The observation also differs from Joy and Samuel (1997) and Kwon *et al.* (2002) who stated that triglyceride, HDL, and LDL cholesterol were not significantly different among the treatment groups.

From the present study, it was indicated that there was better growth performance of broiler chickens with the supplementation of probiotics @ 200 mg / liters drinking water. The present study suggests that supplementation of probiotics has significant influences on weight gain and haemato-biochemical parameters in broiler chickens as compared to antibiotic supplementation.

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