

Research Article

EFFECT OF TURMERIC (*CURCUMA LONGA*) SUPPLEMENTATION ON GROWTH AND BLOOD CHEMISTRY OF BROILERS

Kamdev Sethy*, P. Swain, K. Behera, S.M. Nayak, S.R. Barik, P. Patro, P. Meher

Received 11 February 2016, revised 05 May 2016

ABSTRACT: To access the effect of turmeric (*Curcuma longa*) supplementation on growth and blood chemistry of broiler chickens, seventy five day old straight run coloured synthetic broiler chicks were randomly divided into 3 groups (25 chicks per group). Group I served as control (without any supplementation), where as birds in groups II and III were supplemented with 0.5% and 1.0% *Curcuma longa* powder respectively and the trail was lasted for 7 weeks, during which weekly body weight changes were recorded. Blood samples were collected at the end of the experiment to study the blood profile of birds. The results indicated that addition of *Curcuma longa* powder caused significant ($P < 0.05$) increase in body weight gain and blood Hb concentration. On the other hand *Curcuma longa* supplementation had non- significant ($P > 0.05$) effect on blood biochemical parameters of bird. The present results confirmed the beneficial effects of dietary *Curcuma longa* powder to improve body weight and Hb concentration of broiler chickens.

Key words: *Curcuma longa*, Broilers, Growth, Blood chemistry.

INTRODUCTION

Turmeric (*Curcuma longa*) is a rhizomatous herbaceous perennial herb of ginger family that is widely used and cultivated in India (Govindarajan and Stahl 1980). It belongs to the family Zingiberaceae along with ginger, cardamom, and galangal. This medicinal plant possesses rhizomes and underground root-like stems that had been originally used as a food additive in curries to improve the storage condition, appearance, flavour, palatability and

preservation of food (Jayaprakasha *et al.*, 2005).

The active ingredients of turmeric are curcumin, demethoxycurcumin, bis-demethoxycurcumin and colourless metabolites tetrahydrocurcumin (Huang *et al.* 1995). Turmeric has antioxidant, antibacterial, antifungal, antiprotozoal, antiviral, anti-inflammatory, anticarcinogenic, anti-hypertensive, and hypo-cholesteremic activities (Chen and Huang 2009). Kumari *et al.* (2007) and Rajput *et al.* (2012) showed

College of Veterinary Science & Animal Husbandry, Orissa University of Agriculture & Technology,
Bhubaneswar-751003, Odisha, India.

*Corresponding author. e-mail: babuivri@gmail.com.

that supplementation of turmeric increased the body weight gain of broiler chickens. Turmeric also has beneficial effects on blood parameters in broiler chickens (Swathi *et al.*, 2012). Therefore, an experiment was conducted on broiler chicken to find out the effect of different

doses of turmeric supplementation on their growth and blood chemistry.

MATERIALS AND METHODS

An experiment was conducted on 75 straight run day old coloured synthetic broiler chicks, randomly distributed in 3 groups containing 25 chicks each and fed as per specification of Bureau of Indian Standards (BIS, 1992). Birds were reared in deep litter system and given feed and water *ad libitum*. Broiler birds were given broiler starter feed from 0 to 3rd weeks and broiler finisher diet from 4th to 7th week. The ground turmeric powder was procured from local market of Bhubaneswar, Odisha, India. Treatments were: group I (control), group II supplemented with 0.5% turmeric powder, group III supplemented with 1 % turmeric powder through the concentrate mixture. Various rations were also analysed for proximate composition (AOAC, 2005). Body weights of birds were recorded at weekly intervals. At the end of the experiment blood was collected from three birds of each group. The serum was collected in vials and kept at -40°C until further analysis. Haemoglobin (Hb) content and packed cell volume (PCV) were determined as per Schalm *et al.* (1975) and Jain (1986), respectively. The serum biochemical parameters like glucose, total protein, albumin, globulin, A: G ratio, cholesterol were estimated by using Crest Biosystems Kit (Goa, India). The data were analysed by Statistical Package for Social Science (SPSS) software version 16.

Table 1. Ingredient (%) and chemical composition (% DM basis) of broiler starter and finisher diets.

Parameter	Starter	Finisher
Ingredient		
Maize	52.0	59.00
Soya bean meal	41.0	33.00
DORB	4.0	5.00
Mineral mixture	2.70	2.70
Common salt	0.30	0.30
Chemical composition		
Moisture	9.74	10.10
CP	22.75	20.09
Ether extract	2.10	2.17
Crude fibre	4.20	3.93
Total ash	9.40	9.55
Acid insoluble ash	2.50	2.67
Nitrogen free extract	61.55	64.26
Metabolisable energy*(kcal/kg)	2790	2895

All diets were supplemented with common salt @ 0.3%, Lysine 0.1%, DL-methionine 0.1%, toxin binder 0.2%, Trace min. 0.2%, Bioblend 0.01%, Ventriplus 0.25%, Veldot 0.5%, Biochol 0.5%; *Calculated.

RESULTS AND DISCUSSION

The composition and proximate analysis of different rations used in the present experiment has been shown in Table 1. The crude protein content (%) of the broiler starter and broiler finisher was 22.75 and 20.09 respectively. The

Table 2. Cumulative body weight gain (g) of broilers under study.

Week	Group			P value
	I	II	III	
1	36.42±2.67	35.50±1.10	39.18±1.93	0.190
2	75.80±2.80	78.42±1.89	79.53±1.60	0.179
3	190.40 ^a ±6.40	210.60 ^a ±6.10	240.20 ^b ±5.31	0.040
4	360.30 ^a ±12.60	430.10 ^b ±13.70	480.10 ^c ±11.41	0.020
5	590.50 ^a ±21.80	670.30 ^b ±20.18	710.00 ^c ±19.70	0.010
6	730.10 ^a ±30.18	890.80 ^b ±32.14	910.00 ^b ±30.60	0.000
7	1050.41 ^a ±41.47	1250.50 ^b ±38.90	1310.80 ^b ±36.42	0.010

^{abc} Values with different superscripts in a row differ significantly (P<0.05).

Table 3. Haematological and serum biochemical profile of broiler birds under study.

Parameters	Group			P value
	I	II	III	
Hb (g/dl)	8.55 ^a ±0.35	10.90 ^b ±0.42	11.45 ^c ±0.44	0.032
PCV (%)	30.50±0.50	31.00±1.00	30.00±1.00	0.188
Glucose (mg/dl)	165.40±7.33	174.25±8.60	151.42±5.01	0.417
Cholesterol (mg/dl)	214.09±2.30	216.08±0.73	193.34±3.40	0.071
Total protein (g/dl)	2.90±0.02	3.26±0.24	3.07±0.12	0.742
Albumin (g/dl)	1.81±0.08	2.05±0.01	1.90±0.05	0.255
Globulin (g/dl)	1.09±0.06	1.21±0.10	1.17±0.18	0.170
A/G ratio	1.66±0.07	1.69±0.12	1.62±0.05	0.172

^{abc} Values with different superscripts in a row differ significantly.

protein and energy requirement was as per the BIS (1992) requirement.

The body weight gain was higher (P<0.05) in groups fed diets containing turmeric compared to control group (Table 2). This could be attributed to the phytobiotic stimulant property of turmeric. Turmeric has the ability to stimulate digestive enzymes and depress pathogenic microbial flora in the small intestine which compete the host for nutrients (Dieumou

et al., 2009). These results are in agreement with Herawati (2010) and Elmakki *et al.* (2013). However, Fakhim *et al.* (2013) and Akbarian *et al.* (2012) did not record any positive response following the inclusion of turmeric in broiler diets.

Results of haematological and blood biochemical parameters are presented in Table 3. The mean haemoglobin (Hb) values increased significantly (P<0.05) in turmeric fed groups

compared to control group (Table 3) but PCV values were in normal range and were found to be comparable ($P>0.05$) in all the three groups. Similarly Swathi *et al.* (2012) and Kumari *et al.* (2007) observed increased Hb values in birds supplemented with turmeric followed by tulsi. This may be due to enhanced absorption of iron and protein in turmeric supplemented birds than control (Kumari *et al.*, 2007). Spectrophotometric analysis of serum samples indicated that, during the whole experimental period all biochemical parameters related to glucose and protein metabolism (Total protein, albumin, globulin and their ratio) remain unchanged in birds fed turmeric compared with the control group (Table 3). The present findings also demonstrated that total cholesterol were not changed significantly ($P>0.05$) in all treated groups throughout the experimental period (Table 3). Similar to this Abou-Elkhair *et al.* (2014) observed that supplementation of 0.5% turmeric powder did not has any significant effect on total protein, albumin, glucose urea, total cholesterol concentration in broiler birds, but Emadi and Kermanshahi (2007) concluded that incorporation of turmeric powder into the male broiler diets for 42 days significantly increased total cholesterol in blood.

CONCLUSION

Supplementation of 0.5% and 1.0% turmeric powder improved the body weight and Hb concentration without affecting blood biochemical parameters of broiler chickens.

ACKNOWLEDGMENT

The authors are thankful to the Vice Chancellor, Orissa University of Agriculture and Technology, Bhubaneswar, Odisha, India,

for providing the necessary facilities to carry out this work.

REFERENCES

Abou-Elkhair R, Ahmed HA, Selim S (2014) Effects of black pepper (*Piper nigrum*), turmeric powder (*Curcuma longa*) and coriander seeds (*Coriandrum sativum*) and their combinations as feed additives on growth performance, carcass traits, some blood parameters and humoral immune response of broiler chickens. Asian Austral J Anim Sci 27: 847–854.

Akbarian A, Golian A, Kermanshahi H, Gilani A, Moradi S (2012) Influence of turmeric rhizome and black pepper on blood constituents and performance of broiler chickens. Afr J Biotechnol 11(34): 8606-8611.

AOAC (2005) Official Methods of Analysis. 18th edn., Association of Official Analytical Chemists, Washington, D.C. USA.

BIS (1992) Poultry Feeds Specification. 4th rev. edn., Bureau of Indian Standards. New Delhi, India.

Chen HW, Huang HC (2009) Effect of curcumin on cell cycle progression and apoptosis in vascular smooth muscle cells. Br J Pharma 124: 1029–1040.

Dieumou FE, Tegui A, Kuate JR, Tamokou NB, Dongmo MC (2009) Effects of ginger (*Zingiber officinale*) and garlic (*Allium sativum*) essential oils on growth performance and gut Microbial population of broiler chickens. Livest Res Rural Dev 21 (8): 210-217.

Elmakki AM, AbdelAtti AK, Dousa MB, Elagib AAH, Malik EEH, Elamin MK (2013) Effect of treated cowpea seeds on broiler chicken. Global J Anim Sci Res 1(1): 61-68.

Emadi M, Kermanshahi H (2007) Effect of turmeric rhizome powder on immunity responses of broiler chickens. J Anim Vet Adv 6: 833-836.

Fakhim R, Ebrahimnezhad Y, Seyedbadi HR, Vahdatpour T (2013) Effect of different

concentrations of aqueous extract of ginger (*Zingiber officinale*) on performance and carcass characteristics of male broiler chickens in wheat-soybean meal based diets. *J Bio Sci Biotech* 2(2):95-99.

Govindarajan VS, Stahl WH (1980) Turmeric—Chemistry, Technology and Quality. *CRC Crit Rev Food Sci Nutri* 12: 199-301.

Herawati (2010) The effect of red ginger as phytobiotic on body weight gain, feed conversion and internal organs condition of broiler. *Int J Poult Sci* 9(10): 963-967.

Huang MT, Ma W, Lu YP, Chang RL, Fisher C, Manchand PS, Newmark HL, Conney AH, You M (1995) Effects of curcumin, demethoxycurcumin, bisdemethoxy curcumin and tetrahydrocurcumin on 12O-tetradecanoylphorbol-13-acetate induced tumor promotion. *Carcinogenesis* 16: 2493-2497.

Jain NC (1986) Schalm's Veterinary Hematology. 4th edn., Lea and Febiger, 600. Washington square, Philadelphia, USA.

Jayaprakasha GK, Rao LJM, Sakariah KK (2005) Chemistry and biological activities of *C. longa*. *Trends Food Sci Tech* 16: 533–548.

Kumari P, Gupta MK, Ranjan R, Singh KK, Yadava R (2007) *Curcuma longa* as feed additive in broiler birds and its pathophysiological effects. *Indian J Exp Biol* 45: 272-277.

Rajput N, Muhammah N, Yan R, Zhong X, Wang T (2012) Effect of dietary supplementation of curcumin on growth performance, intestinal morphology and nutrients utilization of broiler chicks. *J Poult Sci* 50: 44-52.

Schalm OW, Jain NC, Carroll EJ (1975) *Veterinary Hematology*. 3rd Lea and Febiger, Philadelphia.

Swathi B, Gupta PSP, Nagalakshmi (2012) Effect of tulsi (*Ocimum sanctum*) and turmeric (*Curcuma longa*) on broiler performance and blood constituents during heat stress in broilers. *Int J Pharm Bio Sci* 3(3): 446–453.

***Cite this article as:** Sethy K, Swain P, Behera K, Nayak SM, Barik SR, Patro P, Meher P (2016) Effect of turmeric (*Curcuma longa*) supplementation on growth and blood chemistry of broilers. *Explor Anim Med Res* 6(1): 75-79.