

Growth performance of broiler chickens of turmeric (*Curcuma longa*) turmeric aqueous extract

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ABSTRACT

The effects of Turmeric Powder extract (TPE) on the growth performance of broiler chicken were evaluated in the 5-week study. On 240-day-old chicks weighing 40.9g, levels were supplemented with turmeric powder extracts (TPE) in the water of broiler chicken. In conclusion, there was increased final live weight and weight gain, a better feed conversion ratio (FRC), and body and feed intake with the highest TPE on water. The serum metabolites were not affected by the level of TP in the diets. It was concluded that levels supplemented with turmeric powder Extracts (TPE) in the water of broiler chicken appear to act as a growth promoter with no adverse effect on health status.

Keywords: turmeric; broiler; growth performance.

INTRODUCTION

In poultry production, herbs have become a potential antibiotic substitute in poultry nutrition¹. Alternatives to replace antibiotics are called phytogetic feed additives, including probiotics, prebiotics, enzymes, and essential oils. Phytogetic growth promoters mainly enhanced gut health for optimum functioning². Turmeric supplementation stimulates the bird's digestive system by promoting intestinal lipase, maltase, and sucrose activities and the secretions of pancreatic amylase, lipase, chymotrypsin, and trypsin activities³. The findings showed improved body weight gain and FCR turmeric supplementation⁴. The supplementation of curcumin increased the villus height and width and increased epithelial cells in all segments (duodenum, jejunum, and ileum) of the small intestine of the digestive system.

This study aimed to evaluate the potential use of different levels of turmeric powder extract additive in water on broiler chickens' growth performance and production during the study.

MATERIALS AND METHODS

The study was conducted in. Karbala, College of Agriculture, Department. Animal. Production was from 15/3/2021 to 20/4/2021. Two hundred forty-one-day-old chicks were used, and the average body was. Weight was 40.9 g. of Ross 308 breed. The duration of the study was 5 weeks. Chickens were distributed randomly

for four treatments and three replications of each treatment. Each treatment contained 60 chicks. The temperature is fixed at about 34- 35 °C in the first week and then decreases gradually to 2.3 °C per week until it reaches 21 - 23 °C. The illumination regime was a 12-hour light-dark cycle.

Preparation of the aqueous extract and method of use:

Turmeric was obtained from local markets, and the aqueous extract was made according to the modified Hernandez method by mixing an amount of powder with a volume of distilled water in a ratio of 1 g/ 2 ml of water and mixing them with a mixer. The solution then was presented in a water bath to a temperature of 60 degrees. C- For an hour, the solution is left, and then the solution is left overnight at room temperature. Then, the clear solution is filtered. by sterile gauze before using determined ingredients by analysis and using NRC⁹

RESULTS

The results in Table 1 show the influence of fortification aqueous extract of turmeric powder on broiler chickens' average body life weight During the trial period of 1 - 35 days. The results differed significantly at $P < 0.05$ in the mean of the weight of the body of the added treatments. The extraction of turmeric for chicken water compared to a comparison. Treatment. The significant increase in body weight continued during the breeding period. However, a significant increase was found in the fourth treatment, outperforming the rest of the additional treatments. This result agreed with researcher 10, who found a significant improvement in the productive properties of chicks added with different turmeric levels compared to control chickens.

Transaction	first week	second week	third week	fourth week	fifth week
T1	185.00±4.92	460.80 ± 1.31 C	980.96 ± 1.37 C	1493.33±49.16 B	2069.67 ± 17.47 C
K1	185.50 ± 3.60	467.96 ± 0.55 B	992.00 ± 3.60 B	1508.67±10.06 B	2116.67 ± 20.81 BC
K2	186.50 ± 2.00	468.16 ± 0.76 B	987.46 ± 0.80 B	1540.33 ± 4.50 B	2150.00 ± 50.00 B
K3	187.16 ± 0.28	480.33 ± 0.76 A	1006.30 ± 3.62 A	1621.33 ± 7.63 A	2263.67 ± 12.89 A
LSD		1.6814	5.0458	47,979	54.934
Morale level	NS	0.01	0.01	0.01	0.01

¹T. T1: control treatment without addition. K2: The second treatment is adding an aqueous turmeric powder extract at a concentration of 10 ml/liter of water. 3: A third treatment by adding an aqueous turmeric powder extract at a concentration of 20 ml/liter of water. K4: The fourth treatment. Averages ± Standard Error.

Table 1. This is a table. Tables should be placed in the main text near the first time they are cited.

Transaction	first week	second week	third week	fourth week	fifth week	Total
T1	129.00± 5.55 B	395.60 ± 8.60	649.00 ± 5.02 AB	931.27 ± 21.01	1107.93 ± 44.23	3212.8± 9.44 AB
K1	127.26 ± 6.20 B	386.46 ± 10.50	660.53 ± 5.83 A	953.00 ± 26.96	1142.67 ± 17.38	3269.92± 15.47 A
K2	132.66 ± 4.34 B	390.13 ± 5.00	636.66 ± 15.51 B	926.07 ± 32.83	1113.67 ± 16.60	3199.19± 44.15 B

K3	148.46 ± 8.32 A	396.66 ± 6.50	656.40 ± 2.00 A	940.77 ± 24.37	1155.33 ± 10.50	3270.62± 29.03 A
LSD	11,818		16,419			
Morale level	P<0.01	NS	P<0.05	NS	NS	NS

²T. T1 control treatment without addition. K2: The second treatment is adding an aqueous turmeric powder extract at a concentration of 10 ml/liter of water. 3: A third treatment by adding an aqueous turmeric powder extract at a concentration of 20 ml/liter of water. K4: The fourth treatment. Averages ± Standard Error.

Table 2. Shows the effect of adding an aqueous turmeric powder extract on the total forage consumption rate during the experiment.

Table 3 shows the effect of adding the aqueous extract to turmeric powder on the food conversion factor during the experiment. There was a significant improvement in the feed conversion factor for the fourth treatment compared with the control treatment. At the same time, however, we did not find a significant difference between the experimental and control treatments.

Transaction	first week	Second week	third week	fourth week	fifth week	Total
T1	0.88±0.01 B	1.43 ± 0.05	1.24 ± 0.008	1.82 ± 0.14 A	1.94 ± 0.30	1.91±0.33
K1	0.86 ±0.06 B	1.36 ± 0.03	1.26 ± 0.01	1.84 ± 0.08 A	1.88 ± 0.09	1.81±0.05
K2	0.90 ±0.01 B	1.38 ± 0.01	1.22 ± 0.02	1.67 ± 0.07 AB	1.83 ± 0.18	1.80±0.11
K3	1.00 ±0.04 A	1.35 ± 0.02	1.24 ± 0.008	1.52 ± 0.03 B	1.79 ± 0.01	1.73±0.04
LSD	0.077			0.1787		
Morale level	P<0.01	NS	NS	P<0.05	NS	NS

³T. T1: control treatment without addition. K2: The second treatment is adding an aqueous turmeric powder extract at a concentration of 10 ml/liter of water. 3: A third treatment by adding an aqueous turmeric powder extract at a concentration of 20 ml/liter of water. K4: The fourth treatment.

. Averages ± Standard Error.

Table 3. Effect of adding turmeric extract on the food conversion factor.

Table 4. Effect of adding the aqueous extraction to turmeric powder on the rate of weight gain during the experiment period, where we did not find significant differences in the weekly weight gain rate of the extracted treatments compared to the control treatment, while in the second week, there were significant differences among the experimental treatments and control. There were significant differences among experimental treatments in the third and fourth weeks.

Transaction	first week	second week	third week	fourth week	fifth week	Total
T1	146.00± 3.96	275.80 ± 4.59 C	520.16 ± 0.28 B	512.37 ± 48.64 B	576.33 ± 62.42	2031.32± 4.05 B
K1	147.16 ± 4.16	282.46 ± 4.13 B	524.03 ± 3.83 AB	516.67 ± 11.93 B	608.00 ± 24.24	2078.32± 4.80 B

K2	147.16 ± 2.88	281.66 ± 1.89 BC	519.30 ± 1.47 B	552.87 ± 5.20 B	609.67 ± 52.63	2110.66± 5.66 B
K3	148.16 ± 1.25	293.66 ± 0.57 A	525.96 ± 3.40 A	615.77 ± 9.64 A	642.00 ± 5.29	2225.55± 7.44 A
LSD		6.1076	5.0223	48.266		90.460
Morale level	NS	P<0.01	P<0.05	P<0.01	NS	P<0.01

⁴T. T1: control treatment without addition. K2: The second treatment is adding an aqueous turmeric powder extract at a concentration of 10 ml/liter of water. 3: A third treatment by adding an aqueous turmeric powder extract at a concentration of 20 ml/liter of water. K4: The fourth treatment. Averages ± Standard Error.

Table 4. The effect of adding turmeric extract on weight gain

Table 5: The effect of using the aqueous extract of turmeric powder on the relative growth rate during the experiment period, where there was an improvement in the relative growth rate of the treatments added to the turmeric extract to chicken water compared to the control. In the fourth week, there was a significant improvement in the control treatment.

Transaction	first week	second week	third week	fourth week	fifth week	Total
T1	130.35± 0.40	85.42 ± 2.09	72.15 ± 0.13 A	41.37 ± 3.06 B	32.02 ± 3.79	27.26±2.45
K1	131.47 ± 1.95	86.45 ± 1.67	71.78 ± 0.36 AB	41.32 ± 0.83 B	33.53 ± 1.24	27.91±1.86
K2	130.33 ± 2.49	86.05 ± 0.89	71.53 ± 0.20 B	43.74 ± 0.34 B	33.02 ± 2.43	27.93±3.56
K3	131.02 ± 1.54	87.84 ± 0.08	70.75 ± 0.29 C	46.83 ± 0.64 A	33.04 ± 0.10	27.89±0.58
LSD			0.4932	3.0733		
Morale level	NS	NS	P<0.05	P<0.01	NS	NS

⁵T. T1: control treatment without addition. K2: The second treatment is adding an aqueous turmeric powder extract at a concentration of 10 ml/liter of water. 3: A third treatment by adding an aqueous turmeric powder extract at a concentration of 20 ml/liter of water. K4: The fourth treatment. Averages ± Standard Error.

Table 5. The effect of adding turmeric extract on the relative growth of chicks

Table 6 shows the effect of using the aqueous extraction of turmeric powder on the water consumption rate during the experiment period, as there were significant differences in the water consumption rate of the extract treatments compared with the control.

Transaction	first week	second week	third week	fourth week	fifth week	Total
T1	370.00± 9.84	921.60 ± 2.62 C	1961.93 ± 2.75 C	2986.67 ± 98.33 B	4139.33 ± 34.94 C	10379.53±88. 95 C
K1	371.00 ± 7.21	935.93 ± 1.10 B	1984.00 ± 7.21 B	3017.33 ± 20.13 B	4233.33 ± 41.63 BC	10541.52±50. 67 B
K2	373.00 ± 4.00	936.33 ± 1.52	1974.93 ± 1.61	3080.67 ± 9.01	4300.00 ± 100.00	11116.92±90. 84

		B	B	B	B	A
K3	374.33 ± 0.57	960.66 ± 1.52 A	2012.60 ± 7.25 A	3243.33 ± 15.27 A	4527.33 ± 25.79 A	11118.25±28. 67 A
LSD		3.3629	10.092	95.957	109.87	150.58
Morale level	NS	P<0.05	P<0.01	P<0.01	P<0.01	P<0.01

⁶T. T1: control treatment without addition. K2: The second treatment is adding an aqueous turmeric powder extract at a concentration of 10 ml/liter of water. 3: A third treatment by adding an aqueous turmeric powder extract at a concentration of 20 ml/liter of water. K4: The fourth treatment. Averages ± Standard Error.

Table 6. The effect of adding turmeric extract on the water consumption rate.

DISCUSSION

The improvement in the productive traits of chickens for broilers to which the aqueous turmeric extract was added to water during the experimental period may be attributed to the presence of active compounds in the extract. At high levels, especially Hydrolysable phenolic acids, flavonoids, and tannins, which help improve the digestion of nutrients by stimulating the secretion of digestive enzymes, which enhances the digestion of the food intake, and this, in turn, helps improve the overall growth of broilers. This result agrees with researcher ¹¹, who found significant differences $P \leq 0.05$ in the final average body weight and the mean weight gain of turmeric-supplemented treatments during the rearing period. This also agrees with researcher ¹², who found significant improvements of $P < 0.05$ in the weight gain rate of the treatment supplemented with turmeric compared to the control during the Breeding period. The active substances present in turmeric also act as antioxidants and anti-inflammatories, which improve the functioning of the alimentary canal in the absorption of nutrients ¹³ and consequently lead to an increase in feed consumption for birds, and this is consistent with the findings of the researcher ¹⁰, which found a significant improvement, $P < 0.05$, in the rate of feed consumption for the treatment supplemented with turmeric water extract compared with the control treatment during the rearing period. As well as to the role of turmeric in the moral increase of the physiological structure of the small intestine in terms of the height of the villi and its surface area, and the villi rose to the depth of the Rajput crypts) ¹⁴. (Turmeric works to improve the growth and reproduction of beneficial bacteria that are initially inside the small intestine of birds, which is positively reflected in improving the rate of food consumption and the health status of birds ¹⁵, improving the food conversion factor, which agrees with the researcher ¹⁶, which found a significant improvement of $P < 0.05$ in the feed conversion factor of the turmeric-supplemented treatment. Compared with the control during the rearing period, we conclude the role of turmeric extract in improving the environment of the alimentary canal in food digestion and increasing the absorption of nutrients, which leads to significant productivity improvement traits of chickens.

CONCLUSIONS

The study investigated the effects of feeding aqueous turmeric extract to broiler chickens. The results showed that the extract significantly positively affected the chickens' growth rate, feed intake, and food conversion ratio. These effects were likely due to active compounds in the extract, such as hydrolyzable phenolic acids, flavonoids, and tannins. These compounds have antioxidant and anti-inflammatory properties, and they can improve the functioning of the alimentary canal to improve nutrient absorption and digestion. The extract also positively affected the growth of beneficial bacteria in the small intestine of the chickens, which further enhanced their nutrient absorption and overall health.

Based on the results of this study, it is concluded that feeding aqueous turmeric extract to broiler chickens can significantly impact their growth and overall health. The extract should be considered as a potential feed additive for broiler chickens.

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Institutional Review Board Statement. "The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board (Agriculture College, Kerbala University, Iraq)

REFERENCES

1. Lillehoj H, Liu Y, Calsamiglia S, Fernandez- Miyakawa M E, Chi F, Cravens R L, Oh S and Gay C G 2018. Phytochemicals as antibiotic alternatives to promote growth and enhance lost health. *Veterinary Research* 49 (76):1-18.
2. Yitbarek M B 2015. Phytogenics as feed additives in poultry production: a review. *International Journal of Extensive Research* 3: 49-60
3. Plate K and Srinivasan K 2000. Influence of dietary spices and their active principles on pancreatic digestive enzymes in albino rats. *Food/ Nahrung* 44 (1): 42-46.
4. Daramola. O T.2020.Growth performance and serum metabolites of broiler chickens fed turmeric (*Curcuma longa*) powder-supplemented diets. Received 22 June 2020; Accepted 5 October 2020; Published 1 December 2020.
5. Mustafa,M.M;Karadas ,F;and Taayed,L.T.2021. Adding a different level of turmeric powder and curcumin to the diet on broiler performance, carcass traits, immunity, and gut morphology of broiler chicken under normal and heat stress conditions. *Iraq journal of agricultural sciences* - 2021:52(2):512-526.
6. SAS. 2012. Statistical Analysis system. User's Guide. Statistical version. 9th.ed. Inst-Inc Cary, NC.The USA.
7. Duncan, B. D. 1955. Multiple Range Test and Multiple F-Test. *Biometrics*. 11: 1- 42.
8. Hernandez, M., R. Lopez , R.M. Abanas, V. Paris and A. Arias. 1994. Antimicrobial activity of *Visneamocanera* Leaf extracts. *J. Ethnopharmacology*. 41; 115-119.
9. AL-Ameri. SMK and ALjashami, S.M.2017.study the effect of adding two levels of *Curcuma longa* and *caryophyllus Eugenia* to the broiler chicken on the production performance. 9(2). 801-789
10. Saed, Z. J. M., Mohammed, Th. T. & Farhan, S. M. Effect of ginger and celery seeds as feed additives on reproductive performance of broiler breeder males. *Plant Archives*.2018,18(2): 1823-1829.
11. Daramola. O T.2020.Growth performance and serum metabolites of broiler chickens fed turmeric (*Curcuma longa*) powder-supplemented diets. Received 22 June 2020; Accepted 5 October 2020; Published 1 December 2020.
12. Mahmood, N. A. & Abdulateef, S. M. Determining Some Undesirable Behavioral Traits and Their Impact on the Behavioral Performance of Broiler Chicks. in *IOP Conference Series: Earth and Environmental Science* .2021,vol. 904.
13. Godara ,K.V and Singh,A .2019 . Effect of feed restriction and turmeric powder supplementation on broiler performance.*Haryana Vet.* (Dec. 2019)58(2),254-256.

14. Rajput,N., N.Muhammad, R.Yan, X.Zhong and T.Wang .2013.Effect of dietary supplementation of curcumin on growth performance, intestinal morphology and nutrients utilization of broiler chicks.J.Poult.Sci.50:44-52
15. R. Aziz, S., A. Rashid, S. Impact Of Using Sunflower Seed Meal In Broiler Male Diets On Performance Traits And Carcass Characteristics. Anbar Journal Of Agricultural Sciences, 2023; 21(1): 148-157. doi: 10.32649/ajas.2023.179726.
16. Mondal ,M.A. ,Yeasmin,.T.,Karm,.R. ,Nurealam Siddiqui,M.,Raihanun-Nabi, .S.M. Sayed ,. M .A .and Siddiky , . M.N.A .2015. Effect of dietary supplementation of turmeric powder on the growth performance and carcass traits of broiler chickens.SEARCH.Agri.13(1);188-199.

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