RESEARCH ARTICLE

Effect of Supplementation of Combination of Prebiotic and Acidifier on Performance of Broiler Chicken

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Abstract

This study was undertaken to evaluate the effect of supplementation of prebiotics (Mannanoligosaccharide, MOS) and acidifier combination on the performance of broilers. The feeding trial was conducted on 135-days-old 'Cobb-400' broiler chicks for a period of six weeks. The day-old broiler chicks were randomly divided into three equal groups viz. T_0, T_1 and T_2 comprised 45 birds each, further subdivided into three replicates of 15 birds each. Group T_0 served as control and received a standard broiler diet. The birds in groups T_1 and T_2 were fed diets containing prebiotic (MOS) and acidifier combination @ 0.05% and 0.75%, respectively. The birds from group T_1 received diet containing a prebiotic (MOS) and acidifier combination @ 0.05% of feed. The birds from group T_2 received a diet containing a prebiotic (MOS) and acidifier combination @ 0.075% of the feed. The final live body weight and total weight gain of birds of T_1 group was significantly ($p < 0.01$) higher than control and T_2 group. The average feed consumption of birds of experimental groups was comparable. The feed conversion ratio was significantly ($p < 0.05$) better than control and T_2 group. The average dressing percentage, giblet weight percentage, gut pH, and gut length of birds of T_1 group was comparable. The average total viable count (TVC) and total coliform count (TCC) did not vary between experimental groups The group T_1 recorded the highest net profit per bird.

Keywords: Acidifier, Broiler, Combination, Performance Poultry Prebiotic.

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Introduction

Among the alternatives to antibiotic invented recently, prebiotic is one of the most important classes. Prebiotics was defined as a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and or activity of one or a limited number of bacteria in the colon and thus improves host health (Falaki *et al.,* 2011). Acidifiers or organic acids include short-chain fatty acids, volatile fatty acids and weak carboxylic acids that are only partly dissociated. Acidifiers may play a role in maintaining gut integrity by reducing the colonization of pathogens (like *Salmonella* and *E.Coli*) in the intestinal wall by lowering the intestinal pH below 6 and promoting normal micro-flora of gut. Short-chain fatty acids such as butyric acid increase epithelial cell proliferation, quick repairing of the intestinal epithelium, increased villus height, and increased absorptive capacity (Hosna, 2018).

Feed additives like prebiotics and acidifiers have been observed to improve the growth performance of birds by increasing the count of favorable micro-flora present in the gut of poultry (Li *et al.* 2008). Sizeable work of combination of prebiotic and probiotic has been tried on the broilers to improve the growth performance; however, very scanty information is available on supplementation of a combination of prebiotic and acidifier in broiler. Therefore present experiment was planned to study the effect of prebiotic (mannan-oligosaccharides, MOS) and gut acidifier on growth performance and gut health of broiler.

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Materials and Methods

This experiment was conducted after prior approval from the Institutional Animal Ethics Committee (Approved No. III/19) in the Department of Animal Nutrition, Bombay Veterinary College, Mumbai.

One hundred and thirty-five day-old 'Cobb-400' broiler chicks were divided into three treatment groups of 45 each and randomly assigned to three treatment diets, which were further subdivided into three replicates of 15 birds each for a period of six weeks. Group T_0, was fed basal diet (BIS, 2007), Group T_1 had basal diet supplemented with prebiotic (Mannanoligosaccharide, MOS) and acidifier combination (1:1) @0.05 % of feed, and in Group T_2: basal diet was supplemented with prebiotic (Mannan-oligosaccharide, MOS) and same acidifier combination used for experimental

group T_1 @0.075 % of feed. The acidifier combination used in the present experiment was a mixture of formic, acetic, propionic, butyric, lactic and fumaric acid. The prebiotic and acidifier were used in both the treatment groups in 1:1 ratio.

All the chicks were kept hygienically on a deep litter system in separate pens and adopted uniform management conditions. The brooding was carried out for first two weeks by using electric bulbs. Standard vaccination schedule was followed. All birds were weighed individually at the end of each week of the experimental period (6 weeks). The weight on first day (at the start of the experiment) and 42 days of age were recorded. At the end of experiment, six birds per treatment were randomly selected and euthanized by cervical dislocation. After opening abdominal cavity, gizzard, liver, heart, duodenum, jejunum and ileum were weighed and recorded. Feed intake per pen was recorded weekly to arrive at the average weekly feed consumption and feed conversion ratio (FCR).

The gut pH was determined using pH meter, whereas gut length was measured with the help of measuring tape. Estimation of total viable count and total coliform count of intestinal content of six birds from each group was also carried out at the end of sixth week (Garrido *et al*., 2004). The economics of broiler production was calculated at the end of the experiment. Using a completely randomized block design, all the data obtained were subjected to statistical analysis as per Snedecor and Cochran (1995).

Results and Discussion

The effect of adding prebiotic in combination with acidifier on the performance of the birds is presented in Table 1. The data reveals that the average final live body weight and total weight gain of birds in T_1 group were significantly ($p < 0.01$) higher than control and T_2 group. The present observation are in agreement with Antongiovanni *et al*. (2007) in broiler birds supplemented with a combination of prebiotic and acidifiers. This may be attributed to the lowered pH conducive to the growth of favorable bacteria, simultaneously hampering the growth of pathogenic bacteria that grow at a relatively higher pH. However, Riad *et al*. (2010) reported that the addition of prebiotic had no significant effect on body weight.

The average feed consumption of birds of the experimental groups was comparable. The present findings agree with Corduk *et al*. (2008), who reported non-significant effect of organic acid, prebiotic, and their combination on feed intake. Mahdavi and Torki (2009) also observed non-significant difference in feed intake of birds of treatment groups receiving butyric acid @ 2 or 3 g per kg feed. Contrary to the present observations Riad *et al*. (2010) and Lende (2007) reported higher feed consumption on addition of Bio-MOS @ 1 g/kg diet of broilers and acidifier @ 0.1 and 0.05 % in starter and finisher diet, respectively.

The feed conversion ratios in feed intake per unit gain in weight for the birds from group T1 were significantly ($p < 0.05$) higher than control and T_2 groups. However, difference between control and T_2 group was non-significant

Table 1: Supplemental effect of prebiotic and acidifier combination on performance of broiler chicken

		Groups			*Stat.*
Parameters		T_0	T_1	T_2	*Sign.*
Initial weight (g)		44.53 ± 0.31	44.33 ± 0.29	44.60 ± 0.29	__
Final weight (g)		2288.76^{b} ± 46.00	2492.71^{a} ± 34.60	2343.82^{b} ± 50.06	**
Total gain in weight (g)		2244.22^{b} ± 46.00	2448.38^{a} ± 34.54	2299.22^{b} ± 50.06	*
Total feed consumption (g)		4160.36 ± 46.73	4030.76 ± 34.79	4048.67 ± 76.95	NS
Average feed conversion ratio		1.85^{b} ± 0.03	1.65^{a} ± 0.03	1.76^{b} ± 0.03	*
Dressing %		71.51 ± 0.45	72.43 ± 0.79	72.16 ± 0.57	NS
	Liver wt.	1.99 ± 0.04	2.04 ± 0.08	2.02 ± 0.06	NS
Giblet wt. (%)	Gizzard wt.	2.15 ± 0.06	2.14 ± 0.04	2.06 ± 0.07	NS
	Heart wt.	0.40 ± 0.006	0.40 ± 0.01	0.42 ± 0.015	NS
	Duodenum	5.17 ± 0.11	5.08 ± 0.15	5.01 ± 0.02	NS
Gut pH	Jejunum	5.88 ± 0.08	5.83 ± 0.08	5.82 ± 0.11	NS
	Ileum	7.17 ± 0.15	6.78 ± 0.22	6.85 ± 0.22	NS
Gut length (cm)		194.73 ± 5.70	204.26 ± 5.72	202.99 ± 6.08	NS
Total viable count (CFU/ ml)		2.29×10^{12}	1.49×10^{12}	1.73×10^{12}	__
Total coliform count (CFU/ ml)		2.02×10^{12}	0.94×10^{12}	1.54×10^{12}	__
Net profit per bird (₹)		4.99	23.21	11.70	__
Net profit per kg (₹)		2.19	9.32	4.82	__

Means having common superscript in the same row do not differ significantly
NS- Non Significant *- Significant at 5% level **- Significant at 1% level

($p > 0.05$). The present study results agree with Ao and Choct (2013), who reported significantly better FCR by addition of MOS @ 1 kg/ton and 0.5 kg/ton in starter and in finisher diet, respectively. Hu and Guo (2007) observed non-significant effect on FCR in broiler birds supplemented with 500, 1000 and 2000 mg acidifier per kg of broiler diet.

There was no significant variation in average dressing and giblet weight, gut pH and gut length of birds at the end of six week in the experimental groups. Similar findings were reported by Samanta *et al.* (2009) and Paul *et al.* (2007).

The average total viable count (TVC) and total coliform count (TCC) in the T1 group supplemented with prebiotic and acidifier combination @ 0.05% were numerically lowest followed by the T2 and control group. However, there were differences between the various treatment groups was non-significant. Thus, it revealed that prebiotic and acidifier combination @ 0.05% of diet helped reduce the TVC and TCC of the intestines. The present study results agree with Yang *et al*. (2007) who found reduced coliform load at the gut mucosa on supplementation of MOS @ 1g/kg of feed.

Net profit per bird and per kg were higher in both the supplemented groups (T1 and T2) than control (T0), with the highest in T2, revealing that supplementation of prebiotic and acidifier in combination is economically profitable.

Conclusion

From the results of this study, it is concluded that dietary inclusion of prebiotic and acidifier in combination @ 0.05% in the diet is beneficial in improving growth performance and higher margin of profit in broilers.

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