Journal of Animal Research: v.6 n.3, p. 381-384. June 2016

DOI: 10.5958/2277-940X.2016.00034.6

Effect of Probiotic Supplementation on Feed Consumption and Nutrient Retention in CARIBRO CROSS Broilers

P.P. Patel, R.S. Oza*, V.R. Desai and R.S. Gupta

Animal Nutrition Research Department, College of Veterinary Science and Animal Husbandry, Anand Agricultural University, Anand, INDIA

*Corresponding author: RS Oza; Email:dr.rajojha1987@gmail.com

Received: 18 Nov., 2015 **Accepted:** 13 March, 2016

ABSTRACT

Three hundred (300) unsexed day old 'CARIBRO CROSS' broiler chicks were distributed randomly into three treatment groups T_1(control), T_2 (probiotic supplemented in the feed) and probiotic supplemented in the water (T_3) having 6 replicates in each treatment. Two replicates of each group contain 16 birds each and the rest four of each group contain 17 birds each. The probiotic contained *Lactobacillus acidophilus, Lactobacillus bulgaricus, Lactobacillus plantarum, Streptococcus faecium, Bifidobacterium bifidus* and *Saccharomyces cerevisiae.* The probiotic was incorporated at the rate of 100 g/tonne of feed during starter phase (0 – 4 weeks) and 50 g/tonne of feed during finisher phase (5 – 7 weeks) in feed probiotic group. However, the probiotic was given at the rate of 1 g/L of water during first week of age and thereafter 1 g/4L of water up to 7 weeks of age in water probiotic group. The basal diet was formulated for starter (23.46 % CP, 2800 ME Kcal/Kg) and finisher phase (20.07 % CP, 2900 ME Kcal/kg) separately. The chicks consumed significantly ($p < 0.01$) less amount of feed under water probiotic group followed by feed probiotic group and the highest in control group during starter phase, finisher phase and overall experimental period. The retention of nutrients was higher in probiotic fed in feed group then in water but treatment differences were not significant ($p > 0.05$). It was concluded that probiotic supplementation reduce the feed consumption of CARIBRO CROSS chicks.

Keywords: Probiotics, CARIBRO CROSS, Feed consumption, Nutrient retention

Poultry production has become one of the fastest growing sectors of agro-business in India. However, the intensive poultry production has been adversely affected due to the cost of production. Because of high quantities of valuable protein, essential amino acids, fat, essential fatty acids, vitamins and minerals, poultry meat production has been paid more and more attention. Due to prevalence of various infectious diseases, there has been a decrease in the production and weight gain of infected flocks. Mortality in susceptible birds may reach up to 90 %. For the control of these infectious diseases, the use of antibiotics in poultry industry is increasing day by day. Antibiotics have been also used to promote growth rate, improve feed conversion ratio (FCR) and reduce mortality in broiler flocks. However, frequent use of antibiotics in poultry diets resulted in severe problems like resistance of pathogen to antibiotics, accumulation of antibiotics residue in their products and environment, imbalance of normal microflora and reduction in beneficial intestinal microflora (Barton, 2000). This resulted into severe restriction or total ban on the use of antibiotics in animal and poultry industry in many countries. As a result, the poultry industry must focus on alternative to antibiotics for maintaining health and performance under commercial conditions. This has led to development of different products used as feed additives such as enzymes, probiotics, organic acids, plant extracts and prebiotics. Probiotics represent potential replacements for antibiotics in the animal food industry because of their reported ability to reduce enteric disease in poultry and potential food borne pathogen contamination of poultry or poultry products (Reid and Friendship, 2002; Patterson and Burkholder, 2003).

The use of dietary additives such as probiotics is gaining momentum not only because they are cost effective but also due to their beneficial effects on growth rate, feed conversion ratio, livability and prevention of intestinal infections. In view of the potential beneficial effects of probiotics supplementation in broiler diet, the present investigation was undertaken to confirm the earlier observations and to assess the value of probiotics in practical broiler diets. CARI BRO CROSS breed is a multicoloured breed developed by CARI (Central Avian Research Institute). The bird achieves moderate body weight at 7 weeks of age, late in compare to imported commercial broiler strains available in market but having less susceptibility to adverse environmental conditions, better heat tolerance and dressing percentage.

MATERIALS AND METHODS

Three hundred unsexed day old 'CARIBRO CROSS' broiler chicks were distributed randomly into three treatment groups *viz.* control (T_1), probiotic supplemented in the feed (T_2) and probiotic supplemented in the water (T_3) having 6 replicates in each treatment. Two replicates of each group contain 16 birds each and the rest four of each group contain 17 birds each. The probiotic was incorporated at the rate of 100 g/tonne of feed during starter phase (0 – 4 weeks) and 50 g/tonne of feed during finisher phase (5 – 7 weeks) in feed probiotic group (T_2). Each gram of probiotic contains 10^9 CFU of: *Lactobacillus acidophilus*, *Lactobacillus bulgaricus*, *Lactobacillus plantarum*, *Streptococcus faecium*, *Bifidobacterium bifidus* and *Saccharomyces cerevisiae.* The probiotic was given at the rate of 1 g/L of water during first week of age and thereafter 1 g/4L of water up to 7 weeks of age in water probiotic group (T_3). The chicks were reared in battery brooder cage system and brooding temperature was maintained or attained by 60 watt electric bulb in each cage up to 4 weeks then after bulb was removed. Nine cages were used for housing experimental birds up to 2 weeks and thereafter 18 cages were used for housing experimental birds up to 4 weeks. During 5th and 6th week of age 8 birds were kept in one cage and thereafter 6 birds were kept in one cage during 7th week of age. The size of individual cage was 75 cm x 38 cm x 38 cm. In each cage 60 watt electric bulb was provided to maintain brooding temperature. Cages as well as door of the cage brooder house were covered with gunny bags to check the entry of cool air into the house. Double folded news paper was spread inside the cages during evening to morning for first week of age. Two sides of experiment room were open and curtained during cool hours. Throughout the experimental period, feed and water were provided *ad libitum* and standard farm management practices were followed. The experiment was conducted for a period of seven weeks. All the birds were vaccinated against Marek's disease, New Castle Disease and Infectious Bursal Disease as per routine management practice. The basal diet was formulated for starter (23.46 % CP, 2800 ME Kcal/Kg) and finisher phase (20.07 % CP, 2900 ME Kcal/kg) separately following BIS (1992) requirement and the chemical composition has been presented in Table 1. All the experimental feeds were fortified with adequate vitamin and other feed supplements.

Table 1: Proximate analysis (% DM basis) of broiler starter and broiler finisher feeds used during experiment

Parameters	Broiler starter feed (0 – 4 weeks)	Broiler finisher feed (5 – 7 weeks)
Dry Matter	94.30 ± 0.23	94.94 ± 0.17
Crude Protein	23.46 ± 0.18	20.07 ± 0.12
Ether Extract	5.89 ± 0.09	5.55 ± 0.09
Crude Fiber	5.01 ± 0.10	4.74 ± 0.12
NFE	55.87 ± 0.32	58.57 ± 0.26
Ash	9.77 ± 0.15	11.08 ± 0.22
Silica	1.70 ± 0.06	1.79 ± 0.08
Calcium	1.53 ± 0.01	1.46 ± 0.02
Phosphorus	0.80 ± 0.06	0.77 ± 0.02

Feed residues were collected and weighed at weekly intervals. The record of the feed offered and residual amount left was maintained to calculate the feed intake up to 7 weeks. The metabolism trial was conducted during 7th week on six birds per treatment. From each treatment the birds were randomly selected and shifted in individual metabolic cages. The birds were individually fed with respective treatment diets. The adaptation period was of 2 days followed by 3 days collection period. During the collection period the data for quantity of feed offered, left over and excreta voided were recorded in order to determine the nutrient utilization. The quantity of excreta voided by individual bird was collected and weighed quantitatively after every 24 hrs at 8.00 am. One – fourth portion of excreta was preserved in measured quantity of concentrated sulfuric acid for nitrogen estimation. Rest

of excreta was processed for dry matter content. Sample taken for determination of dry matter content was kept in previously weighed petri dish and dried in hot air oven at 80 ± 2º C for 24 hrs. The dried material obtained was subsequently pooled, ground and secured for further analysis. The dried samples were pooled over three days of collection period and then ground to pass through 2.0 mm sieve and stored in air tight glass bottles at room temperature for further proximate analysis. Likewise samples of feed, left over by individual bird at the end of metabolic trial were stored and subjected to proximate analysis. Nitrogen from acid-excreta, feed and leftovers were estimated by Kjeldahl's method (AOAC, 1995). The data pertaining to all the parameter were subjected to statistical analysis by applying Completely Randomized Design as per Snedecor and Cochran (1995).

Table 2: Effect of supplementing probiotics on feed intake and dry matter intake (g/bird) in chicken

Parameter	Treatments		
	T_1	T_2	T_3
Starter phase (0 – 4 weeks)	$1297.94^{c} \pm 13.51$	$1218.84^{b} \pm 8.57$	$1046.24^{a} \pm 16.80$
Finisher phase (5 – 7 weeks)	$2102.51^{c} \pm 17.13$	$1925.56^{b} \pm 16.95$	$1842.46^{a} \pm 15.04$
Overall Feed intake (g/ bird)	$3400.45^{c} \pm 22.42$	$3144.40^{b} \pm 23.86$	$2888.70^{a} \pm 31.74$
Dry matter intake (g)	121.91 ± 2.90	104.16 ± 5.61	113.74 ± 6.98

a, b, c means bearing different superscripts in a row differ significantly ($p < 0.01$)

RESULTS AND DISCUSSION

Feed intake and dry matter intake of the CARIBRO CROSS chicks, fed on probiotic have been presented in Table 2. The average total feed consumption during starter phase (0 – 4 weeks) was significantly ($p < 0.01$) lower in water probiotic supplemented group (T_3) followed by feed probiotic supplemented group (T_2) and control group (T_1). The values for total feed consumption in the present study during starter phase (0 - 4 weeks) were found to be lower than the findings of Anjum *et al.* (2005) who observed numerically lower feed consumption in probiotic supplemented broilers (1726.0 g) compared to control broilers (1732.0 g) during 4 weeks of experimental period. The lowest feed consumption during finisher phase (5 – 7 weeks) was observed in water probiotic supplemented group (T_3) followed by feed probiotic supplemented group (T_2) and control group (T_1) which differed significantly ($p < 0.01$). The average total feed consumption during overall experimental period (0 – 7 weeks) was significantly ($p < 0.01$) lower in water probiotic supplemented group (T_3) followed by feed probiotic supplemented group (T_2) and the highest in control group (T_1). The broilers under water and feed probiotic supplemented group consumed, respectively 15.05 and 7.53 per cent less feed as compared to control group broiler during entire experimental period. Samanta and Biswas (1995) and Gohain and Sapcota (1998) reported that the feed consumption was numerically lower in probiotic supplemented broilers compared to control broilers during 7 weeks of experimental period. However, Chitra *et al.* (2004) and Bandy and Pampori (2006) observed significantly higher feed consumption in probiotic supplemented broilers as compared to control broilers during 7 weeks of experimental period.

The data for nutrient retention and balances are presented in Table 3. The highest DM retention was observed in treatment T_2 followed by control T_1 and the least in T_3. These differences were non significant ($p > 0.05$). However, DM (Dry Matter) intake in feed probiotic supplemented group (T_2) was lowest even though there was highest DM retention indicating better utilization of nutrients. The findings of the present study are in line with the findings of Rao *et al.* (2004) ,Mountzouris *et al.* (2010), and Chae *et al.* (2012).

Table 3: Average daily nutrient retention and balances by CARIBRO CROSS broilers fed probiotics diets during metabolism trial

Parameters	Treatments		
	T_1	T_2	T_3
Dry matter (%)	67.17	70.04	66.96
Organic matter (%)	71.03	73.09	70.80
Crude protein (%)	85.19	87.48	84.24
Ether extract (%)	67.71	70.29	71.11
NFE (%)	67.35	69.81	67.65

The highest OM (Organic Matter) retention was observed in treatment T_2 followed by control T_1 and the least in T_3. Similarly, Shilpa *et al.* (2007) reported significantly higher OM retention in probiotic supplemented broilers as compared to control broilers. The highest CP retention

was observed in treatment T_2 followed by control T_1 and the least in T_3. These results are in agreement with the earlier findings of Gohain and Sapcota (1998) and Rao *et al.* (2004). The highest EE retention was observed in treatment T_3 followed by T_2 and the least in T_1. Similar findings were observed by Shilpa *et al.* (2007) and Mountzouris *et al.* (2010). The highest NFE retention was observed in treatment T_2 followed by T_3 and the least in T_1. Similar results were recorded by Mountzouris *et al.* (2010).

CONCLUSION

It may be concluded that application of probiotics in feed as well as in water may reduce the feed consumption in CARIBRO CROSS chicks. However, further studies are needed to assess the factors that may influence the action of probiotics on the nutrient retention vis-à-vis feed consumption in CARIBRO CROSS.

ACKNOWLEDGEMENTS

The authors are thankful to Dr F.P. Savaliya, Principal Scientist, Poultry Science Department, Anand Agricultural University, Anand, for providing necessary facilities to conduct the research work at Poultry Science Department.

REFERENCES

Anjum, M.I., Khan, A.G., Azim, A. and Afzal, M. 2005. Effect of dietary supplementation of multi-strain probiotic on broiler growth performance. *Pakistan Vet. J.*, **25(1):** 25 - 29.

AOAC. 1995. Official Methods of Analysis, 16th ed. Association of Official Analytical Chemists, Washington, DC.

Bandy, M.T. and Pampori, Z.A. 2006. Effect of probiotics on the performances of the broilers chicks. *Indian J. Anim. Nutr*., **23(3):** 183 - 185.

Barton, M.D. 2000. Antibiotic use in animal feed and its impact on human health. *Nutr. Res. Rev*., **13**: 279 – 299.

BIS. 1992. Nutrient Requirements for Poultry, Livestock Feeds, Equipment and Systems .Bureau of Indian Standards, Manak Bhavan, New Delhi, India.

Chae, B.J., Ingale, S.L., Kim, J.S., Kim, K.H., Sen, S., Lee, S.H., Khong, C., Kim, E.K. and Kwon, I.K. 2012. Effect of dietary supplementation of probiotics on performance, caecal morphology and small intestinal morphology of broiler chickens. *Anim. Nutr. and Feed Technol*., **12(1)**: 1 - 12.

Chitra, P., Mohan, B. and Viswanathan, K. 2004. Effect of probiotic with ascorbic acid on the growth performance of broiler in summer season. *Indian J. Poult. Sci*., **39(3)**: 281-284.

Gohain, A.K. and Sapcota, D. 1998. Effect of probiotic feeding on the performance of broilers. *Indian J. Poult. Sci*., **33(1)**: 101 - 105.

Mountzouris, K.C., Tsitrsikos, P., Palamidi, I., Arvaniti, A., Mohnl, M., Schatzmayr, G. and Fegeros, K. 2010. Effects of probiotic inclusion levels in broiler nutrition on growth performance, nutrient digestibility, plasma immunoglobulins and cecal microflora composition. *Poult. Sci.,* **89**: 58 – 67.

Patterson, J.A. and Burkholder, K.M. 2003. Application of prebiotics and probiotics in poultry production. *Poult. Sci*., **82**: 627 – 631.

Rao, S.V., Reddy, M.R. Raju, M.V. and Panda, A.K. 2004. Growth, nutrient utilization and immune competence in broiler chicken fed probiotic, gut acidifier and antibacterial compounds. *Indian J. Poult. Sci*., **39(2)**: 125 - 130.

Reid, G. and Friendship, R. 2002. Alternatives to antibiotic use: Probiotics for the gut. *Anim. Biotechnol*., **13**: 97 – 112.

Samanta, M. and Biswas, P. 1995. Effect of feeding probiotic and lactic acid on the performance of broiler. *Indian J. Poult. Sci*., **30(2)**: 145 - 147.

Shilpa, J.A., Jadhav, N.V., Nagabhusana, V. and Naik, D.G. 2007. Efficacy of feeding Lactobacillus acidophilus and Saccharomyces cerevisiae – 1026 on performance of broilers. *Indian J. Poult. Sci*., **42(1)**: 88 - 91.

Snedecor, G.W. and Cochran, W.G. 1995. Statistical Methods. 8th ed. The Iowa State University Press, Ames, Iowa, USA.