Original Research Article

Effect of Probiotics on Growth Performance and Carcass Characteristics in Broilers at Farmer's Door

ABSTRACT

Aims: An experiment was conducted to investigate the comparative efficacy of two probiotics of different origins (yeast and bacterial based) on the growth performance and carcass characteristics of broilers chicken.

Place and Duration of Study: The study was conducted at Krishi Vigyan Kendra, Purnea between January, 2020 to March, 2020.

Methods: Two hundred forty, day old chicks were kept and were randomly divided into 4 groups (A, B, C and D) and each group had 2 replicates of 20 chicks. Four (A, B, C and D) iso-caloric and iso-nitrogenous (ME 3000 kcal/ kg and CP 21.56%) broiler starter and finisher (ME 3000 kcal/ kg and CP 18.75%) diets were formulated containing *Saccharomyces Cerevisiae*, *Bacillus cereus toyoi* and mixture of both @ 0.2 % except group A which was control. Birds were raised for first week on commercial diet. Broiler starter and finisher diets were fed from 8-28 and 29-42 days, respectively.

Result: A significant ($P<0.05$) effect was observed on overall performance of the birds fed diet containing probiotics. Probiotics in feed at 0.2% *Saccharomyces Cerevisiae* supplementation improved body weight gain (+12.7%), feed intake (3.8%) and feed conversion efficiency (-8.7%) compared with the control. There were no any significant differences were found in carcass traits among group but highest carcass traits values were recorded in group-B followed by group-C than group-D and lowest in control group.

Conclusion: The result indicated that the addition of probiotics in feed containing 0.2% *Saccharomyces cerevisiae* improved broiler growth performances and it is beneficial to be used as supplement in feed of broiler chickens.

Keywords: *Saccharomyces Cerevisae*, *Bacillus cereus toyoi*, growth performance, carcass characteristics, broilers

1. INTRODUCTION

There is a worldwide attempt to reduce antibiotic use in animal production because increased microbial resistance to antibiotic and residues in animal products can be harmful to consumers

[1]. Therefore, several alternatives to growth-promoting antimicrobials have been investigated in recent years [2]. Those strategies have focused on preventing the proliferation of pathogenic bacteria and modulating beneficial gut micro-flora so that the health, immune status and performance are improved [3]. Probiotics are live microorganisms that affect the host animal by improving its intestinal balance. Observed effects after probiotic supplementation are related to a more beneficial microbial population in the gut due to pathogen inhibition. Mechanisms of pathogen inhibition may include stimulation of the immune system, competition for available nutrients, and direct antimicrobial effects by secretion of inhibitory substances or competition for adhesion receptors to intestinal epithelium [4]. Healthy animals generally maintain a balanced microbial population that plays an important role in the growth and health of animals [5]. Some studies show that probiotics supplementation in feed of chickens improves the performance and it has been reported probiotics were the most effective growth promoter [6].

The main objective of present study was to compare the effect of probiotics on growth performance and carcass characteristics in broilers.

2. MATERIALS AND METHODS

Day-old broiler chicks (n=240) were kept for experiment. Chicks were weighed on first day and checked for their physical health. The four poultry farmer from Purnea district were selected to conduct the present experiment in their farm. The 4 poultry farmer were divided into 4 groups having 40 chicks in each group. Trial was conducted in open house but the managerial practices were kept control throughout the experiment period. Chicks were offered with a sugar solution (250 g sugar/liter water) to provide energy and to overcome the stress of transportation. Afterwards, chicks were put in the brooding area. The brooding temperature was maintained at 90°F during 1st week and it was then gradually lowered by 5 °F every week till it reached 75°F. Commercial starter diet was fed to chicks for first week. On day 8, all birds were weighed individually and were randomly divided into four experimental groups (A, B, C and D) having 40 chicks in each group which were further divided into two replicates (20 chicks/ replicate). Birds were vaccinated against Newcastle disease on day 5 and 28. Vaccination against Infectious Bursal disease was repeated on day 15 and 22 of experiment.

Table1. Basal composition and analyzed results of the experimental diets

Ingredients	**Starter diets**	**Finisher diets**

	A	B	C	D	A	B	C	D
Maize	59.5	59.3	59.3	59.3	42.00	42.00	42.00	42.00
Wheat	-	-	-	-	16.44	16.24	16.24	16.24
Soybean Meal	30.59	30.59	30.59	30.59	28.75	28.75	28.75	28.75
Fish Meal	4.58	4.58	4.58	4.58	-	-	-	-
Oil	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Limestone	1.01	1.01	1.01	1.01	1.08	1.08	1.08	1.08
Dicalcium phosphate	0.87	0.87	0.87	0.87	1.08	1.08	1.08	1.08
Salt	0.27	0.27	0.27	0.27	0.3	0.3	0.3	0.3
Vitamin mix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Mineral mixture	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
DL-methionine	0.18	0.18	0.18	0.18	0.07	0.07	0.07	0.07
Saccharomyces cerevisiae	-	0.2	-	-	-	0.2	-	-
Bacillus cereus toyoi	-	-	0.2	-	-	-	0.2	-
Saccharomyces cerevisiae + *Bacillus cereus toyoi*	-	-	-	0.1 +0.1	-	-	-	0.1 +0.1
Calculated value								
ME , Kcal/Kg	3000	3000	3000	3000	3000	3000	3000	3000
Crude protein, %	21.56	21.56	21.56	21.56	18.75	18.75	18.75	18.75

Two diets; starter and finisher were prepared having CP 21.56 %, 18.75 % and ME 3000, 3000 kcal/kg, respectively (Table 1). The birds were fed starter diet from 8-28 and finisher diet from 29-42 days. Birds of group A were fed diet without any supplementation (control group), whereas birds of group B, C and D were fed starter and finisher diets containing 0.2% *Saccharomyces cerevisiae*, *Bacillus cereus toyoi* and blend of both *Saccharomyces cerevisiae* and *Bacillus cereus toyoi* (0.1% + 0.1%), respectively.

During the trial weekly feed intake, weekly body weight was recorded and feed conversion ratio (FCR) of the birds was calculated. At the end of the experiment, 2 birds from each replicate were

randomly selected and slaughtered to determine dressing percentage, breast and thigh meat yield and giblet organs weight. The data collected was utilized to calculate dressing percentage and organ weights (g organ weight/100 g body weight). The data was analyzed statistically [7].

3. RESULTS AND DISCUSSION

Weight gain at different periods of time was presented in table-2. Upto 28th day showed a significant increase in weight gain of broilers fed diets containing *Saccharomyces cerevisiae* (1265 gm) and *Bacillus cereus toyoi* (1245 gm) as compare to control group (1105 gm). At 42nd day highest weight gain was observed in group-B (2457 gm) followed by group-C (2419 gm) than Group D (2258 gm) and lowest in group A (2180 gm). All four groups were significantly differ to each other. These results confirmed the previous findings, who reported that dietary inclusion of probiotics in the diets of broilers showed improved body weight gain [8,9,10,11,12]. Therefore improvement in body weight gain of the birds in this study may be attributed to better digestibility of crude protein, which may have contributed in better growth of the birds.

The growth performance of broiler starter, finisher and overall from the first day of experiment upto 42 day was recorded and presented in Table 2. Results showed improved feed intake due to the addition of *Saccharomyces cerevisiae*, *Bacillus cereus toyoi* and mixture of both @ 0.2 % of feed compared to the control. The highest feed intake at 42nd day was observed in birds fed diet supplemented with *Saccharomyces cerevisiae* (4382 gm) followed by those fed diet supplemented with *Bacillus cereus toyoi* (4378 gm) and birds fed diet supplemented with mixture of both *Saccharomyces cerevisiae* and *Bacillus cereus toyoi* (4376 gm). All three supplemented groups were non-significant among themselves and significantly higher than control. Nawaz *et al.* also reported the increased feed intake in broilers fed diet supplemented with of *Saccharomyces cerevisiae* [8]. Results of the present study supported by the findings of who reported increased feed intake in broilers fed diet supplemented with different levels of *Saccharomyces cerevisiae* [13]. Results were also in accordance with those of Shareef *et al.* who used 1.0, 1.5 and 2.0% *Saccharomyces cerevisiae* in broiler diet and found a significant increase in feed intake [14]. Better feed intake of those groups which are supplemented with probiotics in broiler feed [15].

Table 2. Growth performance and nutrient digestibility of broilers fed diets supplemented with *Saccharomyces cerevisiae*, *Bacillus cereus toyoi* and mixture of both *Saccharomyces cerevisiae* and *Bacillus cereus toyoi* (8-42 days)

Group	Weight gain (g)			Feed intake (g)			Feed conversion ratio		
	8-28	29-42	8-42	8-28	29-42	8-42	8-28	29-42	8-42
A	1105^{c}	1075^{b}	2180^{d}	1970^{b}	2249^{b}	4219^{b}	1.78^{b}	2.09^{b}	1.95^{b}
B	1265^{a}	1192^{a}	2457^{a}	2077^{a}	2305^{a}	4382^{a}	1.64^{a}	1.93^{a}	1.78^{a}
C	1245^{a}	1174^{a}	2419^{b}	2066^{ab}	2312^{a}	4378^{a}	1.66^{ab}	1.98^{a}	1.81^{a}
D	1180^{b}	1078^{b}	2258^{c}	2025^{b}	2351^{a}	4376^{a}	1.72^{b}	2.18^{b}	1.94^{b}
SEm±	9.68	6.34	7.84	12.16	12.46	22.76	0.02	0.01	0.02
C.D. (5%)	25.97	24.91	30.79	47.75	48.49	89.35	0.07	0.06	0.06

Mean under same superscript did not differ significantly

C.D. value= Critical difference value

The different periods of FCR showed improvement in broilers fed diets containing *Saccharomyces cerevisiae* group and *Bacillus cereus toyoi* group compared to birds fed diets without probiotic supplementation (Table 2). The most efficient FCR was observed in birds of group B (1.78:1) fed diet containing *Saccharomyces cerevisiae* , followed by those of group C fed diet containing *Bacillus cereus toyoi* (1.81:1) and group D (1.94:1)fed diet containing mixture of both *Saccharomyces cerevisiae* + *Bacillus cereus toyoi* at the end of experiment. These results are in agreement with the findings [16] when they fed *Lactobacillus acidophilus* based probiotic to broiler chicks and observed that chicks fed probiotic cultures showed better FCR than those control chicks. Observed better FCR due to dietary inclusion of yeast @ 1.5%/kg of diet [13]. Better FCR of the birds using the yeast culture may be attributed to the digestion of crude protein, which enhanced growth of the birds resulting in better efficiency of feed utilization. Better FCR in broilers fed diet supplemented with of *Saccharomyces cerevisiae* [8]

Different values of carcass traits are presented in table-3. There were no any significant differences were found in carcass traits among group but highest dressing percentage were recorded in group-B (66.94%) followed by group-C (66.14%) than group-D (65.55%) and lowest in control group (65.01). Similar trend were also found in breast meat percentage and thigh meat percentage were highest in group -B followed by group -C, group-D and group –A. Better dressing percentage in broilers reported when supplementation with probiotics [8,17]. Mutassim

who reported that supplementation of yeast increased breast meat yield in broilers [18]. The higher dressing percentage in birds fed diet containing yeast (*Saccharomyces cerevisiae*) may be due to higher body weight gain in the birds of this group compared to other treatment groups.

Table 3. Carcass characteristics of broilers fed diet *Saccharomyces cerevisiae, Bacillus cereus toyoi* and mixture of both *Saccharomyces cerevisiae* and *Bacillus cereus toyoi*

Group	Dressing (%)	Breast meat (%)	Thigh meat (%)	Abdominal fat (%)
A	65.01	20.31	20.26	2.87
B	66.94	21.32	21.89	1.99
C	66.14	20.99	20.83	2.05
D	65.55	20.71	20.51	2.47
SEm±	0.82	0.47	0.56	0.01
C.D. (5%)	2.74	1.61	1.56	0.05

4. CONCLUSION:

Under the conditions of the present study, probiotic supplementation at 0.2% *Saccharomyces cerevisiae* in broiler feed was effective in improving weight gain, feed intake, feed conversion efficiency and carcass traits. The results indicated that supplementation of current probiotic is beneficial in feed of broiler but optimal concentration of probiotics in broiler feed deserves further more investigations.

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