USE OF PROBIOTICS IN BROILER FEED AT STARTER PHASE

ALTAF-UR-RAHMAN*, SARZAMIN KHAN*, DAULAT KHAN *,
MUNIB HUSSAIN**, SOHAIL AHMED*, SYED MOHAMMAD SOHAIL*,
ISHTIAQ AHMED***, IKRAM-UL-HAQ**** and ZAHIR SHAH*

* *Faculty of Animal Husbandry and Veterinary Science, NWFP Agricultural University, Peshawar, Pakistan*
** *Animal Sciences Division, National Agriculture Research Center, Islamabad, Pakistan*
*** *Veterinary Diagnostic and Research Centre, Mandia, Abbottabad, Pakistan*
**** *Department of Agricultural Extension Education & Communication, NWFP Agricultural University, Peshawar, Pakistan*

ABSTRACT

The experiment was carried out at MS Poultry Farm Baffa, district Mansehra, North West Frontier Province (NWFP) during 2005-2006. The main objective of the study was to evaluate the effects of different levels of locally available probiotic (mixture of live cultured beneficial microbes having trade name as Organic Green Culture; OGC) was added in the starter rations of broiler chicks. The effectiveness of the product was quantified in terms of gain in body weight (GBW), dry matter intake(DMI) and feed efficiency (FE). Four hundred and sixteen day-old chicks were randomly distributed into 4 groups, A, B, C and D, where each group was further divided into 4 sub-groups containing 26 birds each. Four experimental diets viz, I, II, III and IV where OGC probiotic was added @ 0, 1, 2 and 4 grams per Kg of feed, respectively were randomly allotted to these 16 sub-groups in such a way that each ration was replicated 4 times. Each ration was given ad libitum twice daily. The experiment lasted for 21 days. The data were statistically analyzed using completely randomized design. The mean values for GBW were 515.8, 523.5, 573.8 and 573.3 grams, the mean values for FI were 645.0, 633.0, 599.0 and 600.0 grams, while the mean values for FE were 1.35, 1.21, 1.04 and 1.04 for the chicks fed rations I, II, III and IV, respectively. Probiotic treatment highly ($P<0.001$) positively affected the GBW, DMI and FE of the experimental chicks. The chicks fed diet IV had OGC probiotic @ 4 g/kg starter ration resulted better GBW than the chicks fed diets I and II containing probiotic @ 0 and 1 g/kg. The chicks fed diet III (containing probiotic @ 2 g/kg) exhibited more GBW than the chicks fed diet II. The chicks in group C consuming feed added with probiotic @ 2 g/kg starter rations showed the lowest DMI as compared with those in groups A, B and D fed on probiotic @ 0, 1 and 4 g/kg starter rations. The chicks fed on control ration presented the poorest FE as compared to those fed rations having probiotic. It was concluded that the addition of OGC probiotic @ 2 g/kg had the potential to improve the over all growth performance traits of commercial Hubbard broiler chicks during starter phase.

Key Words: Probiotics, Broilers, Starter phase, Body weight, Feed intake, Feed efficiency

Citation: Altaf-ur-Rahman, S. Khan, D. Khan, M. Hussain, S. Ahmed, S.M. Sohail, I. Ahmed, Ikram-ul-Haq and Z. Shah. 2009. Use of probiotics in broiler feed at starter phase. Sarhad J. Agric. 25(3): 469-473.

INTRODUCTION

Poultry farming is a sub-sector of livestock, which has been developed from backyard chicks rising to commercial farming during the past five decades. Among the agriculture sector, it is considered as one of the most progressive and innovative business. In Pakistan, commercial poultry started in 1963. Further progress was made, when a Canadian firm "Shaver" extended its collaboration with Pakistan International Air-lines, to establish a modern hatchery at Karachi in 1965. Since then, a rapid and a continuous expansion have been observed in this field. This in turn, has brought a great revolution by increasing broiler and layer farming, establishing hatcheries and feed milling in the private sector. Feed is the major component affecting net return form the poultry business because 60 to 75% of the total input, in terms of money, is spent on feed (Asghar *et al.* 1999; Farooq *et al.* 2001). To obtain better return, minimizing the feed cost is the main challenge for the present poultry farmers. For this purpose, during the last decade, many research strategies have been practiced, such as introducing feed supplements and feed additives (Pervez, 1992; Farina, 1992). Feed additives are added either singly or in combination to basic feed, usually in small quantities as premixes. These are called as non-nutrients feed additives. Probiotics are one of the feed additives; which are the live culture of useful micro-organisms. The probiotic (Organic Green Culture) is introduced in Pakistan by Korean company (Hanpoong industry). It contains micro-organisms like *Saccharomyces*

cervisiae, Lactobacillous acidophillous, Bacillous subtilis and *Aspergillous oryzae.* These micro-organisms have the ability to secrete energy nutrients hydrolyzing enzymes, such as amylase, protease and lipase in the gastro-intestinal tract. According to the manufacturer claims, these enzymes have the capability to synergize with the endogenous enzymes to enhance their catalytic activities for maximizing the digestion rate of dietary energy nutrients, which in turn improve the growth rate of the chicks as compared to the chicks fed the diets containing no probiotic. Therefore, the present study was designed to investigate the effect of OGC probiotic on the growth performance of broiler chicks at starter phase.

MATERIALS AND METHODS

The present study was conducted at MS Poultry Farm Baffa, district Mansehra, North West Frontier Province. Four hundred and sixteen day-old broiler chicks were randomly distributed into 4 groups, A, B, C and D, each group was further divided into 4 sub-groups containing 26 birds each. Four experimental diets viz, I, II, III and IV were randomly allotted to these groups. All the 4 diets were containing per kg of ration (basal feed ingredients) added with 0, 1, 2 and 4 g/kg Probiotic (Table I and II). Each ration was offered *ad libitum* twice daily. The experiment lasted for 21 days. The data were collected for dry matter intake, gain in body weight and feed efficiency. The data were statistically analyzed with the standard procedures of analysis of variance, using completely randomized design (Table 1), while the mean values were compared by least significance difference (LSD), as described by Steel and Torrie (1981). The statistical package (SAS, 2006) was used to perform the above analysis on computer.

Statistical Model $Yij = \mu+Tj+Єij$

Yij = ith observation of jth treatment.
Tj = Effects due to treatment.
$Єij$ = Experimental or random error.
μ = Over all mean (mean effect).

Table I. ***Proportion of ingredients in starter rations***

Ingredients	Ration I	Ration II	Ration III	Ration IV
Probiotic (g)	0	1	2	4
Corn (g)	320	320	320	320
Wheat (g)	200	200	200	200
Canola Meal (g)	50	50	50	50
Corn Gluten Meal (g)	50	50	50	50
Soybean Meal (g)	100	100	100	100
Blood Meal (g)	28	28	28	28
Rice Polishing (g)	80	80	80	80
Molasses (g)	30	30	30	30
Fish Meal (g)	100	100	100	100
DL-Methionine (g)	1.2	1.2	1.2	1.2
L-Lysine (g)	0.8	0.8	0.8	0.8
Rock Phosphate (g)	30	30	30	30
Vit.Min. Premix (g)	10	10	10	10
Total	1000	1000+1	1000+2	1000+4

Table II. ***Chemical composition***

Parameters	Ration I	Ration II	Ration III	Ration IV
ME (Kcal/kg)	2846.56	2846.56	2846.56	2846.56
Crude Protein %	23.52	23.52	23.52	23.52
Crude Fiber %	4.27	4.27	4.27	4.27
Ether Extract %	4.00	4.00	4.00	4.00

RESULTS AND DISCUSSION

Gain in Body Weight

The mean GBW was 515.75, 523.50, 573.75 and 573.25 grams for treatments I, II, III and IV, respectively. Highly significant ($P<0.001$) difference was observed among treatments for GBW. Treatment IV containing probiotic @ 4 g/kg starter ration showed higher GBW than treatments I and II having probiotic @ 0 and 1 g/kg of starter ration. Treatment III (containing probiotic @ 2 g/kg of starter ration) indicated more GBW than treatment II. Moreover, treatments II and III were also found to be better than treatment I for GBW. Whereas, no difference between treatment III and IV was obtained for such parameter (Table III). It was hypothesized that the increasing level of probiotic would consistently increase the GBW of the experimental birds. Because the microbes present in probiotic would secrete amylase, protease and lipase. Which would enhance the catalytic activities of the endogenous enzymes to liberate more energy from hydrolyzing the energy feed nutrients. Such higher quantity of liberated energy would help to improve GBW of the chicks fed probiotic added rations as compared to the chicks fed the rations containing no probiotic. The above hypothesis was found to be true, because, the GBW of the experimental birds was increased with increasing level of probiotic in the experimental diets.

The microbes of probiotic in the intestinal tract of the inoculated birds may be secreting the amylolytic, cellulolytic, proteolytic and lipolytic enzymes (Biswas *et al.* 1999; Bedford, 2001; Lázaro *et al.* 2003; Józefiak *et al.* 2004), which provide maximum help to enhance the digestibility of starch, protein and fat components in the sequential way and liberated maximum energy. Such energy would not only improve the overall vital activities in the birds, but also improve the GBW. The results of this study are in agreement with those reported by Chiang and Hsieh (1995), who obtained maximum growth response in broilers, even using a probiotic at very low levels such as 0.25 0r 0.50 g/kg starter ration. Omprakash *et al.* (1996) also found the highest GBW (500 to 550g per chick) by incorporating probiotic at 15 or 20 ml/litre drinking water in broilers, at starter phase. The present findings are further supported by the results of many researchers (Shoeib and Madian, 2002; Sklan, 2002; Cross, 2002; Muneer *et al.* 2002; Lázaro *et al.* 2003; Józefiak *et al*. 2004; Kabir *et al.* 2004) they also predicted that the all beneficial species of *Lactobacillus* if added in the form of probiotic had the efficiency to produce energy nutrients digesting enzymes, which could be able to accelerate the catalytic activities of the endogenous enzymes, which could generate higher content of energy, which could be highly effective in improving GBW of specially in broiler chicks during starter phase.

Table III ***Mean values for weight gain, feed consumption and feed efficiency ratio***

	Rations				
	I	II	III	IV	
Weight gain/chick (g)	515.75^{c}	523.50^{b}	573.75^{a}	573.25^{a}	4.96
Feed consumption/chick (g)	645.00^{a}	633.00^{b}	599.00^{c}	600.00^{c}	7.40
Feed efficiency ratio	1.25^{a}	1.21^{b}	1.04^{c}	1.04^{c}	0.0185

Mean values in the rows with the same superscripts are not significantly different.

Dry Matter Intake

The mean DMI values for groups A, B, C and D were 645, 633, 599 and 600 g/chick, respectively. The chicks in group C consuming feed added with probiotic @ 2 g/kg starter rations showed the lowest DMI as compared with those in groups A or B or D fed on probiotic @ 0 or 1 or 4 g/kg starter rations (Table III). It was hypothesized that using probiotic in the experimental diets would not only enhance the digestion rate, but also increase the nutrient retention and decrease their passage rate as undigested. Because of secreting energy nutrients hydrolyzing enzymes from the microbes present in probiotic, which would reduce the DMI comparing with control. The postulate was found to be correct, because the chicks fed basal ration plus various levels of probiotic presented the lower DMI as compared to the chicks fed the ration had no probiotic. The above findings are also favored by Kumprecht and Zobac (1996). It was reported that average DMI values were lowest (500-550 grams/chick) for the chicks fed probiotic added rations as compared to the chicks in the control groups. Samanta and Biswas (1997) however, found non significant difference for DMI of the chicks fed probiotic treated versus untreated rations. The obvious reasons could be the origin of the probiotic, type and species of the microbes present in the probiotic, concentration of the probiotic tested, route of feeding probiotic i.e. added in feed or added in water, nature of the climate, where the trial was conducted or due to any other hidden factors etc (Bedford 2001; Hamid *et al.* 1994)

Feed Efficiency

Highly significant ($P<0.001$) differences were obtained among the experimental diets for FE values. The chicks fed on control ration showed poor FE as compared to those fed rations having probiotic (Table III).
These findings are further supported by the work of many researchers (Jin *et al.* 1997; Pedron *et al.* 1997; Nezami *et al.* 2000; Gonzalez *et al.* 2001; 2001) they also reported best-FE for the chickens raised on rations containing high levels (5 to 10 grams/kg feed) of probiotic. The improved FE might be due to maintaining normal intestinal microflora by competitive exclusion and antagonism, altering metabolism by increasing digestive enzyme activity and by improving digestion rate of energy nutrients.

CONCLUSION AND RECOMMENDATION

Based on the results of present study, it was concluded that the inclusion of OGC probiotic @ 2 g/kg had the potential to improve the growth performance of commercial *Hubbard* broiler chicks during starter phase. Therefore, under the conditions of the present trial, it is recommended for the commercial broiler farmers to use OGC probiotic up to 2 g/kg in the starter ration of commercial broiler chicks for obtaining maximum production. Further research work is needed to use the same levels of such Probiotic in broiler finisher ration. It is also suggested that the effect of Probiotic Organic Green Culture should be tested on commercial layers, broiler breeders and layer breeders.

REFERENCES

Asghar, A., M. Farooq, M.A. Mian, Perveez and A. Khurshaid. 2000. Economics of broiler production in Mardan Division. J. Rural Dev. Administ. 32: 56-64.

Bedford, A. 2001. Microbial interactions in response to exogenous enzyme utilization. In: Enzymes in farm animal nutrition. CABI Publish. 299–314.

Biswas, T., L. Mandal and S.K. Sarker. 1999. Studies of enzymes supplementation and herbal preparation at different levels of energy on the performance of broilers. J. Interacademic. 3: 53-58.

Camps, D.M. 1996. Growth promoters in broiler chickens. Revista Cubana de Ciencia Avicola. 1: 31-37.

Chiang, S.H. and W.M. Hsieh. 1995. Effect of direct-fed microorganisms on broiler growth performance and litter ammonia level. Asian Aust. J. Anim. Sci. 2: 159-162.

Cross, M.L. 2002. Microbes versus microbes: immune signals generated by probiotic *lactobacilli* and their role in protection against microbial pathogens. FEMS Immunol. Medicine Microbiol. 34: 245-253.

Farooq, M., S. Faisal, M.A. Mian, F.R. Durrani and M. Arshad. 2001. Status of broiler breeders in Abbottabad and Mansehra. Sarhad J. Agric. 17: 489-495.

Farina, M.K. 1992. Influence of supplemental ascorbic acid on broiler performance under the stressful farm conditions. M. Sc Thesis $_{(Hons)}$, NWFP Agric. Univ. Peshawar.

Gonzalez, N.J., S. Cornejo, F. Jimenez and G. Lorenzoni. 2001. Effect of dietary supplementation with and enzyme complex (Avizyme 1500) containing amylase, xylanase and protease on performance and egg quality of commercial layers. Poult. Sci. 80 (7): Abst. 151.

Hamid, A., Z.F. Khan, M. Ahmad and M.A. Qadeer. 1994. Probiotics in poultry production. Bangladesh J. Sci. & Indust. Res. 29: 1-12.

Jin, L.Z., Y.W. Ho, N. Abdullah and S. Jalaludin. 1997. Probiotic in poultry: modes of action. World's Poult. Sci. J. 4: 351-368.

Józefiak, A., M.F. Rutkowski and D. Boros. 2004. The effect of dietary fibre fractions from different cereals and microbial enzymes supplementation on performance, ileal viscosity and short-chain fatty acids concentration in caeca of broiler chickens. Anim. Feed Sci. 13: 487–496.

Kabir, S.M.L., M.M. Rahman, M.B. Rahman and S.U. Ahmed. 2004. The dynamics of probiotics on growth performance and immune response in broilers. Int'l J. Poult. Sci. 3: 361-364.

Kumprecht, I. and P. Zobac. 1996. Continuous application of probiotics based on *Saccharomyces cerevisiae* var. elipsoideus and Bacillus C.I.P 5832 in the nutrition of chicken broilers. Zivocisna Vyroba. 7: 311-316.

Lázaro, M., P.M. Garcia and G.G. Mateos. 2003. Influence of enzymes on performance and digestive parameters of broilers fed rye-based diets. Poult. Sci. 82: 132–140.

Muneer, M., A.S. Akhtar and T.N. Pasha .2002. Immunomodulatory effects of multistrain probiotic on broiler chicks. College of Vet. Sci. Lahore, Pakistan.

Nezami, E.L.H., H. Mykkänen, P. Kankaanpää, S. Salminen and J. Ahokas. 2000. Ability of Lactobacillus and Propionibacterium strains to remove aflatoxin B_1 from the chicken duodenum. J. Food Prot. 63: 549-552.

Omprakash, A.V., D. Narahari and T.S. Chandra. 1996. *Eremothecium ashbyii* culture as growth promoter for pureline broiler chicks. Cheiron. 25: 1-2.

Pedron, O., A. Giardini, V. Dell' Orto and H. Durand. 1997. Performance of broilers following the administration of two different levels of *Pediococcus acidilactici*, strain 18-5M. Selezione Veterinaria. 8: 221-225.

Pervez, 1992. Response of broilers to different feed additives. M. Sc. $_{(Hons)}$Thesis, NWFP Agric. Univ., Peshawar.

Pradhan, R.N., G. Sahoo, P.K. Babu, S.C. Mishra and L.M. Mohaoatra. 1998. Role of probiotics on performance of broiler chicks. Indian J. Anim. Prod. Mgt. 2: 80-83.

Samanta, M. and P. Biswas. 1997. Effect of feeding Streptococcus culture on the performance of broilers. J. Interacademicia. 2: 118-120.

Shoeib, H.K. and A.H. Madian. 2002. A study on the effect of feeding diets containing probiotics (Pronifer and biogen) on growth performance, intestinal flora and haematological picture of broiler chicks. Assiut Eteterinary Med. J. 47: 112-125.

Sklan, D. 2002. Development of the digestive tract of poultry. World's Poult. Sci. 57 (4). 415 – 428.

Statistical Analysis System. 2006. A handbook of statistical analysis system, Ver. 6.04. Instt. Inc. Cary, NC.

Steel, R.G.D. and J.H. Torrie. 1981. Principles and Procedures of Statistics. McGraw Hill Book Co. New York.