

The Effect of Dietary *Curcuma Longa* powder (Turmeric) supplementation on some Blood Parameters and Carcass Traits Of Broiler Chickens

M. A. Al-Noori, A. B. Hossain, A. H. A. Al-Maahidy and S. Th. J. Al. Rawi
College of Veterinary Medicine\ University of Anbar

Summary

This study was carried out to determine the effects of *Curcuma Longa* on powder some Blood Parameters and Carcass Traits Of Broiler Chickens. Hundred and thirty five ROSS breed one day old broiler chicks were randomly divided into 3 groups (45 chick per each) of mixed sex. *Curcuma Longa* powder was supplemented to the basal diet at 0.0 (Control), 0.5 and 1.0% (groups 2 and 3) respectively and the trail was lasted for 6 week. The results indicated that addition of *Curcuma Longa* powder significantly increases ($P<0.05$) were observed in, Hb, PCV, Total Protein and Globulin, as compared with the control. On the other hand *Curcuma Longa* powder supplementation at the 1.0% (group 3) of broiler diets significantly increase ($P<0.05$) in WBC as compared with other groups. *Curcuma Longa* supplementation had non- significant effect on RBC, Total Albumin and Cholesterol. Also, no-significant effect were observed in Dressing Percent and Liver, Spleen, Heart, Gizzard weight percent. The present results confirmed the beneficial effects of dietary *Curcuma Longa* powder to improve some blood parameters of Broiler Chickens.

تأثير إضافة الكركم إلى العليقة على بعض صفات الدم والذبيحة لفروج اللحم

مثنى عبد الحميد النوري، عبد الوهاب بديوي حسين، عاصف حسن عبد الرزاق المعاضدي وسعد

ثابت الراوي

كلية الطب البيطري/ جامعة الأنبار

الخلاصة

تهدف هذه الدراسة إلى تقدير تأثير مسحوق الكركم على بعض صفات الدم والذبيحة في فروج اللحم. استخدم 135 فرخ بعمر يوم واحد من فروج اللحم غير المجنس لسلالة روز. تم توزيعها بصورة عشوائية إلى ثلاث مجاميع (45 فرخ/ مجموعة). أضيف مسحوق الكركم إلى العليقة الأساسية بنسب 0.0 (السيطرة)، 0.5 و 1.0% (المجموعة الثانية والثالثة) على التوالي واستمرت التجربة لغاية عمر ستة أسابيع. أشارت النتائج إلى أن إضافة مسحوق الكركم زاد معنوياً ($P<0.05$) في الهيموغلوبين، حجم الخلايا المضغوطة، البروتين الكلي والكلوبيولين بالمقارنة مع مجموعة السيطرة. إضافة إلى ذلك فإن إضافة الكركم بنسبة 1.0% (المجموعة الثالثة) إلى عليقة فروج اللحم زاد معنوياً ($P<0.05$) في كريات الدم البيضاء بالمقارنة مع بقية المعاملات. وأشارت النتائج إلى أن إضافة مسحوق الكركم إلى العليقة لم يؤثر معنوياً على كريات الدم الحمراء والألبومين والكولسترول الكلي. أيضاً لم يؤثر معنوياً على نسبة التصافي ونسبة وزن الكبد، الطحال، القلب والقانصة. نستنتج من النتائج أن لإضافة مسحوق الكركم تأثير مفيد في تحسين بعض صفات الدم لفروج اللحم.

Introduction

Herbs and herbal products are in corporate in livestock feeds instead of chemical products and antibiotics in order to stimulate the effectiveness of feed nutrients which result in more rapid gain, higher production and better feed efficiency. Herbs and the

logically active substances content stimulate body metabolism, improve digestion, have bactericidal, immunostimulant action improved productivity of poultry (1) reports have shown that supplementing poultry diets with various herbs have favorable effect on the performance and health of reared birds (2). The *Curcuma Longa L.* (Family: Zingiberaceae) named turmeric is perennial herb. *Curcuma Longa L.* has received attention as a component of designer foods for its cancer- preventing ability (3). Curcumin a major component in turmeric has a potent antioxidant activity (4,5). Turmeric has also been used as a traditional remedy for treatment of inflammation and other disease (6). Dietary Curcuminoids have been associated with anti oxidative (7) and anti carcinogenic (8, 9) activities. In recent years, much attention has been focused on the apoptotic action of curcumin (10,11,12) with respect to lipid metabolism, several reports have shown that dietary curcuminoids reduce serum and liver cholesterol in cholesterol- fed rats (13). At the present study, the effect of *Curcuma longa L.* as feed additive is evaluated on some blood parameters and carcass traits in broiler chickens.

Materials and Methods

- **Experimental design:** This experiment was carried out in the poultry farm of Veterinary Collage, Anbar University. The experiment continued for 42 days started from 26 - 3 - 2009 to 6- 5- 2009. One hundred thirty five days old broilers (Rose) chicks were divided randomly into 3 treated groups 45 bird, each treatment was further subdivided into 3 replicates of 15 birds per replicate. The treatments were divided as follows:

Treatment 1: Using basal diet with no adding herbal control.

Treatment 2: Basal diet plus 0. 5% of *Curcuma Longa* powder.

Treatment 3: Basal diet plus 1% of *Curcuma Longa* powder.

- **Birds management and Protective Program for Broiler During the Experiment:**

Chicks were reared in (1.5 m × 1.0 m) floor pens with a thick litter system of wood shavings about 5 cm to keep chicks from cold floor. Each pen was equipped with a feeding trays of 38 cm in a diameter and water of 5 liter for sex weeks. After that period the trays were replaced by automatic feeding trough. The level of water and feeding trough were at the level of bird backs to help them to get their water and feed easily. Environmental temperature in the first two day of life was 34-35 °C and decreased to 32 °C to the end of the first week, then decreased to 30-31°C in the second week and decreased 2°C at weekly to reach 22 °C till the end of the experiment. The light was provided along the whole day with only one hour cut off to get them in darkness. Chicks were vaccinated in boxes by spray with Newcastle disease vaccine (B1) and infectious Bronchitis vaccine (IB) vaccine at first day of age. After that chicks were given drinking water with sugar 50 gm/100 liter to be as a source of energy. Then chicks were distributed randomly on their treatments. All vaccination that given to the bird are listed in Table (1).

- **Feeding program:** The feeding program consisted of a starter diet that have been used until 21 days of age and a finisher diet until 42 days of age. All diets of each period were prepared with the same batch of ingredients and all diets within a period had the same composition. Diets were formulated to meet or exceed requirements by the (14) for broilers at this age. There were 3 groups: control, 0.5%, and 1% *Curcuma Longa* powder. Nutritionists formulate diets to meet nutritional requirements of the birds. However, there is not any general consensus on the number of diets to be formulated. The feed and water provided in ad-libitum during the experiment. A two phase feeding program involved the supplying of starter (1-

21 days of age) finisher (22-42 days of age) diet to the broiler chicks. The composition of the experimental basal diets is shown in Table (2).

Table (1) Protective vaccination program

Age of chicks by days	Vaccines used and the way of vaccination
1	NDV (B1)+ IB ₁₂₀ (spray)
7	NDV(Lasota) via drinking water
10	IBD ₂ via drinking water
14	NDV (Lasota) via drinking water
20	IBD ₂ via drinking water
21	NDV(Lasota) via drinking water

- **Blood Parameters:** At 42 days of age, two birds from each replicate with body weight similar to the mean pen body weight were slaughtered and the blood samples were collected from the bronchial vein to determine the WBC count, PCV and Hb. The blood samples were collected in test tubes containing anticoagulant (Sodium EDTA).
- **Blood serum parameters:** At the age of 42 days, two birds from each replicate were slaughtered for blood samples. The samples taken were centrifugated at 5000 revolution for 10-15 minute to separate the serum. The serum samples were stored at -20C for analysis of total Cholesterol, protein, albumin and globulin.
- **Carcass parameter:** At the end of the experiment two birds were taken unsexed from each replicate randomly taken and the weight of each chick was taken than slaughtered, the viscera, feather and legs were all removed and then washed from the remained blood.
- **Each chick was weighted to get the dressing percent. According to (15), was used:**

$$\text{Dressing\%} = \frac{\text{weight of carcass without edible gible}}{\text{weight of the live bird}} \times 100$$

The weight of edible giblets were taken from the digestive system using electric balance to get the weight of these parts then their percent of these parts were taken from the whole weight of the carcass.

$$\text{Weight of edible giblet \%} = \frac{\text{weight of the edible gible}}{\text{weight of the live bird}} \times 100$$

- **Statistical analysis:** Data were analyzed by using complete randomized design (CRD). The statistical analysis were done by using system SAS (16) and treatment means when significant, were compared using Duncan multiple range test (17).

Table (2) Composition of experimental diets in different periods of the experiment

Ingredient (%)	Starter 1-21 day	Finisher 22-42 day
Yellow Corn	62	66.5
Soybean meal (44% protein)	26	20.5
Protein concentric (50%)	13.8	15
Oil	1	2.0
Limestone	0.7	0.7
Salt	0.3	0.3

Calculated chemical analysis

ME (Kcal/kg)	2975	3086
Crude protein %	22.11	20.19
Calcium %	1.11	1.06
Avialable Phosphore	0.55	0.54
Methionine	0.48	0.44
Lysine	1.09	0.98

Protein concentric: 50% C. protein, 2200 kcal/kg M.E., 6% Fat, 3.5% C. fiber, 8% Calcium, 3% available phosphore, 2.75% Lysine, 1.8 Methionine, 2.3 Methionine + Cystine analyses of Diets according to the National Research Council (14)

Results and Discussion

The values of total protein, Albumin, Globulin (g\100ml) and total Cholesterol (mg\100ml) in blood serum of broiler chicks at the end of experiment are presented in Table(3). The broiler chicks fed on the experimental diets showed significant ($P<0.05$) differences among treatment for the estimated serum constituents serum total protein and Globulin for the chicks fed 0.5 and 1.0% *curcuma longa* of diet (T2 and T3) as compared with the control (T1) and the values of this treatments 2.90, 2.89 and 2.54 g\100ml serum, respectively. The different levels of *curcuma longa* at 42 days of age had no significant effect on total Cholesterol and Albumin of the chickens. These results agreed with (18) who stated that supplementation of turmeric in broiler chicken diet at 0.25,0.5,0.75 and 1.0 percent levels had no significant effect on total Cholesterol. Similarly, (19) who stated that supplementation of turmeric in broiler diet at 0.1 and 0.2 percent levels had no significant effect on total Cholesterol. These results not agreed with (20) they reported that supplementation of *curcuma longa* at 0.25,0.5 and 0.75 percent levels in broiler diets had significant decreased in blood Albumin and no significant effect in total protein.

Table (3) Effect of different levels of Curcuma Longa powder on Total protein, Albumin, Globulin and Total cholesterol \pm standard error on broiler

Parameter Treatment	Total protein Mg/dl	Albumin Mg/dl	Globulin Mg/dl	Total cholesterol Mg/dl
(T1) Control	2.54 \pm 0.09 b	2.20 \pm 0.04 a	0.34 \pm 0.07 b	115.00 \pm 2.55 a
(T2) 0.5% Curcuma Longa powder	2.90 \pm 0.02 a	2.33 \pm 0.05 a	0.57 \pm 0.04 a	112.78 \pm 3.32 a
(T3) 1.0% Curcuma Longa powder	2.89 \pm 0.04 a	2.25 \pm 0.09 a	0.64 \pm 0.07 a	114.60 \pm 2.18 a

Different small letter in column showed significantly differs at level ($p<0.05$).

Table (4) showed results of the effect of *curcuma longa* on Hematological values. The Hb, P.C.V parameters exhibited a significant increase ($P<0.05$) between treatments as compared with control, treatment T2, T3 *curcuma longa* recorded the highest values of Hb which were 10.3, 9.08, 7.87 gm\100ml and P.C.V which were 30.3, 28.35, 25.38% respectively. The use of *curcuma longa* significant ($P<0.05$) increased on WBC of the chickens at 1.0% level. Also table (4) showed no significant differences on RBC count in all treatments. These results agreed with (20) they reported that supplementation of *curcuma longa* at 0.5 percent level in broiler diets significantly increase in Hb.

Table (4) Effect of different levels of Curcuma Longa powder on some blood parameter \pm standard error on broiler

Parameter Treatment	Hb gm/100ml	PCV %	RBC 10 ⁶ /mm ³	WBC 10 ³ /mm ³
(T1) Control	7.87 \pm 0.24 c	25.38 \pm 0.43 c	2.10 \pm 0.09 a	18.55 \pm 0.62 b
(T2) 0.5% Curcuma Longa powder	10.30 \pm 0.41 a	30.30 \pm 0.42 a	2.38 \pm 0.12 a	19.18 \pm 1.32 b
(T3) 1.0% Curcuma Longa powder	9.08 \pm 0.41 b	28.35 \pm 0.63 b	2.35 \pm 0.23 a	23.69 \pm 1.08 a

Different small letter in column showed significantly differs at level ($p<0.05$).

Table (5) shows that the percentage of the dressing, liver, heart, gizzard and spleen were not significantly affected by the experimental treatment. However, it was observed that values of spleen weight% increased numerically. Chicks fed 0.5 and 1.0% *curcuma longa* increase of spleen weight% as compared with control. The increase of spleen weight% may be due to immunostimulate activity of curcumin which is the active compound in curcuma longa (21). These results agreed with (22) who stated that chicks fed curcuma longa had no significant effect on carcass parameters. Similarly, (19) who stated that supplementation of curcuma longa in broiler diet showed no significant effect on carcass yield.

Table (5) Effect of different levels of Curcuma Longa powder on Total protein, Albumin, Globulin and Total cholesterol \pm standard error on broiler

Parameter Treatment	Dressing percent %	Heart %	Liver %	Gizzard %	Spleen %
(T1) Control	72.4 \pm 1.2 a	0.52 \pm 0.07 a	2.15 \pm 0.20 a	1.98 \pm 0.06 a	0.107 \pm 0.02 a
(T2) 0.5% Curcuma Longa powder	73.6 \pm 0.8 a	0.53 \pm 0.15 a	2.23 \pm 0.15 a	2.22 \pm 0.23 a	0.144 \pm 0.01 a
(T3) 1.0% Curcuma Longa powder	73.8 \pm 1.0 a	0.50 \pm 0.10 a	2.10 \pm 0.09 a	2.30 \pm 0.35 a	0.139 \pm 0.08 a

Different small letter in column showed significantly differs at level ($p < 0.05$).

References

1. Sabra, K. L. & Mehta, R. K. (1990). A comparative study on additive of level (Herbal growth promoter and some chemical growth promoters in the diets of broiler chickens. Ind. J. of Anim. Prod. and Mangement., 6:115-118.
2. El-Gendi, G. M. (1996). Effect of feeding dietary herbal feed additives on productive and metabolic responses of broiler chicks. Egypt. Poult. Sci., 16:395-412.
3. Kelloff, G. J.; Crowell, J. A.; Hawk, E. T.; Steele, V. E.; Lubet, R. A.; Boone, C. W.; Covey, J. M.; Doody, L. A.; Omenn, G. S.; Greenwald, P.; Hong, W. K.; Parkinsor, D. R.; Bagheri, D.; Baxter, G. T.; Blunden, M.; Doelts, M. K.; Eisenhauer, K. M.; Johnson, K.; Longfellow, G. G.; Malone, W. F.; Nayfield, S. G.; Sefried, H. E.; Swall, L. M. & Sigman, C. C. (1996). Strategy and planning for chemopreventive drug development: Clinical development plant II. J. Cell. Biochem., 26: 54- 71.
4. Ruby, A. J.; Kuttan, G. & Babu, K. D. (1995). Anti- tumor and antioxidant activity of natural curcuminoids cancerlett, 94: 79 – 83.
5. Sreejayan, R. M. N. (1994). Curcuminoids as potent inhibitors of lipid peroxidation. J. Pharm. Pharmacol., 46: 1013 – 1016.
6. Ammon, H. P. & Wahl, M. A. (1991). Pharmacology of Curcuma Longa. Planta Med., 57:1-7.
7. Asai, A.; Nakagawa, K. & Miyazawa, T. (1999). Antioxidative effects of turmeric, - rosemary- and capsicum extracts on membrane phospholipids peroxidation and liver lipid metabolism in mice. Biosci. Biotechnol. Biochem., 63: 2118-2122.
8. Srimal, R. C. (1997). Turmeric: A brief review of medicinal properties. Fitoteraphia LXVIII, 6: 483-493.

9. Miquel, J.; Bernard, A.; Sempere, J. M.; Diaz-Alperi, J. & Ramirez, A. (2002). The curcuma antioxidants: pharmacological effects and prospects for future clinical use: A review. *Archives of Gerontol. and Geriatrics*, 34: 37-46.
10. Han, S. S.; Cung, S. T.; Rabertson, D. A.; Ranjan, D. & Bondada, S. (1999). Curcumin causes the growth arrest and apoptosis of B cell lymphoma by down regulation of egr-1, c-myc, bcl-xl, NF-KB and p53. *Clin. Immunol.*, 93: 152-161.
11. Khar, A.; Ali, A. M.; Pardhasaradhi, B. V. V.; Begum, Z. & AiJum, R. (1999). Anti-tumor activity of ciif¹ the induction of apoptosis in AK-5 tumor cells. *FEES Lett.*, 455: 165-168.
12. Kuo, M. L.; Huang, T. S. & Lin, J. K. (1996). Curcumin and induces apoptosis in human leukaemia cells. *Biochim. Biophys. Acta*, 1317: 95-100.
13. Babu, P. S. & Srinivasan, K. (1997). Hypolipidemic action of curcumin, the active principle of turmeric in streptozotocin induced diabetic rats. *Mol. Cell. Biochem.*, 166: 169-175.
14. National Research Council (NRC). (1994). *Nutrient Requirement of poultry*. 9th ed. National Academy press, Washington.
15. Al-Fayadh, H. & Naji, S. A. (1989). *Technology Poultry Production*. First ed., The Higher Education press direction. Baghdad. (In Arabic).
16. SAS. (1996). *SAS User's Guide: Statistical System*, Inc. Cary NC. USA.
17. Duncan, D. B. (1955). Multiple range and multiple F. test. *Biometrics*, 11: 1- 42.
18. Namagirilakshmi, S. (2005). *Turmeric (Curcuma longa) as nutraceutical to improve broiler performance*. M.Sc., Thesis submitted to Tamil Nadu Veterinary and animal Sciences University, Chennai.
19. Mehala, C. & Moorthy, M. (2008). Production Performance of Broilers Fed with Aloe Vera and curcuma longa (Turmeric). *Int. J. Poult. Sci.*, 7 (9): 852- 856.
20. Emadi, M. & Kermanshahi, H. (2007). Effect of Turmeric Rhizome Powder on the Activity of Some Blood Enzymes in Broiler Chickens. *Int. J. Poult. Sci.*, 6(1): 48-51.
21. Anatony, S.; Kuttan, R. & Kutta, G. (1999). Immunomodulatory activity of curcumin. *Immunological Investigations*, 28:291-303.
22. Radwan Nadia, L.; Hassan, R. A.; Qota, E. M. & Fayek, H. M. (2008). Effect of Natural Antioxidant on Oxidative Stability of Eggs and Productive and Reproductive Performance of Laying Hens. *Int. J. Poult. Sci.*, 7(2): 134-150.