RESEARCH ARTICLE

Effect of Feeding Diets Supplemented with an Antibiotic or Probiotic on the Carcass Characteristics and Economics of Commercial Broiler Chicken

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Abstract

The present study was aimed to evaluate the growth-promoting activity of probiotics and antibiotics in broilers. A total of 540 straight-run day-old commercial broiler chicks (Vencobb-430) were randomly assigned to three treatment groups. Each treatment comprised of six replicates, with 30 chicks in each, resulting in 180 chicks per treatment. Treatment Group 1 served as the control group, while Group T_2 was supplemented with antibiotics (Enramycin hydrochloride 8 % @ 100 g/ton of feed from 0-42 days; and Neomycin sulphate + Doxycycline from 2nd to 5th day, Sulphadiazine + Trimethoprim from 16th to 19th day; and Enrofloxacin from 30th to 33rd day in water each combination @ 10 mg/kg b.wt.), and Group T_3 received probiotics (1 billion cfu/g of strains) in feed from 0-42 days and in water from 2nd to 5th day, 16th to 19th day and 30th to 33rd. To assess growth-promoting activity, parameters such as carcass characteristics, livability, GI tract and internal organ morphometry and economics as return over feed cost were recorded. The results indicated that at the end of 42nd days, no significant differences were observed in any of the parameters studied among the three experimental groups, although the antibiotic-supplemented group exhibited numerical improvements compared to the other groups. At the end of experiment probiotic supplemented group was found to have some improvement in length of colo-rectum compared to other group. The incorporation of probiotics led to numerical improvements in ROFC compared to the control group. The observed improvements in the probiotic and antibiotic-supplemented groups may be attributed to their gut microflora-stabilizing properties, resulting in enhanced gut absorption of nutrients.

Key words: AGP, Broiler, Chicken, Economics, Probiotics.

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Introduction

Poultry production stands out as one of the world's most technologically advanced agricultural sectors, playing a significant role in the global food supply. The Indian poultry industry, in particular, ranks among the largest producers of both eggs and broiler meat globally. Within this industry, feed costs constitute a substantial portion, accounting for over 70% of the total production cost (Chamba *et al.,* 2014). To enhance the performance and well-being of birds, various feed additives are employed. In broiler production, optimizing feed utilization efficiency can be achieved by incorporating additives such as enzymes, probiotics, prebiotics, antibiotic growth promoters, antioxidants, anti-coccidials, herbal preparations, acidifiers, among others, into broiler rations (Kamal and Ragaa, 2014). Since the 1950s, the availability of antibiotics led to their widespread use for therapeutic purposes and as growth stimulants in farm animals. However, concerns regarding antimicrobial resistance and the transfer of antibiotic resistance genes from animals to human microbiota prompted the withdrawal of approval for antibiotics as growth promoters in the European Union from January 1st, 2006 (Castanon, 2007). Consequently, the poultry industry faces mounting pressure to phase out the use of antibiotic growth promoters (AGP). Probiotics,

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defined as "live microorganisms which, when administered in adequate amounts, confer a health benefit on the host" (FAO, 2001), emerge as a potential substitute for antibiotics in the poultry feed industry. This substitution is due to the reported ability of probiotics to mitigate enteric diseases and potential foodborne pathogens. Given these considerations, the present experiment was designed to investigate the effects of supplementing feed with probiotics as an alternative to antibiotic growth promoters in broilers.

Materials and Methods

Experimental Birds, Feeding, Housing and Management

The present experiment was conducted at Poultry Research Station, College of Veterinary Science & Animal Husbandry, Kamdhenu University, Anand, Gujarat (India). A total 540 straight-run day-old commercial broiler chicks (Vencobb-430) from a single hatch purchased from a private hatchery were used in experiment. On arrival of the chicks at farm, wing banding was done and weighed individually. The chicks were distributed randomly to three treatment groups. Each treatment consisted of six replicates and each had 30 chicks leading to 180 chicks per treatment. Brooding and rearing of chicks was carried out in deep litter system following standard managemental and healthcare practices. Weighed quantities of different treatment diets were offered replicate wise twice a day during entire experimental period. Throughout the experiment, all experimental birds had *ad libitum* access to clean, wholesome drinking water.

Experimental Design

The broiler feeds were prepared on three stages pre-starter (0-14 days), starter (15-28 days) and finisher (29-42 days). The detailed experimental design is demonstrated in Table 1. For composition of probiotics used in feed, each gram contained not less than 1 billion cfu/g of strains of *Bacillus subtilis, Bacillus licheniformis, Bacillus coagulans* & *Clostridium butyricum HJCB998*. For composition of probiotics used in water, each gram contained not less than 1 billion cfu/g of strains of *Bacillus subtilis, Bacillus licheniformis, Bacillus coagulans, Pediococcus acidilactici, Saccharomyces boulardii* and *Clostridium butyricum HJCB998.*

Assessment of Growth Performance

Carcass characteristics, livability, gastro intestinal tract and internal organ morphometry and economics as return over feed cost were recorded for all the individual birds belonging to all the experimental groups for 6 weeks (42 days).

Statistical Analysis

The data were analyzed using Completely Randomized Design as per Snedecor and Cochran (1994). Means of replicates under each treatment were considered for analysis.

Results and Discussion

The recorded data for carcass characteristics, livability, gastro intestinal tract and internal organ morphometry and economics as return over feed cost of the birds at 6^{th} week of age fed with T_1, T_2 and T_3 diets have been demonstrated in Table 2, 3 and 4, respectively.

Carcass Characteristics

In T_1, T_2 and T_3 diets, the mean pre-slaughter (live) weight of six birds taken from each treatment group (one bird per replicate) was found to be 2747.17 ± 116.06 g, 2957.50 ± 78.49 g and 2835.67 ± 105.48 g, respectively. The differences among various treatments of pre-slaughter (live) weight were found to be non-significant. However, higher weight was observed in T_2 group followed by T_3 and T_1 groups. Hence, the differences among various treatments of dressed weight were found to be non-significant. However, higher weight was observed in T_1 group followed by T_2 and T_3 groups. Dressing percentage was found significantly ($p<0.05$) higher in birds fed with T_1 (70.16 ± 2.97) diet as compared to T_2 (63.68 ± 0.60) and T_3 (63.23 ± 0.52) diets. The differences in giblet weight among various treatments were found to be non-significant. However, higher giblet weight was found in birds fed with T_2 (104.40 ± 4.77 g) diet followed by T_1 (99.07 ± 6.18 g) and T_3 (98.72 ± 3.84 g) diets. The abdominal fat weight of birds fed with T_2 (44.07 ± 1.34 g) diet was significantly ($p<0.05$) higher as compared to the birds fed with T_1 (31.82 ± 2.94 g) and T_3 (33.05 ± 2.30 g) diets, but T_1 and T_3 did not differ significantly among each other.

The present results were different from the findings of Awad *et al.* (2008), who found significant difference between the live weights of birds fed with probiotic and basal diets. The results obtained in present study were in accordance with Saiyed *et al.* (2015), who concluded from their studies that there was significant ($p<0.05$) difference in the abdominal

Table 1: Experimental design

Treatments	Treatmentdetail
T1	**Control group :** Without antibiotic growth promoter and probiotic in feed and in water
T2	**AGP** - **Antibiotic growth promoters in feed** from 0 to 42^{nd} day Enramycin hydrochloride 8% @ 100 g/ton of feed **AGP in water** from 2^{nd} to 5^{th} day Neomycin Sulphate 100 mg + Doxycycline 100 mg @ 10 mg/kg body weight; From 16^{th} to 19^{th} day Sulphadiazine 200 mg + Trimethoprim 40 mg @ 10 mg/kg body weight; From 30^{th} to 33^{rd} day Enrofloxacin 100 mg @ 10 mg/kg body weight
T3	**Probiotic in feed** from 0 to 42^{nd} day Probiotic Mixture***** @ 500 g/tone **Probiotic in water** from 2^{nd} to 5^{th} day, 16^{th} to 19^{th} day and 30^{th} to 33^{rd} day Probiotic Mixture** @ 5 g per 100 birds

fat weights of birds fed with probiotic and control diets. Abdel-Raheem and Abd-Allah (2011) also showed that there was a significant increase ($p<0.05$) in the dressing % in probiotic supplemented broilers as compared to control diet supplemented group. Sarangi *et al.* (2016) concluded that there was no significant difference in the organ weights of birds fed with probiotic and control diets.

Livability

In present study, all the experimental groups had same percent of livability during entire experimental period. Comparatively antibiotic supplemented group showed higher rate of mortality in starting phase of experiment than other two groups. Livability (%) of the birds fed with T_1, T_2 and T_3 diets was recorded as 92.22 in all the experimental groups during entire experimental period (14 birds died in each group). The livability of birds fed with different diets did not differ significantly among each other at the end of experiment. The present findings were in accordance with the results found by Hosamani *et al.* (2006), Awad *et al.* (2008), Alkhaf *et al.* (2010), Kim *et al.* (2011), and Abdel-Raheem and Abd-Allah (2011) on the livability of birds fed with the treatments diets containing antibiotic, probiotic and control. However, the current results were in contrast to the observations of Bozkurt *et al.* (2009), who reported significant ($p<0.05$) difference between the livability of birds fed with prebiotic, organic acid, probiotic and control diets. Amer and Khan (2012) reported significantly ($p<0.05$) highest mortality in birds supplemented with control diet.

Gastro Intestinal Tract (GIT) and Internal Organ Morphometry

The weekly morphometry (length and % weight of the organs to the body weight) of the gastro intestinal tract, *i.e.*, proventriculus, gizzard, duodenum, jejunum, ilium, cecum, colo-rectum, and internal organs, *i.e.*, heart, liver and spleen of bird from one to six week of age has been presented in Tables 3-5, respectively.

GIT and internal organ morphometry of 18 birds were studied to assess dietary effects. At week 1, jejunum weight (% of b. wt.) was higher in the control group than in antibiotic and probiotic groups. At week 2, duodenum and ileum weights were higher in the control group, while ceca weight was higher in the antibiotic group. At week 3, heart and intestinal segment weights were higher in the probiotic group. At week 4, duodenum, jejunum, and colo-rectum weights were higher in the probiotic group, but gizzard weight was higher in the control group. At week 5, colo-rectum length was greater in antibiotic and probiotic groups than in control. At week 6, colo-rectum length was highest in the probiotic group, with no difference between control and antibiotic groups.

The present finding showed that there was no any major impact of treatment diets on the organ morphometry at different ages of birds. The present findings were in accordance with the results observed by Hussein *et al.* (2020), who reported that at 35th day of age liver, gizzard and heart percent relative to body weight was non-significant among each other. Mashayekhi *et al.* (2018) reported that birds fed with control diet, antibiotic, probiotic and eucalyptus leaves powder had non-significant difference in liver and spleen weight (g/100 g) and also weight (g/100 g) of duodenum, jejunum and ilium at 42 days of age. Similarly, Toghyani *et al.* (2011) recorded non-significant difference in percentage of live body weight of liver, gizzard, heart, intestine, ceca and length (cm) of intestine and ceca at 42 days of age in birds supplemented with control, antibiotic, probiotic and prebiotic diets. Sarangi *et al.* (2016) observed that non-significant difference in weight of heart, liver and gizzard in birds fed with control, prebiotic, probiotic and synbiotic diet at 42 days of age.

The present findings were in contrast with the results observed by Awed *et al.* (2009), who reported at 35th days of age significantly ($p<0.05$) higher liver and spleen percent

Table 2: Mean (±SE) values of various production traits of broilers fed with different treatment diets

Sr. No.	Traits	T_1 (Control)	T_2 (Antibiotic)	T_3 (Probiotic)	SEm	CD at 5 %	CV%
1	Pre-slaughter (live wt) (g)	2747.17 ± 116.06	2957.50 ± 78.49	2835.67 ± 105.48	101.25	NS	8.71
2	Dressed wt. (g)	1910.50 ± 21.61	1884.17 ± 59.89	1791.50 ± 60.37	50.66	NS	6.66
3	Dressing percentage	70.16^a ±2.97	63.68^b ± 0.60	63.23^b ± 0.52	1.78	5.352	6.62
4	Liver wt. (g)	42.66 ± 1.69	48.20 ± 2.98	45.07 ± 1.83	2.24	NS	12.11
5	Heart wt. (g)	11.82 ± 0.72	12.03 ± 0.55	12.82 ± 0.55	0.61	NS	12.30
6	Gizzard wt. (g)	44.60 ± 4.47	44.17 ± 1.82	40.83 ± 2.10	3.04	NS	17.22
7	Giblet wt. (g)	99.07 ± 6.18	104.40 ± 4.77	98.72 ± 3.84	5.02	NS	12.21
8	Giblet percentage	5.17 ± 0.28	5.55 ± 0.27	5.53 ± 0.24	0.26	NS	11.77
9	Abdominal fat wt. (g)	31.82^b ±2.94	44.07^a ± 1.34	33.05^b ± 2.30	2.29	6.893	15.43
10	Abdominal Fat (%)	1.66^b ± 0.15	2.35^a ± 0.10	1.87^b ± 0.19	0.15	0.450	18.65

Means bearing different superscript within the row differ significantly from each other ($p<0.05$)

relative to body weight in birds fed with probiotic (2.11 ± 0.060, 0.12 ± 0.016) as compared to synbiotic (1.87 ± 0.016, 0.08 ± 0.009) and control (2.04 ± 0.083, 0.09 ± 0.010) groups, but control group was non-significant from synbiotic and probiotic.

Economics: Return over Feed Cost (ROFC)

The return over feed cost (Rs./bird) calculated under the experimental groups of birds is presented in Table 6. Though the total feed cost in each group was similar, the body weights varied, hence the birds fed with T_1, T_2 and T_3 diets were found to have ROFC as 57.05, 66.32 and 57.39 Rs/bird, and 37.30, 43.86 and 37.40 %/bird, respectively. The highest ROFC was observed in the birds fed with T_2 diet. These findings were in accordance with the results of Anjum *et al.* (2005), who observed that birds fed with probiotics @ 100 gm/tone in starter and 50 g/tone in finisher resulted in considerably higher profit as compared to control group. Kathirvelan *et al.* (2012) found that birds fed with Biomark EPPA were found to have low cost of production as compared to control group. However these were in contrast with the results found by Hosamani *et al.* (2006), who observed that ROFC was highest in birds fed with probiotics as compared to antibiotic and control groups.

Table 3: Impact of treatment diets on organ morphometry at 1st and 2nd week of age

Traits	Morphomerty at 1st week of age				Morphomerty at 2nd week of age			
	T_1 (Control Group)	T_2 (Antibiotic group)	T_3 (Probiotic group)	SEm	T_1 (Control Group)	T_2 (Antibiotic group)	T_3 (Probiotic group)	SEm
Pre Slaughter Weight	177.17 ± 8.51	185.00 ± 8.56	180.33 ± 7.11	8.09	448.00^{b}±15.75	517.17^{a}±12.52	486.17^{ab}±17.67	15.46
Heart weight (%)	0.76 ± 0.04	0.74 ± 0.03	0.84 ± 0.05	0.04	0.71 ± 0.03	0.76 ± 0.04	0.81 ± 0.03	0.03
Liver Weight (%)	3.82 ± 0.36	4.49 ± 0.28	3.89 ± 0.12	0.27	3.41 ± 0.11	3.70 ± 0.12	3.68 ± 0.12	0.12
Spleen weight (%)	0.19 ± 0.02	0.16 ± 0.02	0.13 ± 0.02	0.02	0.11 ± 0.01	0.12 ± 0.01	0.12 ± 0.02	0.01
Proventriculus Weight (%)	1.22 ± 0.05	1.04 ± 0.04	1.09 ± 0.07	0.06	0.73 ± 0.02	0.68 ± 0.02	0.74 ± 0.04	0.03
Proventriculus Length (mm)	31.50 ± 1.88	29.00 ± 1.03	29.50 ± 1.31	1.45	38.00 ± 0.58	38.33 ± 0.80	39.17 ± 1.54	1.06
Gizzard Weight (%)	4.09 ± 0.14	3.91 ± 0.10	3.67 ± 0.11	0.12	3.15 ± 0.10	2.79 ± 0.15	2.91 ± 0.04	0.10
Gizzard Length (mm)	35.00 ± 1.32	38.83 ± 0.75	38.17 ± 1.80	1.36	48.67 ± 1.69	48.83 ± 0.70	49.33 ± 1.23	1.27
Duodenum Weight (%)	2.00 ± 0.13	1.73 ± 0.04	1.73 ± 0.08	0.09	1.30 ± 0.09^{a}	1.15 ± 0.07^{ab}	1.03 ± 0.04^{b}	0.07
Duodenum Length (mm)	180.83 ± 9.53	176.50 ± 2.70	181.00 ± 4.73	6.34	239.33±6.54	243.83±5.51	234.00±3.52	5.34
Jejunum Weight (%)	2.56 ± 0.15^{a}	2.20 ± 0.15^{ab}	2.06 ± 0.08^{b}	0.13	1.69 ± 0.08	1.45 ± 0.06	1.51 ± 0.07	0.07
Jejunum Length (mm)	456.33±22.42	452.33±6.53	451.17± 4.24	13.70	567.17±7.16	601.17±27.01	603.67±11.17	17.37
Ilium Weight (%)	2.02 ± 0.13	1.78 ± 0.17	1.85 ± 0.06	0.13	1.38 ± 0.05^{a}	1.10 ± 0.04^{b}	1.13 ± 0.04^{b}	0.04
Ilium Length (mm)	433.83±10.51	455.50±13.33	459.67±13.76	12.62	576.17±17.49	631.17±31.40	593.33±17.99	23.21
Ceca Weight (%)	0.52 ± 0.08	0.57 ± 0.05	0.56 ± 0.02	0.06	0.35 ± 0.01^{b}	0.43 ± 0.02^{a}	0.41 ± 0.02^{ab}	0.02
Ceca Length (mm)	75.17 ± 3.53	69.50 ± 5.29	72.33 ± 4.14	4.38	88.00 ± 1.51	96.50 ± 2.20	92.33 ± 5.05	3.30
Colo-rectum Length (mm)	51.50 ± 3.77	44.67 ± 2.23	53.17 ± 5.69	4.15	65.33 ± 5.74	67.17 ± 2.24	64.50 ± 2.26	3.79
Colo-rectum Weight (%)	0.31 ± 0.05	0.25 ± 0.02	0.24 ± 0.021	0.03	0.19 ± 0.01	0.16 ± 0.01	0.16 ± 0.01	0.01
Total Intestinal length (mm)	1197.67±29.82	1198.50±17.74	1217.33±18.48	12.51	1536.00±22.05	1639.83±55.89	1587.83±20.71	22.41

The means bearing different superscript within same row differ significantly from each other ($p < 0.05$)

Table 4: Impact of treatment diets on organ morphometry at 3rd and 4th week of age

Traits	Morphometry at 3rd week of age				Morphometry at 4th week of age			
	T_1 (Control Group)	T_2 (Antibiotic group)	T_3 (Probiotic group)	SEm	T_1 (Control Group)	T_2 (Antibiotic group)	T_3 (Probiotic group)	SEm
Pre Slaughter Weight	910.67±27.11	935.67±37.09	965.00±18.89	28.68	1608.33±75.84	1568.50±83.45	1683.67±68.86	76.28
Heart weight (%)	0.61 ± 0.02^{b}	0.57 ± 0.03^{b}	0.71 ± 0.02^{a}	0.02	0.54 ± 0.03	0.58 ± 0.02	0.58 ± 0.01	0.02
Liver Weight (%)	2.89 ± 0.06	2.70 ± 0.16	2.63 ± 0.08	0.10	2.18 ± 0.10	2.24 ± 0.05	2.33 ± 0.08	0.08
Spleen weight (%)	0.14 ± 0.01	0.12 ± 0.01	0.14 ± 0.01	0.01	0.12 ± 0.01	0.13 ± 0.01	0.11 ± 0.01	0.01
Proventriculus Weight (%)	0.59 ± 0.04	0.54 ± 0.02	0.54 ± 0.03	0.03	0.45 ± 0.01	0.45 ± 0.03	0.45 ± 0.02	0.02
Proventriculus Length (mm)	40.57 ± 0.55	38.15 ± 2.62	44.12 ± 0.47	1.57	42.97 ± 2.30	44.29 ± 3.00	40.61 ± 1.35	2.32
Gizzard Weight (%)	2.62 ± 0.10	2.27 ± 0.08	2.47 ± 0.12	0.10	2.16 ± 0.09^{a}	1.87 ± 0.07^{b}	1.80 ± 0.08^{b}	0.08
Gizzard Length (mm)	52.63 ± 0.73	50.91 ± 0.89	52.67 ± 1.27	0.99	59.56 ± 1.65	57.49 ± 1.13	55.79 ± 0.61	1.20
Duodenum Weight (%)	1.09 ± 0.05^{a}	0.99 ± 0.07^{ab}	0.87 ± 0.03^{b}	0.05	0.80 ± 0.03^{b}	0.82 ± 0.04^{b}	0.94 ± 0.03^{a}	0.03
Duodenum Length (mm)	243.00 ±7.25	237.50 ±9.00	257.50 ±6.77	7.73	285.67±13.52	284.50±9.40	287.67±6.13	10.15
Jejunum Weight (%)	1.56 ± 0.08^{a}	1.43 ± 0.12^{a}	1.17 ± 0.04^{b}	0.08	1.08 ± 0.08^{b}	1.06 ± 0.06^{b}	1.36 ± 0.06^{a}	0.07
Jejunum Length (mm)	624.00±11.71	622.33±23.78	650.17±13.20	17.10	758.83±12.31	760.00±26.92	821.33±42.43	29.87
Ilium Weight (%)	1.26 ± 0.04^{a}	1.01 ± 0.06^{b}	0.98 ± 0.03^{b}	0.05	0.97 ± 0.05	0.87 ± 0.06	1.01 ± 0.02	0.05
Ilium Length (mm)	614.00±16.34	644.67±32.56	634.00±11.31	22.03	776.00±26.55	814.50±45.05	833.83±32.29	35.48
Ceca Weight (%)	0.42 ± 0.02^{a}	0.33 ± 0.01^{b}	0.36 ± 0.02^{ab}	0.02	0.31 ± 0.02	0.33 ± 0.03	0.34 ± 0.02	0.02
Ceca Length (mm)	112.00 ±7.78	115.33 ±5.51	122.50 ±4.71	6.14	137.17±5.29	131.17± 3.53	142.50±11.06	7.37
Colo-rectum Length (mm)	70.33 ± 4.14	70.83 ± 2.39	74.33 ± 2.67	3.16	81.67 ± 6.92	89.17 ± 4.79	94.17 ± 2.07	5.01
Colo-rectum Weight (%)	0.17 ± 0.01^{a}	0.14 ± 0.01^{b}	0.13 ± 0.01^{b}	0.01	0.12 ± 0.01^{b}	0.11 ± 0.01^{b}	0.14 ± 0.01^{a}	0.01
Total Intestinal length (mm)	1663.33±36.11	1690.67±57.26	1738.50±17.13	23.14	2039.33±51.66	2079.33±76.32	2179.50±71.82	39.30

The means bearing different superscript within same row differ significantly from each other ($p < 0.05$)

Table 5: Impact of treatment diets on organ morphomerty at 5th and 6th week of age

Traits	Morphometry at 5th week of age				Morphometry at 6th week of age			
	T_1 (Control Group)	T_2 (Antibiotic group)	T_3 (Probiotic group)	SEm	T_1 (Control Group)	T_2 (Antibiotic group)	T_3 (Probiotic group)	SEm
Pre Slaughter Weight	2111.67±91.06	1962.50±168.29	2049.51±53.73	114.75	2747.17±116.06	2957.50±78.49	2835.67±105.48	101.25
Heart weight (%)	0.48 ± 0.03	0.46 ± 0.03	0.44 ± 0.01	0.02	0.43 ± 0.02	0.41 ± 0.01	0.45 ± 0.01	0.01
Liver Weight (%)	2.31 ± 0.12	2.01 ± 0.11	2.17 ± 0.10	0.11	1.56 ± 0.06	1.63 ± 0.11	1.60 ± 0.08	0.09
Spleen weight (%)	0.11 ± 0.01	0.11 ± 0 .01	0.10 ± 0.00	0.01	0.09 ± 0.01	0.09 ±0.00	0.09 ± 0.01	0.01
Proventriculus Weight (%)	0.41 ± 0.02	0.40 ± 0.02	0.43 ± 0.03	0.02	0.35 ± 0.01	0.34 ± 0.01	0.34 ± 0.01	0.01
Proventriculus Length (mm)	43.77 ± 1.38	41.39 ± 0.94	42.55 ± 0.79	1.07	45.20 ± 1.42	48.34 ± 2.20	47.82 ± 1.71	1.80
Gizzard Weight (%)	1.86 ± 0.09	1.86 ± 0.08	1.99 ± 0.08	0.08	1.63 ± 0.16	1.50 ± 0.06	1.45± 0.08	0.11
Gizzard Length (mm)	59.18 ± 0.96	58.45 ± 2.46	62.23 ± 1.51	1.76	62.05 ± 2.88	67.83 ± 1.49	68.64 ± 2.17	2.25
Duodenum Weight (%)	0.70 ± 0.06	0.62 ± 0.02	0.60 ± 0.03	0.04	0.63 ± 0.03	0.59 ± 0.04	0.63 ± 0.02	0.03
Duodenum Length (mm)	297.83 ±10.35	289.17 ±11.95	288.83 ±6.75	9.93	326.83 ±9.82	315.33 ±9.28	311.00 ±10.26	9.80
Jejunum Weight (%)	0.98 ± 0.06	0.84 ± 0.04	0.81 ± 0.04	0.05	1.02 ± 0.06	0.88 ± 0.05	0.89 ± 0.03	0.05
Jejunum Length (mm)	810.83 ±22.62	791.50 ±25.98	792.17 ±26.72	25.17	883.00 ± 18.61	825.33 ± 30.47	826.17 ± 33.18	28.15
Ilium Weight (%)	0.97 ± 0.06	0.80 ± 0.06	0.82 ± 0.04	0.05	0.83 ± 0.03	0.76 ± 0.05	0.09 ± 0.05	0.05
Ilium Length (mm)	783.67 ±29.42	811.17 ±35.41	774.17 ±37.38	34.24	819.67 ±28.46	799.67 ±23.55	894.83 ±45.57	33.87
Ceca Weight (%)	0.27 ± 0.01	0.27 ± 0.01	0.30 ± 0.01	0.01	0.32 ± 0.02	0.30 ± 0.02	0.27 ± 0.01	0.02
Ceca Length (mm)	143.00 ±8.55	151.00 ±7.06	146.83 ± 8.21	7.96	149.50 ± 9.67	172.00 ± 5.88	166.33 ± 9.16	8.41
Colo-rectum Length (mm)	$72.17^{b} \pm 6.42$	$94.17^{a} \pm 3.11$	$88.83^{a} \pm 1.89$	4.26	$85.33^{b} \pm 3.01$	$81.17^{b} \pm 5.02$	$100.67^{a} \pm 5.05$	4.46
Colo-rectum Weight (%)	0.09 ± 0.00	0.09 ± 0.01	0.09 ± 0.01	0.01	0.09 ± 0.00	0.09 ± 0.00	0.09 ± 0.00	0.00
Total Intestinal length (mm)	2107.50±67.91	2137.00±73.03	2090.83±65.40	37.65	2264.33±43.41	2193.50±50.01	2299.00±95.16	37.86

The means bearing different superscript within same row differ significantly from each other (p

Table 6: Means (±SE) of various ROFC traits of broilers fed with different treatment diets

Particulars		Treatments		
		T_1	T_2	T_3
Feed consumption (g)	Pre-starter	626.37	612.13	613.60
	Starter	1565.47	1519.30	1521.20
	Finisher	2159.51	2109.36	2140.07
	Total	4351.36	4240.80	4274.87
Cost of feed (Rs/kg)	Pre-starter	33.90	34.39	34.64
	Starter	35.01	35.50	35.75
	Finisher	35.61	36.10	36.35
Feed cost	Pre-starter	21.23	21.05	21.26
	Starter	54.81	53.94	54.38
	Finisher	76.90	76.15	77.79
Total feed cost		**152.94**	**151.14**	**153.43**
Average body weight (kg)		2.53	2.62	2.54
Cost of feed (Rs/kg broiler bird)		60.45	57.69	60.41
Income from selling of birds (Rs./bird) @ 83 Rs/kg		**209.99**	**217.46**	**210.82**
ROFC (Rs/bird)		**57.05**	**66.32**	**57.39**
ROFC (Rs/kg broiler birds)		**22.55**	**25.31**	**22.59**
ROFC (%/bird)		**37.30**	**43.86**	**37.40**

Conclusion

The overall result of the experiment on carcass characteristics, livability and return over feed cost (ROFC) indicate that an antibiotic supplementation in diet improved the overall economic performance in the broiler birds at the end of 42 days by the way GI Tract and internal organ morphometry find some improvement in probiotic group. Broiler birds fed with diet containing either antibiotic growth promoter or probiotic did not have any significant effect on livability. The dressing percentage was significantly ($p<0.05$) higher in the control group as compared to antibiotic and probiotic supplemented groups, whereas abdominal fat weight and percent was significantly ($p<0.05$) higher in antibiotic supplemented group. The ROFC (%/bird) was highest in broiler birds fed with antibiotic as compared to the probiotic and control diets.

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