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Evaluation the Effect of Several Non-Antibiotic Additives on Growth Performance of Broiler Chickens

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Abstract: This experiment was conducted to evaluation the effects of Prebiotic, Garlic powder and Turmeric powder on performance and carcass characteristics of broiler chickens. Based a randomized completely design, 240 day old Ross 308 broilers were distributed into 16 floor pens and reared for 42 days. A basal diet was formulated according to NRC recommendations for starter (0-21 days) and grower (22-42 days) periods. The basal diet was also supplemented with prebiotic Biolex-MB, garlic powder and turmeric powder, resulting 4 dietary treatments were prepared including control group. Each dietary treatment was fed *ad-libitum* to 4 replicates group of 15 birds at the beginning of rearing period. The result of present study indicated that the diets containing feed additives had no significant effect on broilers performance with an except of Biolex-MB, which improved weight gain and feed conversion ratio ($p<0.05$). Supplementation of biolex-MB in diet significantly ($p<0.05$) affected the amount of carcass, thigh and breast ($p<0.05$). The highest percent of carcass and thigh were found in biolex-MB and control bird groups, respectively ($p<0.05$). The percent of breast was not affected with feed treatments.

Key words: Prebiotic, garlic, turmeric, performance, *ad-libitum*, broiler

INTRODUCTION

Recently the use of antibiotic growth promoter in poultry industry has been seriously criticized by governmental policy makers and consumers because of the development of microbial resistance to these products and the potential harmful effects on human health (Botsoglu and Fletouris, 2001; Williams and Losa, 2001; McCartney, 2002). At present and up till 2009 only 4 antibiotic growth promoter are permitted for use in poultry nutrition. On the other hand, there is increasing public and government pressure in several countries of EU and some non-EU to search for natural alternative to antibiotics (Williams and Losa, 2001; McCartney, 2002). Probiotic, prebiotic and medicinal plants as natural feed additives are recently used in poultry diet to enhance the performance and the immune response of birds. Prebiotics are indigestible carbohydrates that leave a desired effect on the host, by selective growth stimulation or activation of one or more bacteria in a large part of the GI tract (Gibson and Roberfroid, 1995). Biolex-MB is a commercial prebiotic of the Mannan-oligosaccharides family, which is obtained by extraction from the outer cell wall of the yeast *Saccharomyces cerviciae*. Garlic (*Allium sativum*) is well known as a spice and herbal medicine for the prevention and treatment of a variety of diseases (Adibmoradi *et al*., 2006). The major active ingredients of garlic are allicin, ajoene, S-allyl cysteine. Garlic has been found to demonstrate antimicrobial activity (Adibmoradi *et al*., 2006), lower serum and liver cholesterol (Qureshi *et al*., 1983) and improve productive performance of broiler chicks (Demir *et al*., 2003). Curcuma longa (turmeric) is a perennial herb that grows to a height of 3-5 ft and is cultivated extensively in Asia (India and China) and other countries with a tropical climate. Curcumin, the active ingredient from the spice turmeric is a potent antioxidant and anti-inflammatory agent with hepatoprotective, anticarcinogenic and antimicrobial properties (Pal *et al*., 2001).

The purpose of this study was to investigate the effect of prebiotic, garlic powder and turmeric powder supplementation in diets on broilers performance.

MATERIALS AND METHODS

Bird and diet: In this study, 240 broiler chickens of the commercial Ross 308 strain were used in a randomized completely design with 4 treatments and 4 replicates in

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Table 1: Ingredient compositoin (as percent of dry matter) and calculated analysis of the basal diets

Ingredients	Starter (0-21 days)	Grower (22-42 days)
Corn	58.7	61
Soybean meal	30	29
Wheat bran	5	5
Fish meal	2	0
Soybean oil	1	2
Oister shell meal	1.2	1
DCP	1.07	1
Vitamin and mineral perimix	0.5	0.5
DL-Methionine	0.13	0.1
L-lysine	0.15	0.25
Salt	0.25	0.1
Coccidiostat	0	0.05
Total	100	100
Nutrient content		
ME (kcal kg^{-1})	2850	2950
Crude protein (%)	20.48	18.44
Crude fiber (%)	3.89	3.81

Vitamin and mineral provided/kg of diet: vitamin A, 360000 IU; vitamin D3, 800000 IU; vitamin E, 7200 IU; vitamin K3, 800 mg; vitamin B1, 720 mg; vitamin B9, 400 mg; vitamin H2, 40 mg; vitamin B2, 2640 mg, vitamin B3, 4000 mg; vitamin B5, 12000 mg; vitamin B6, 1200 mg; vitamin B12, 6 mg; Choline chloraid, 200000 mg, Manganeze, 40000 mg, Iron, 20000 mg; Zinc, 40000 mg, coper, 4000 mg; Iodine, 400 mg; Selenium, 80 mg

each treatment and 15 birds/replicates and reared on the floor pens for 42 days. A basal deit was formulated as control according to NRC (1994) recommendations for starter (0-21 days) and grower (22-42 days) periods. The required amount of growth stimulating additives under study was added to the basal diet so that in addition to the control treatment, four dietary experimental treatments containing prebiotic Biolex-MB (2000 g ton^{-1}), Garlic powder (1000 g ton^{-1}) and Turmeric powder (1000 g ton^{-1}) were prepared (Table 1). During the experiment, water and feed were given to the birds *ad-libitum*.

Sample collection: Weighing of the feed and chickens were made on a weekly basis. At the end of the experiment, 2 birds from each replicate of treatments were slaughtered for separation of carcasses (Perreault and Leeson, 1992).

Statistical analysis: All data were analyzed using the one-way ANOVA procedure of SAS (1998) for analysis of variance. Significant differences among treatments were identified at 5% level by Duncan (1955) multiple range tests.

RESULTS AND DISCUSSION

Growth performance: The effect of experimental treatments on the performance of broiler chickens is given in Table 2. Weight gain and feed conversion ratio were only affected by dietary Biolex-MB in 0-21, 22-42 and 0-42 days of experiment ($p<0.05$). There were no significant difference in feed intake across treatments. Mohan *et al.* (1996), Piray *et al.* (2007), Pelicano *et al.* (2004) and Thitaram *et al.* (2005) have observed the beneficial effects of prebiotics on the body weight gain of broiler chickens. Pelicano *et al.* (2004); Maiorka *et al.* (2001) and Santin *et al.* (2001) reported that in birds under prebiotic nutrition, the FCR was improved significantly as compared with the control treatment. In contrast with present study, Ignacio (1995) and Kumprecht and Zobac (1997) reported that the use of prebiotics in the ration of broiler chickens reduce the feed conversion ratio. The use of prebiotics, by increasing in length of the intestinal mucosa, increases the absorption areas and improves the birds growth performance (Santin *et al.*, 2001). The data of present study show that dietary garlic and turmeric meal can not affect the growth performance of broiler chickens.

The results were consistent with Horton *et al.* (1991), Dey and Samanta (1993), Namagirilakshmi (2005) and Mehala and Moorthy (2008), who reported that supplementation of garlic powder and turmeric powder in diet had no significant effect on weight gain and feed conversion ratio. On the other hand, Shi *et al.* (1999) and Kumar *et al.* (2005) observed a positive effect of garlic powder and turmeric powder on broiler performance, respectively. Variance between reports of researchers could be related to differences in management and environmental conditions that be exist in various experiments. It's suggested that under benefit management and/or environmental conditions, the effect of such feed additives may be worthless.

Carcass composition: The effect of experimental treatments on the composition of the bird carcasses (in grams) and the carcass efficiency (in %) are given in Table 3. The weight of the dressing carcass, thigh and breast in birds under Biolex-MB treatment was significantly higher as compared with other treatments ($p<0.05$). The birds under Biolex-MB and garlic powder treatments had the higher carcass percent than other groups. Also, birds under control treatment had the highest thigh percent as compared with Biolex-MB and garlic powder treatments ($p<0.05$). The positive effect of the prebiotic use on the weight of broiler carcasses (Yusrizal and Chen, 2003; Ammerman *et al.*, 1989; Piray *et al.*, 2007) confirm the results of this experiment. No significant differences were detected in other carcass composition (as gram or percent) of birds fed garlic powder and turmeric powder when compared to control group. Durrani *et al.* (2006) observed no improvement in amount of breast and thigh by application of turmeric. However, present results on

Table 2: The main effects of treatments on performance of broiler chickens (Mean±SE)

	Feed consumption (g)			Body weight gain (g)			Feed conversion ratio (g g^{-1})		
Treatments	0-21	22-42	0-42	0-21	22-42	0-42	0-21	22-42	0-42
Control	1111.08±5.44	3552.3±77.07	4663.4±81.24	557.75±7.42^{b}	1879.2±43.97^{b}	2436.9±49.17^{b}	1.99±0.01^{a}	1.89±0.005^{a}	1.91±0.005^{a}
Biolex-MB	1126.88±8.90	3451.9±70	4578.8±72.19	654.03±0.59^{a}	2091.67±6^{a}	2745.9±5.89^{a}	1.72±0.01^{b}	1.65±0.03^{b}	1.66±0.02^{b}
Garlic	1085.21±61.96	3512.5±161.32	4597.7±223.27	556.04±52.79^{b}	1887.8±86.91^{b}	2443.9±139.66^{b}	1.96±.07^{a}	1.86±0.004^{a}	1.88±0.01^{a}
Turmeric	1163.71±10	3478.3±6.3	4642±10.11	561.42±17.95^{b}	1787.3±69.91^{b}	2348.7±87.86^{b}	2.07±0.05^{a}	1.95±0.08^{a}	1.98±0.07^{a}
p-values	0.41	0.89	0.95	0.10	0.03	0.05	0.003	0.005	0.002

^{a,b}Means in each column with different superscripts are significantly different ($p<0.05$)

Table 3: The effect of feed additives on carcass composition of broiler chickens

	Treatments				
Variables	Control	Biolex-MB	Garlic	Turmeric	p-value
As (g)					
Carcass	1885±90.04^{b}	2573.3±234.47^{a}	2083.3±147.45^{b}	1986.7±58.11^{b}	0.04
Thigh	472±13.20^{b}	555.83±28.82^{a}	466.17±32.35^{b}	479.33±9.67^{b}	0.07
Breast	527±32.08^{b}	720±14.43^{a}	610.67±36.54^{b}	618.67±35.83^{b}	0.01
As (%)					
Carcass	76.35±2.78^{c}	86.16±1.34^{a}	82.86±1.43^{ab}	78.06±0.59^{bc}	0.014
Thigh	25.09±0.75^{a}	21.75±0.95^{b}	22.39±0.72^{b}	24.12±0.30^{ab}	0.039
Breast	27.95±1.12	28.48±2.81	29.36±0.68	31.09±1.05	0.577

^{a,b,c}Means in each row with different superscripts are significantly different ($p<0.05$)

carcass composition were in contrast to those of Pelicano *et al.* (2003), Waldroup *et al.* (1993), Takahashi *et al.* (2005) and Javandel *et al.* (2008).

CONCLUSION

In generally, the results of the present experiment show that prebiotic Biolex-MB can be used as an effective feed additive to improve broilers performance.

REFERENCES

Adibmoradi, M., B. Navidshad, J. Seifdavati and M. Royan, 2006. Effect of dietary garlic meal on histological structure of small intestine in broiler chickens. J. Poult. Sci., 43: 378-383. http://www.jstage.jst.go.jp/article/jpsa/43/4/378/_pdf.

Ammerman, E., C. Quarles and P.V. Twining, 1989. Evaluation of fructooligosaccharides on performance and carcass yield of male broilers. Poult. Sci., 68 (Suppl.): 167.

Botsoglu, N.A. and D.J. Fletouris, 2001. Drug Resistant in Foods. Pharmacology, Food Safety and Analysis. New York, Marcel Dekker, Inc., pp: 541-548.

Demir, E., S. Sarica, M.A. Ozcan and M. Suicmez, 2003. The use of natural feed additives as alternatives for an antibiotic growth promoter in broiler diet. Br. Poult. Sci., 44 (Suppl. 1): S44-S45.

Dey, A. and A.R. Samanta, 1993. Effect of feeding garlic (*Allium sativum* Linn.) as a growth promoter in broilers. Ind. J. Anim. Health, 32: 17-19.

Duncan, D.B., 1955. Multiple range and F-tests. Biometrics, 11: 1-42.

Durrani, F.R., M. Ismail, A. Sultan, S.M. Suhail, N. Chand and Z. Durrani, 2006. Effect of different levels of feed added turmeric (curcuma longa) on the performance of broiler chicks. J. Agric. Biol. Sci., 1 (2): 9-11. http://www.arpnjournals.com/jabs/research_papers/jabs_0806_12.pdf.

Gibson, G.R. and M.B. Roberfroid, 1995. Dietary modulation of the human colonic microbiota: Introducing the concept of probiotic. J. Nutr., 125: 1401-1412. PMID: 7782892. http://jn.nutrition.org/cgi/reprint/125/6/1401?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&author1=gibson&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&volume=125&resourcetype=HWCIT.

Horton, G.M.J., M.J. Fennell and B.M. Prasad, 1991. Effect of dietary garlic (*Allium sativum*) on performance, carcass composition and blood chemistry changes in broiler chickens. Can. J. Anim. Sci., 71: 939-942.

Ignacio, E.D., 1995. Evaluation of the effect of yeast culture on the growth performance of broiler chick. Poult. Sci., 74 (Suppl. 1): 196 (Abst.).

Javandel, F., B. Navidshad, J. Seifdavati, G.H. Pourrahimi and S. Baniyaghoub, 2008. The favorite dosage of garlic meal as a feed additive in broiler chickens ratios. Pak. J. Biol. Sci., 11 (13): 1746-1749. http://www.scialert.net/qredirect.php?doi=pjbs.2008.1746.1749&linkid=pdf.

Kumar, M., R.S. Choudhary and J.K. Vaishnav, 2005. Effect of supplemental prebiotic, probiotic and turmeric in diet on the performance of broiler chicks during summer. Ind. J. Poult. Sci., 40: 137-141.

Kumprecht, I. and P. Zobac, 1997. The effect of mannanoligosaccharides in feed mixtures on the performance of broilers. Czech J. Anim. Sci., 42 (3): 117-124.

Maiorka, A., E. Santin, S.M. Sugeta, J.G. Almeida and M. Macari, 2001. Utilization of prebiotics, probiotics or symbiotics in broiler chicken diets. Br. J. Poult. Sci.,3: 75-82. DOI: 10.1590/S1516-635X2001000100008. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-635X2001000100008&lng=en&nrm=iso&tlng=pt.

McCartney, E., 2002. The natural empire strcks book. Poult. Int., 41 (1): 36-42.

Mehala, C. and M. Moorthy, 2008. Production performance of broilers fed with Aloe vera and *Curcuma longa* (Turmeric). Int. J. Poult. Sci., 7 (9): 852-856. http://www.scialert.net/qredirect.php?doi=ijps.2008.852.856&linkid=pdf.

Mohan, B., R. Kadirvel, A. Natarajan and M. Bhaskaran, 1996. Effect of probiotics supplementation on growth, nitrogen utilization and serum cholesterol in broilers. Br. Poult. Sci., 37: 395-401. DOI: 10.1080/00071669608417870.

Namagirilakshmi, S., 2005. Turmeric (*Curcuma longa*) as nutraceutical to improve performance. M.V.Sc. Thesis submitted to Tamil Nadu Veterinary and Animal Sciences University, Chennai.

NRC (National Research Council), 1994. Nutrient Requirements of Poultry. 9th Edn. National Academy Press, Washington, DC. http://books.nap.edu/openbook.php?isbn=0309048923.

Pal, S., T. Choudhuri, S. Chattopadhyay, A. Bhattacharya, G.K. Datta, T. Das and G. Sa, 2001. Mechanisms of curcumin-induced apoptosis of Ehrlich's ascites carcinoma cells. Biochem. Biophys. Res. Commun., 288: 658-665. DOI: 10.1006/bbrc.2001.5823.

Pelicano, E.R.L., P.A. Souza, H.B.A. Souza, F.R. Leonel, N.M.B.L. Zeola and M.M. Bioago, 2004. Productive traits of broiler chicken fed diets containing different growth promoters. Brazilian J. Poult. Sci., 6: 177-182. DOI:10.1590/S1516-635X2004000300008.http://www.scielo.br/scielo.php?pid=S1516635X2004000300008&script=sci_arttext&tlng=en.

Pelicano, E.R.L., P.A. Souza, H.B.A. Souza, A. Oba, E.A. Norkus, L.M. Kodawara and T.M.A. Lima, 2003. Effect of different probiotics on broiler carcass and meat quality. Br. J. Poult. Sci., 5: 207-214. DOI:10.1590/S1516-635X2003000300009.http://www.scielo.br/pdf/rbca/v5n3/a09v05n3.pdf.

Perreault, N. and S. Leeson, 1992. Age-related carcass composition changes in male broiler chickens. Can. J. Anim. Sci., 72: 919-929.

Piray, A.H., H. Kermanshahi, A.M. Tahmasbi and J. Bahrampour, 2007. Effects of cecal cultures and *Aspergillus* meal prebiotic (fermacto) on growth performance and organ weights of broiler chickens. Int. J. Poult. Sci., 6 (5): 340-344. http://www.pjbs.org/ijps/fin807.pdf.

Qureshi, A.A., N. Abuirmeileh, Z.Z. Din, C.E. Elson and W.C. Burger, 1983. Inhibition of cholesterol and fatty acid biosynthesis in liver enzymes and chicken hepatocytes by polar fractions of garlic. Lipids, 18: 343-348. DOI: 10.1007/BF02537229.

Santin, E., A. Maiorka, M. Macari, M. Grecco, J.C. Sanchez, T.M. Okada and A.M. Myasaka, 2001. Performance and intestinal mucosa development of broiler chickens fed diet containing *Sccharomyces cerevisiae* cell wall. J. Appl. Poult. Res., 10: 236-244. http://japr.fass.org/cgi/reprint/10/3/236?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&searchid=1&FIRSTINDEX=0&sortspec=relevance&firstpage=236&resourcetype=HWCIT.

SAS Institute Inc., 1998. SAS/STAT User's Guide Edition: SAS Institute Inc., Cary, North Carolina.

Shi, X.H., S.Z. Li, Z.P. Liu, X.H. Shi, S.Z. Li and Z.P. Liu, 1999. A trial on the use of garlic as a feed additive for meat chickens. Poult. Husbabdry Dis. Control, 10: 19-20.

Takahashi, S.E., A.A. Mendes, E.S.P.B. Saldanha, C.C. Pizzolante, K. Pelicia, R.R. Quinteiro, C.M. Komiyama, R.G. Garcia and P.I.C.L. Almeida, 2005. Efficiency of prebiotics and probiotics on the performance, yield, meat quality and presence of *Salmonella* sp. incarcasses of free-range broiler chickens. Br. J. Poult. Sci., 7: 151-157. http://www.scielo.br/pdf/rbca/v7n3/a03v7n3.pdf.

Thitaram, S.N., C.H. Chung, D.F. Day, A. Hinton, J.S. Bailey and G.R. Siragusa, 2005. Isomaltooligosaccharide Increases Cecal Bifidobacterium Population in Young Broiler Chickens. Poult. Sci., 84: 998-1003. http://ps.fass.org/cgi/reprint/84/7/998?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&volume=84&firstpage=998&resourcetype=HWCIT.

Waldroup, A.L., J.T. Skinner, R.E. Hierholzer and P.W. Waldroup, 1993. An evaluation of fructoolligosaccharide in diets for broiler chickens and effects on Salmonellae contamination of carcasses. Poult. Sci., 72 (4): 643-650.

Williams, P. and R. Losa, 2001. The use of essential oils and their compounds in poultry nutrition. World Poultry-Elsevier, 17 (4): 14-15.

Yusrizal, D. and T.C. Chen, 2003. Effect of adding chicory fructans in feed on broiler growth performance, serum cholesterol and intestinal length. Int. J. Poult. Sci., 2: 214-219. http://www.pjbs.org/ijps/fin92.pdf.