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Effect of Supplementation of Probiotics and Prebiotics on Growth Performance of Broilers Chicken

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ABSTRACT

An experiment was conducted to study the effect of supplementation of prebiotics and probiotics on growth performance of broiler chickens. 240-day-old chicks were randomly distributed in four equal groups with five replications of each. First group was control with basal diet, second group: basal diet with probiotics (Ozolab@0.5g/Kg feed), third group: basal diet with prebiotics (Ecomos@1g/kg feed) and fourth group: basal diet with both prebiotics and probiotics. Results indicated that ration supplemented with combination of prebiotics and probiotics showed significant improvement in body weight gain over control group during third and fourth week of age. Birds maintained on combination of prebiotics and probiotics supplemented diet had significantly lower feed intake than probiotic supplemented group. Feed conversion ratio was significantly better in combination of prebiotic and probiotic included group over control group. It was inferred that broiler diet supplemented with combination of both prebiotics and probiotics performed better than all the other groups.

Keywords: Prebiotic, Probiotic, Feed conversion ratio, Feed efficiency

Broiler production in India is rapidly increasing to combat the need of animal protein for human consumption. The main objective of economical rearing of broilers is to minimize alarming farm inputs and maximize output so that poultry rearing become a lucrative profit-making affair. A spurt in the demand of poultry meat leads to growth of poultry industry in India has increased the demand of poultry feed ingredients, which results in escalating cost of conventional feed stuffs. Feeding cost alone constitutes bulk of farm budget which calls for skills of feeding on scientific line. Thus, for the maximum utilization of feed resources optimally and to counteract the escalating cost of feed stuffs various growth promoters are being used to obtain maximum feed efficiency in shortest possible time. Among various growth promoters probiotics require great attention and had been acclaimed to stimulate the growth and improves feed efficiency of birds. However, the use of probiotics in broilers diets had revealed conflicting reports concerning growth performance, like feed efficiency, total body weight gain and health conditions under different situations. Probiotics had to face several barriers like low pH of gastric juice, competitive inhibition by pathogenic bacteria which affects the viability of probiotics in gastro intestinal tract. Hence an alternative prebiotics has been introduced by scientist all over world. Thus, present study was undertaken to study the effect of supplementation of prebiotics and probiotics on growth performance of broilers chicken.

The present study was carried out with 240 day-old commercial broilers chicks for six weeks. All chicks were of same hatch in order to keep the genetic makeup uniform. The selected chicks were of wing banded, weighed individually and randomly divided into four groups containing sixty chicks in each group. Each group was further replicated five times. The dietary treatment comprised of T_2 (basal diet + probiotics ozolab@0.5g/kg feed), T_3 (basal diet + ecomos@1g/kg feed) and T_4 (basal diet + probiotic@0.5g/kg feed +

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prebiotics @1g/kg feed). The T_1 group was kept as control maintained on basal diet without dietary supplementation. Chicks were kept under deep litter system. Feed and water were provided *ad-libitum* and standard managemental practices were followed. Body weight, feed intake was recorded weekly up to six weeks and from these data live weight gain, feed conversion ratio was calculated. Data were analysed as per standard statistical procedures (Snedecor and Cochran, 1994).

Results of average weekly body weight (Table 1) indicated that the ration supplemented with combination of probiotic and prebiotic showed improvement in average weekly body weight significantly (P<0.05) than the diet without any supplementation (T_1) at first, third, fourth and sixth week of age. However, all treatment groups receiving different feed additives either in singly or in combination, except group T_1 recorded numerically higher weight. This result is in agreement with the findings of Mohamed *et al.* (2008) who reported that addition of symbiotic significantly influenced the weight of broiler. Similar findings were observed by Parlat *et al.* (2003); Oguz and Parlat (2004); Guclu (2003) and Eleftherios *et al.* (2010) in quails and Frittis and Waldroup (2003) and Parks *et al.* (2001) in turkeys observed higher body weight in birds.

Table 1: Average weekly body weight (g) of broiler chicken supplemented with probiotics and prebiotics in diet

Age (Week)	T_1	T_2	T_3	T_4	SEM
1st	101.68^{a} ±2.66	106.43^{b} ±2.27	103.29^{ab} ±2.51	107.64^{b} ±2.35	1.21
2nd	276.15 ±6.25	281.28 ±5.61	277.53 ±5.20	284.14 ±5.83	2.86
3rd	517.66^{a} ±11.37	529.78^{a} ±8.26	526.83^{a} ±9.98	563.05^{b} ±10.22	5.01
4th	828.68^{a} ±18.12	859.87^{a} ±14.34	854.36^{a} ±17.38	920.34^{b} ±20.32	8.68
5th	1256.33 ±27.75	1312.16 ±25.29	1304.76 ±27.93	1363.57 ±32.58	13.88
6th	1759.14^{a} ±41.28	1848.79^{b} ±37.51	1844.24^{b} ±37.79	1891.32^{c} ±43.75	19.31

Mean value showing same superscript within a row did not differ significantly (P<0.05).

The results of weekly body weight gain (Table 2) revealed that dietary inclusion of prebiotics and probiotics had significant (P<0.05) effect only at third and fourth week of age. At third week of age, the birds maintained on probiotics and prebiotics diet (T_4) had significantly higher body weight gain than the birds maintained on control diet (T_1), diet supplemented with probiotics (T_2) and prebiotics included diet treatment (T_3).

Results indicated that probiotic, prebiotic and thier combination supplementation could produce beneficial effect in weight gain during this phase of growth. Further, the overall results of body weight gains indicated that the ration in which synbiotic was supplemented (T_4) showed improvement in body weight gain significantly (P<0.05) than the diet without any supplementation (T_1) during third and fourth week of age only during experimental period. Similar results were reported by Ammerman *et al.* (1989) and Waldroup *et al.* (1993). Fleming *et al.* (2004) also found that prebiotic has improved the body weight gain in broilers. Yang *et al.* (2008) studied the effects of Mannan-oligosccharide on growth performance of broiler and reported that there were no significant differences in body weight gain among treatments. In contrast with present results, Ghosh *et al.* (2007) reported that MOS supplementation did not increase body weight gain in quail. Improvement in body weight gain by probiotic supplementation have also been reported by several workers (Gohain and Sapcota, 1998; Hamid and Aijazuddin, 2001; Midilli and Tuncer, 2001; Pham *et al.*, 2003; Kabir *et al.*, 2004; Sabiha *et al.*, 2005 and Khaksefidi and Rahimi, 2005). In contrast to beneficial effects of probiotics supplementation in broiler diets, there were several reports, in which no positive results were noticed. Maiolino *et al.* (1992), Kompiang (2002) and Ladukar *et al.* (2003) did not find any significant

Table 2: Average weekly body weight gain (g) of broiler chicken supplemented with probiotics and prebiotics in diet

Age (week)	T_1	T_2	T_3	T_4	SEM
1st	58.54 ±2.55	64.27 ±2.16	61.55 ±52.28	65.06 ±2.10	1.13
2nd	174.47 ±4.15	174.85 ±3.91	174.21 ±3.90	176.51 ±4.29	2.04
3rd	241.51^{a} ±6.44	249.3^{ab} ±7.64	248.50^{ab} ±6.01	278.92^{b} ±7.27	3.46
4th	311.02^{a} ±9.28	330.09^{ab} ±8.92	327.53^{ab} ±9.94	357.29^{b} ±11.83	4.97
5th	427.65 ±13.28	450.41 ±12.33	443.23 ±15.34	452.29 ±13.60	6.65
6th	502.81 ±17.21	536.63 ±17.04	527.76 ±16.72	539.48 ±19.63	8.58

Mean bearing different superscript within a row differ significantly (P<0.05)

difference in body weight of chickens fed with feeds containing *Lactobacillus acidophilus* and *Streptococcus faceium* from 8-16 days.

Results of feed intake at different weekly intervals (Table 3) as influenced by dietary inclusion of prebiotics and probiotics revealed that this trait was not statistically different among different treatments except in the second and fifth week of age between T_2 probiotic supplemented group and T_4 combination of probiotic and prebiotic supplemented group. The average weekly feed intake of chicks during the second week of age among T_2 and T_4 group exhibited significant difference and similar trend observed in fifth week of age also. Similar findings have been reported in the broilers (Midilli and Tuncer, 2001; Cakir *et al.*, 2008 and Jung *et al.*, 2008) and in quails (Parlat *et al.*, 2003 and Ghosh *et al.*, 2007). These results support the findings of Eleftherios *et al.* (2010) and Oguz and Parlat (2004) who reported that in quails, feed consumption increased significantly in group supplemented with prebiotics.

Table 3: Average weekly feed intake (g) of broiler chicken supplemented with probiotics and prebiotics in diet

Age (week)	T_1	T_2	T_3	T_4	SEM
1st	84.59 ±0.64	82.91 ±2.35	81.97 ±2.60	80.01 ±1.28	0.94
2nd	263.40^{ab} $\pm4.76^{b}$	276.63^{b} ±4.64	273.56^{b} ±7.66	247.11^{a} ±2.15	4.97
3rd	417.81 ±10.41	426.32 ±9.70	435.09 ±12.96	405.05 ±11.06	5.33
4th	587.82 ±6.44	632.13 ±4.90	632.40 ±8.24	613.96 ±5.89	3.15
5th	833.9^{ab} ±7.31	854.82^{b} ±4.21	842.24^{b} ±5.98	806.67^{a} ±4.69	4.32
6th	980.47 ±40.47	1041.19 ±18.68	1041.06 ±9.98	1008.01 ±33.92	15.93

Mean bearing different superscript within a row differ significantly (P<0.05).

Results of weekly feed conversion ratio (Table 4) values showed that the effect of dietary inclusion of probiotic and prebiotics had significant (P<0.05) effect only during the second and fifth week of age and in the remaining weeks the values were statistically comparable among treatments. Indicating that efficiency of utilization of feed in rations supplemented with combined probiotics and prebiotics was superior to that of probiotics supplemented group (T_2), prebiotics supplemented group (T_3) and control group (T_1). The feed conversion ratio value of all the four groups (T_1, T_2, T_3 and T_4) varied, with significant difference from each other except the T_2 and T_3 group during second and fifth week of age. These results are in contrast with Midilli and Tuncer (2001) who found that inclusion of prebiotics improved the feed conversion ratio in broilers. Parlat *et al.* (2003) reported that feeding MOS improved overall feed conversion ratio for 0-5 weeks of age in Japanese quails. This improvement in FCR is in agreement with the findings of Parks *et al.* (2001), who found that MOS-supplemented diets showed a lower FCR of the birds. Similarly, Guclu (2003) and Ghosh *et al.* (2007) found lower FCR for birds fed MOS. Whereas, Yalqnkaya *et al.* (2008) found that MOS did not affect the FCR in broilers.

Table 4: Average weekly feed conversion ratio (FCR) of broiler chicken supplemented with probiotics and prebiotics in diet

Age (week)	T_1	T_2	T_3	T_4	SEM
1st	1.44 ±0.02	1.29 ±0.03	1.33 ±0.04	1.22 ±0.02	0.02
2nd	1.78^{b} ±0.02	1.58^{ab} ±0.05	1.57^{ab} ±0.03	1.39^{a} ±0.06	0.03
3rd	1.72 ±0.05	1.74 ±0.04	1.75 ±0.07	1.45 ±0.14	0.04
4th	1.88 ±0.05	1.91 ±0.03	1.93 ±0.02	1.71 ±0.03	0.02
5th	1.94^{b} ±0.06	1.89^{ab} ±0.06	1.92^{ab} ±0.08	1.78^{a} ±0.03	0.03
6th	1.94 ±0.09	1.94 ±0.10	1.97 ±0.09	1.86 ±0.10	0.04

Mean bearing different superscript within a row differ significantly (P<0.05).

Based on the results obtained in the present study, it can be concluded that ration supplemented with different dietary treatment either singly or in combination reflected significantly (P<0.05) higher body weight gain. Among different dietary supplementations, probiotics + prebiotics incorporated treatment group exhibit higher body weight. Birds fed with probiotics + prebiotics supplemented diet significantly gained more weight whereas probiotic and prebiotic supplemented group gained significantly intermediary body weight gain. Birds maintained on probiotics + prebiotics treated diet had significantly lower feed intake than other groups. Feed utilized more efficiently by probiotics + prebiotics supplemented group and better FCR found in combined probiotic and prebiotic supplemented group.

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