International Journal of Veterinary Science and Agriculture Research
Volume 6 Issue 1, March-April 2024
ISSN: 2582-4112, Available at www.ijvsar.com

Effects of Dietary Turmeric Powder on Growth Performance and Carcass Characteristics of Ac Chickens from 1 to 8 Weeks of Age

Ly Thi Thu Lan [1], Nguyen Thi Anh Thu[1], Nguyen Hoang Qui[1], Lam Thai Hung[2]
[1] *School of Agriculture and Aquaculture, Tra Vinh University, Tra Vinh City, Vietnam*
[2] *Science and Technology Department of Tra Vinh Province, Tra Vinh City, Vietnam*

***For Correspondence**

Correspondence Author
School of Agriculture and Aquaculture, Tra Vinh University, Tra Vinh City, Vietnam

thulan@tvu.edu.vn

Abstract: *A total of ninety one-day-old Ac chickens were divided into three treatments and three replicates, with 10 birds in each group. The study was conducted using a completely randomized design aimed at assessing the effect of turmeric powder supplementation on various parameters, including feed intake, average daily weight gain, feed conversion ratio, and carcass quality of chickens. The experimental design included three dietary treatments supplemented with 0%, 0.1%, and 0.3% turmeric powder. The birds were fed and water ad libitum throughout the trial. The findings indicated that the inclusion of turmeric powder at concentrations of 0.1% and 0.3% in the diets of Ac chickens did not have a significant impact on feed intake. However, supplementation with 0.3% turmeric powder in the diet notably increased the daily weight gain of Ac chickens from 4.65 to 5.23 g/day/bird. Additionally, the feed consumption ratio of the birds improved from 2.04 to 1.78. The chicken thigh weight in the treatment supplemented with 0.3% turmeric powder was considerably greater than that in the diets supplemented with 0.1% turmeric powder or control treatment. Furthermore, a dressing percentage of 72.9% was observed in 8-week-old Ac chickens fed a diet containing 0.3% turmeric powder, which was significantly higher than that in the other groups. It could be concluded that the addition of 0.3% turmeric powder improved growth performance and carcass quality of Ac chickens and could be recommended for improving poultry production.*

Keywords: *Ac chickens, turmeric powder, growth performance.*

I. INTRODUCTION

Ac chickens (Gallus gallus domesticus brisson) are now widely raised in households that is contributing to hunger eradication and poverty reduction for people [1]. However, Ac chickens belong to the local group of chickens with black flesh, skin and bones; Low growth rate and metabolic efficiency.

To improve the efficiency of chicken feed use, in addition to balancing the correct diet and suit the development stage of the chicken. The increased use of medicinal plants in animal nutrition is the result of their positive properties such as anti-inflammatory properties, antiseptic, sedative, bactericidal, fungicidal, antiviral, antioxidant capacity, growth promoting efficacy, dietary palatability, gut functions, immune stimulating effects, stimulation of the secretion of digestive enzymes and absorption of nutrients [2-4]. Presently, there is an increasing interest in finding out alternative substances and strategies to improve the health status of the farm animals for human consumption [5]. Natural alternatives with similar beneficial effects like synthetic antibiotics have been intensified [6]. Some phytogenic feed additives have been successfully incorporated into the feeding standard of poultry birds without any deleterious effect or toxic residues [7]. Prominent among these plants are turmeric powder likely alternative substances to improve the health status of the farm animals. The objective of the study was to evaluate the effect of dietary supplementation of turmeric powder on growth performance and carcass characteristics of Ac chickens.

II. Materials and Methods

1. Location

The experiment was implemented at experimental farm of School of Agriculture and Aquaculture, Tra Vinh University from November, 2019 to March, 2020

2. Preparation of Turmeric powder

Raw turmeric was bought from a local market, then peeled and cut into smaller pieces and dried sufficiently in the sunlight. Turmeric powder was stored in plastic and preserved in room condition. Feed and turmeric powder was mixed before using every day.

3. Experimental design

A total of 90 Ac chickens at 1 day old was allotted in three treatments (three replicates per treatment) by a completely randomized design method (10 Ac chickens per replicate). From 0-4 week of age the birds were fed with the diet of 2997 kcal/kg ME and 20.86 % CP and 3068 kcal/kg ME and 19 % CP for 4-8 weeks of age (Table 1). The feed was analyzed following the method of [8]. The chemical composition of the diets was shown in the Table 1:

Table 1: The nutrient composition of basal diets used in the experiment.

Items	0-4 weeks of age	4-8 weeks of age
Ingredients (%)		
Corn	58.5	64.0
Rice bran	3.00	4.00
Fish meal, 50%	7.90	8.00
Soya bean meal	25.0	20.0
Soya bean oil	1.50	1.45

Dicalcium phosphate (DCP)	0.20	0.10
Limestone	1.50	0.80
Bone meal	0.40	0.00
Oyster Shell	0.20	0.00
Salt	0.25	0.20
Premix	0.80	0.80
Lysine, 70%	0.60	0.45
Methionine + Cysteine	0.15	0.20
Analytical nutritional composition		
CP (%)	20.8	19.0
ME (kcal/kg of feed)	2,997	3,068
Ca (%)	1.34	0.90
P (%)	0.81	0.63

The birds had *ad libitum* accessed to feed and water. Three treatments in the experiment consisted of control treatment (no turmeric powder in the diet), treatment 1 (0.1% turmeric powder in the diet) and treatment 2 (0.3% turmeric powder in the diet). All birds from 0 to 4 weeks old were raised in bamboo floor cages, continuous lighting, natural ventilation, and 27 – 30^0C of ambient temperature. From 4-8 weeks old the birds in each replicate were confined in the cage with dimensions 122x65x38 cm size per each. The experiment design was shown as below:

Treatment 1 (Control): Basal diet without turmeric powder

Treatment 2 (T0.1): Basal diet with 0.1% turmeric powder

Treatment 3 (T0.3): Basal diet with 0.3% turmeric powder

Throughout the experiment, the birds were vaccinated to prevent the common diseases such as Newcastle, Chonic Respiratory Disease and Alvian Fluenza.

4. Growth performance

Ac chickens were individually weighed to determine their initial weight at the beginning of the experiment and weekly during the trial (at 07:00 am before feeding). The data in feed offered and overlap were gathered every morning.

5. Carcass characteristics

Carcass characteristics were measured at 8 weeks old, two chickens (one male and one female) from each replication were randomly chosen. The birds were individually weighed, then slaughtered and scalded after bleeding. The weight of live chickens, carcass, and scalded was recorded.

6. Data Analysis

The data were analyzed by ANOVA using General Linear Model procedure of Minitab 16.0.

III. Results

1. Effects of turmeric powder on daily weight gain and feed conversion

Table 2 showed that turmeric powder as feed additives for chickens improved the growth performance, particularly, improved daily weight gain and feed conversion ratio of chickens throughout the experiment.

Table 2: The growth performance of Ac chickens from 0 to 8 weeks old

Items	Treatments			SEM	P
	Control	$T_{0.1}$	$T_{0.3}$		
0-4 weeks of age					
Initial live weight	19.0	18.7	20.2	0.36	0.057
Daily weight gain (g/day)	3.77^{b}	3.90^{ab}	4.33^{a}	0.11	0.034
Feed intake (g/day)	6.01	5.86	6.23	0.17	0.381
FCR (g feed/g gain)	1.60	1.51	1.44	0.07	0.400
4-8 weeks of age					
Daily weight gain (g/day)	5.17^{b}	5.40^{b}	6.14^{a}	0.15	0.012
Feed intake (g/day)	7.29^{a}	6.83^{b}	7.32^{a}	0.08	0.014
FCR (g feed/g gain)	2.58^{a}	2.44^{ab}	2.02^{b}	0.09	0.010
0-8 weeks of age					
Daily weight gain (g/day)	4.47^{b}	4.65^{b}	5.23^{a}	0.06	0.001
Feed intake (g/day)	8.83	8.36	8.37	0.13	0.084
FCR (g feed/g gain)	2.16^{a}	2.04^{a}	1.78^{b}	0.02	0.000
Finally live weight (g)	269^{b}	279^{b}	314^{a}	3.79	0.000

^{ab} *Means in the same row without common letter are different at $p<0.05$*

2. Effects of turmeric powder on carcass characteristics of Ac chickens

Carcass characteristics mostly showed the reflection of final live weight of Ac chickens which had the greatest performance at 0.3% turmeric powder in the diet. The results in Table 3 showed that turmeric powder had positive effect on body weight, dressed weight, breast and thigh of Ac chickens.

Table 3: Effect of TP supplement on body composition and carcass characteristics of Ac chickens

Items	Treatments			SEM	P
	Control	$T_{0.1}$	$T_{0.3}$		
Carcass slaughter					
Body weight (g)	378[b]	406[a]	415[a]	6.78	0.004
Dressed weight (g)	253[b]	285[a]	303[a]	5.44	0.002
Breast (without bone, g)	52.3[b]	57.5[ab]	58.0[a]	1.45	0.001
Thigh (g)	56.3[b]	55.7[b]	61.8[a]	1.23	0.000
Liver (g)	19.3	22.7	20.7	0.89	0.064
Spleen (g)	2.66	2.83	2.83	0.21	0.817
Heart (g)	5.50	4.83	5.00	0.36	0.422
As ratio of body weight					
Dressed ratio (%)	66.9[b]	69.9[ab]	72.9[a]	0.94	0.000
Breast (without bone, %)	21.2	20.9	19.8	0.71	0.252
Thigh (%)	22.2	19.5	20.4	0.71	0.053

[ab] *Means in the same row without common letter are different at p<0.05*

3. Effects of turmeric powder on Ac chickens' carcass slaughter of sexes

Table 3 showed that carcass parameters were all higher in Ac males than in females except for the weight of breast meat (P<0,05). Heart, liver and thigh meat were not statistically significant (P>0.05). This result can be explained by part of the effect of turmeric powder in the diet, turmeric powder has helped the male to digest and absorb better than the hens.

Table 4: The ratio of carcass slaughter between sexes through the influence of turmeric powder

Items	Sex		SEM	P
	Male	Female		
Carcass slaughter				
Body weight (g)	442[a]	357[b]	5.61	0.002
Dressed weight (g)	315[a]	245[b]	4.44	0.001
Breast (without bone, g)	49.3[b]	62.6[a]	1.18	0.004
Thigh (g)	66.3[a]	49.6[b]	1.00	0.007

Liver (g)	22.0	19.8	0.73	0.052
Spleen (g)	3.33[a]	2.22[b]	0.17	0.001
Heart (g)	5.33	4.88	0.29	0.300
As ratio of body weight				
Dressed ratio (%)	71.2[a]	68.6[b]	0.77	0.037
Breast (without bone, %)	15.7[b]	25.6[a]	0.58	0.002
Thigh (%)	21.2	20.3	0.58	0.286

[ab] *Means in the same row without common letter are different at p<0.05*

IV. Discussion

Turmeric powder supplemented in the diets had a positive influence on daily weight gain, and feed conversion ratio of Ac chickens because turmeric contained natural growth promoters which could be used as an alternative to antibiotics. As indicated in the results, there were no significant differences between treatments in initial live weight during the through experimental period. It indicates that the possible significance at the end of this study was not related to initial weight. With regard to feed intake, similar trend was recorded in this study. Besides, birds on the turmeric powder diet showed a higher weight gain compared to other treatments. Birds fed diets supplemented with 0.3% turmeric powder has the highest amount of daily weight gain while FCR tend to decrease with the increased level of turmeric in the diet.

The highest dressed weight (g) was found in birds fed with 0.3% turmeric powder supplemented diets compared to the dietary treatment's groups. This is in agreement with Al-Sultan [9] who reported that 52% dressed carcass were obtained in bird fed with turmeric containing diet. Similarly, Al-Jaleel [10] and Mondal et al. [11] used turmeric powder as feed additives and found edible dressing percentage significantly increased by including 0.5%, 1.0% and 1.5%, turmeric powder in the diet, respectively.

The highest percent of breast (without bone, g) was recorded in bird fed with 0.3% turmeric powder in the diet. This is in agreement with earlier studies of Osawa et al. [12] and Hussein [13], who indicated higher dressing percentage as well as breast weights of broilers fed a diet containing 0.5% of turmeric powder. Correspondingly, Wang et al. [5] and Ukoha and Onunkwo [14] recorded the highest dressed weight, and breast meat muscle weight in birds fed a diet containing 3% turmeric powder. The increase in breast weight may be due to optimum antioxidant activity of turmeric (curcumin a phenolic group, thetrahydro curcumin, cinamic acid, curlone and niacin) [12] that stimulates protein synthesis by bird enzymatic system [13]. Turmeric supplementation could increase the amount of lean meat ratio and reduce the risk of hyperlipidemia to consumers.

Besides, the improvement of growth and carcass weights of quails might be related to the different components in the diet. According to [15], curcuminoids are one of the roughly 300 distinct components of turmeric. Curcumin, desmethoxycurcumin, and bisdemethoxycurcumin combine to form curcuminoids. 3-6% of turmeric's primary polyphenolic chemicals are in charge of a number of biological processes. Different immunomodulatory effects of turmeric have been demonstrated. Consequently, it might enhance quail growth and health performance.

V. Conclusion

There was a linear of increase in body weight gain and improvement of feed conversion when the turmeric powder was increased from 0 to 0.3%. Besides, the supplementation of turmeric powder in the diet increased carcass percentage of Ac chicken.

Acknowledgements

We would like to acknowledge the support of time and facilities from Tra Vinh University for this study.

References

[1.] Tran Thi Mai Phuong, Le Thi Bien, Technical skills for special chickens (Ac chickens, H'mong chickens). Agriculture Publisher, 2007.

[2.] O. N. Ertas, T. Güler, M. Çiftçi, B. Dalkilic, UG. Simsek, The effect of an essential oil mix derived from oregano, clove, and anise on broiler performance, *International Journal of Poultry Science*, *4*, 2005, 879–84.

[3.] D. E. Cross, R. M. McDevitt, K. Hillman, T. Acamovic, The effect of herbs and their associated essential oils on performance, dietary digestibility and gut microflora in chickens from 7 to 28 days of age, *British Poultry Science*, *48*, 2007, 496–506.

[4.] T. Steiner, Phytogenics in animal nutrition: Natural concepts to optimize gut health and performance, Nottingham: Nottingham University Press, England, 2009.

[5.] D. Wang, H. Huang, L. Zhou, W. Li, H. Zhou, W. Li, H. Zhou, G. Hou, J. Liu, J. Hu, Effects of dietary supplementation with turmeric rhizome extract on growth performance, carcass characteristics, antioxidant capability, and meat quality of Wenchang broiler chicken, *Italian Journal of Animal Science*, *14*, 2015, 344–349.

[6.] R. U. Khan, Antioxidants and poultry semen quality, *World's Poultry Science Journal*, *67*, 2011, 297-308.

[7.] M. A. Oyekunle, M. O. Owonikoko, Antimicrobial drug usage for poultry production within a local government area in Ogun state, *Nigeria Journal of Animal Production*, *29*, 2002, 113–120

[8.] AOAC. Official methods of analysis. 15th ed. AOAC, Washington, D.C (935-955). 1990.

[9.] S. I. Al-Sultan, The effect of curcuma longa (turmeric) on overall performance of broiler chickens, *International Journal of Poultry Science*, *3*, 2003, 333–340

[10.] R. A. Al-Jaleel, Use of turmeric (*Curcuma longa*) on the performance and some physiological traits on the broiler diets, *The Iraqi Journal of Veterinary Medicine, 36*, 2012, 51–57.

[11.] M. A. Mondal, T. Yeasmin, K. Karim, M. N. Siddiqui, M. A. Sayed, Effect of dietary supplementation of turmeric (curcuma longa) powder on the growth performance and carcass traits of broiler chicks, *SAARC Journal of Agriculture*, *13*, 2015, 188–199.

[12.] T. Osawa, Y. Sugiyama, M. Inayoshi, S. Kawakisi, Anti-oxidative activity of tetrahydrocurcuminoids, *Biotechnology and Biochemistry Journal*, *59*, 1995, 1609–161.

[13.] S. N. Hussein, Effect of turmeric (Curcuma longa) powder on growth performance, carcass traits, meat quality and serum biochemical parameters in broilers, *Journal of Advanced Biomedical and Pathobiology Research*, *3*, 2013, 25–32.

[14.] O. A. Ukoha, D. N. Onunkwo, The effect of turmeric (Curcuma longa) on growth performance of broiler chickens, *International Research Journal of Agricultural and Aquatic Sciences*, *3*, 2016, 131–35.

[15.] M. Khodadadi, N. Sheikhi, H. H. Nazarpak, G. N. Brujeni. Effects of dietary turmeric (*Curcuma longa*) on innate and acquired immune responses in broiler chicken. *Veterinary and Animal Science*, 14, 2021,100213.