EFFECTS OF GARLIC SUPPLEMENT ON GROWTH PERFORMANCE OF TAU VANG CHICKEN PERIOD 7-14 WEEKS OF AGE

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ABSTRACT

A study was conducted to evaluate the effect of garlic supplement on the growth performance of Tau Vang chicken in the period of 7-14week old period. It was a completely randomized design with 5 treatments corresponding to 5 diets and 4 replications with 10 birds per experimental unit. The treatments were the different garlic supplement levels of 0,0.05, 0.1, 0.15 and 0.2% (in DM) to basal diet, corresponding to the G0, G0.05, G0.1, G0.15 and G0.2 treatments. The results showed that the daily intakes of DM, OM, CP, EE and ME were significantly higher (P<0.05) in the 3 last treatments (the G0.1, G0.15 and G0.2 treatments) compared with G0 treatment. The significantly higher daily weight gain, final live weight and the lower FCR were found for the G0.15 treatment (P<0.05). The garlic supplement in the diets of Tau Vang chicken improved the carcass, breast meat and thigh meat weights (P<0.05). It was concluded that garlic supplement at level of 0.15% (DM) in the diets gave higher growth performance and carcass values of growing Tau Vang chicken.

Key words: *Tau Vang chicken, garlic, nutrient intake, growth rate, carcass values*

INTRODUCTION

Tau Vang chicken is originally Vietnamese local breed, which has been popularly raised in the Mekong delta of Vietnam. It can tolerate the harsh conditions and low quality diets, however it gives good meat with more than double price as compared to commercial chicken (Pham Tan Nha, 2019). Garlic, ginger additives in diets give better health and meat quality of chicken. It is concluded that supplementation of garlic improves the performance of broilers when added at the level of 1% of broiler ration and could be a viable alternative to antibiotic growth promoter in the feeding of broiler chicken (Issa and Omar, 2012). Al-Shuwailiet al. (2015) reported that after feed supplementation with increasing doses of garlic powder, feed conversion ratio maintained a stable positive tendency up to the 7 th week of age.

In recent years some plant additives such as garlic, ginger, etc. in diets for feeding gave better health, improved growth rate and carcass quality of chicken. The results of the recent study are in agreement with the previous findings by Singh et al. (2015), who reported garlic powder supplementation in basal diet of broiler chicken significantly increased the body weight gain and feed conversion ratio. Oleforuh-Okoleh et al. (2014) also observed that the birds supplemented garlic had better feed conversion ratio (FCR) than those in control group (2.17 vs 2.53). The objective of this study to determine optimum level of garlic supplement in diets on growth performance and carcass quality of growing Tau Vang chicken were raised under the conditions of the Mekong delta of Vietnam for the useful recommendations to the producers.

MATERIALS AND METHODS

Location and climate of the study area

Experiment was conducted from August to November in 2019, at a private farm (a householder) in Vinh Long province. The chemical analysis of feeds was done at the laboratory of the Department of Animal sciences, Faculty of Agriculture of Can Tho University.

The climate of the study region is divided into two seasons: the rainy season (from May to November), and the dry season (from December to April). The annual average temperature is 29ºC. The highest mean daily temperature is 34ºC - 37ºC from April to May and the lowest 21ºC - 22ºC, from December to January. The annual rainfall is 1.400-1.500 mm.

Experimental animals

One day old-Tau Vang chicken were bought from a Tau Vang breeding farm in Long An province. Chicks from 2 to 28 days were fed special concentrate pellet (20% CP). Chicks from 25 to 42 days were fed concentrate pellet, and supplemented a small amount of experimental diets. The chicken at 43 days of age were introduced to the trial, all birds were vaccinated H5N1, Newcastle and some common diseases before using in the trial. In addition, the completely restricted system has been applied according to the government's regulation about biosecurity (good sanitary condition, following the appropriate procedure in husbandry and diseases control).

Experimental design and treatments

Two hundred Tau Vang chicken at 7 weeks of age (420 ± 17.20 g/bird) were allotted in a completely randomized design with 5 treatments and 4 replicates, and 10 birds per experimental unit (balanced sex). The treatments were the different garlic supplement levels of 0, 0.05, 0.1, 0.15 and 0.2% to concentrate basal diets, corresponding to the G0 (basal diet), G0.05, G0.1, G0.15 and G0.2 treatments, respectively). The trial lasted 8 weeks with Tau Vang chicken from 7 to 14 weeks of age. Feed ingredients of basal diet was presented in Table 1.

Table 1. Feed ingredient composition of concentrate basal diet in the experiment

	Feed	**(%)**		**Feed**	**(%)**
1	Rice bran	4.8	6	Premix vitamin	0.40
2	Maize	35.1	7	Premix mineral	0.50
3	Fish meal	10.4	8	$CaCO_3$	0.49
4	Broken rice	36.2	9	DCP	0.51
5	Soybean extraction	11.6			

Feeds and preparation of garlic powder

Garlic was bought at a supermarket, then peeled and cut into 1-2mm pieces and dried for 4-5 days under sunlight. After drying, the garlic was ground to garlic powder by meat grinder. All feed ingredients were bought in one occasion from feed store for throughout the experiment. The basal diet was formulated and contained 12.9 MJ ME/kgDM and 18% CP. Garlic powder was finely mixed with the concentrate following experimental design before feeding. Chemical compositions of garlic, feed ingredients and basal diet were presented in Table 2 and 3.

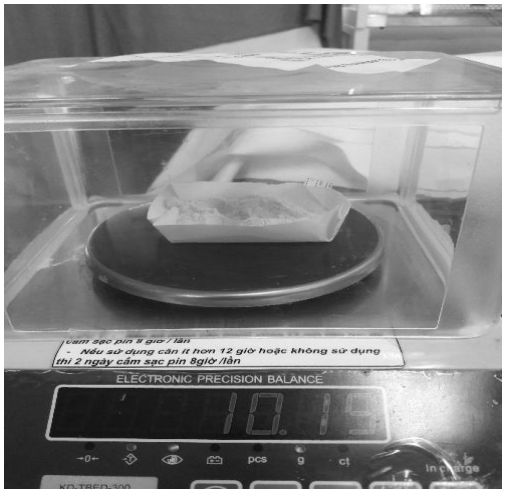

Photo 1. Weigh the garlic

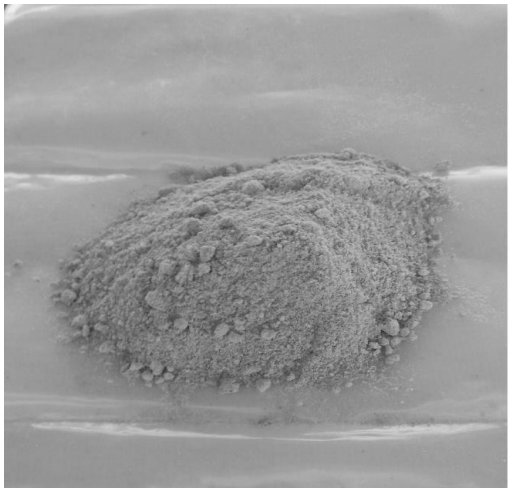

Photo 2. Garlicpowder

Table 2. Chemical compositions of garlic in fresh form

Item	(%)
Water	65.0
CP	1.5-2.1
Carbohydrate	26-30
Glutamylcyteine	0.5-1.6
EE	0.1-0.2
CF	1.50
Saponin	0.09
Ash	0.70

Prasad and Sharma (1981)

Table 3. Chemical compositions of feed ingredients and basal diet (% DM)

Feed / Item	Maize	Broken rice	Rice bran	Soybean Extraction	Fish meal	Basal diet
DM	88.6	86.7	86.0	89.5	91.9	89.1
OM	98.6	99.5	89.6	94.8	78.1	91.8
CP	8.08	9.29	12.5	43.4	60.4	18.1
EE	4.85	0.82	18.1	1.22	12.7	4.01
CF	2.12	0.59	6.59	5.44	0.19	3.65
NDF	28.5	7.35	32.1	12.3	11.0	17.9
Ash	1.40	0.51	10.4	6.82	21.9	8.24
ME (MJ/kgDM)	13.9	13.5	13.0	10.3	12.6	12.9

Note: DM: dry matter, OM: orgarnic matter, CP: crude protein, EE: ether extraction, CF: crude fibre , NDF: neutral detergent fibre, ME: metablolizableernergy (Janssen et al.,1989)

Housing and management

House for birds was made by wood and tole. Experimental birds were confined in pens with 2.5 m^2/10 birds, which were surrounded by wood, plastic net and its floor was overlaid with 20 cm of sand and rice straw layer in its surface for bedding. Feeders and drinkers were put in front of each cage. Feeders and drinkers were cleaned daily every morning and chicken litters were removed weekly. The birds were fed 3 times daily at 7.00, 13.00 and 17.00 h and feed offered to the birds was weekly adjusted by an increase from 5 % to 10% according to real feed intake. Birds were freely to access water.

Measurements

Daily intakes of feed and nutrients: feed and refusals were collected and weighed daily morning.

Daily weight gain and feed conversion ratio: the birds were weighed weekly and at the end of experiment.

Carcass values: after finishing 4 birds (2 male and 2 female) per each experimental unit were slaughtered for the evaluation of carcass traits. Body measurements of birds were described by Salomon (1996).

Chemical analyses

Feeds offered were analyzed for chemical compositions: DM, OM, CP, EE, CF, Ash. They were analyzed following procedures of AOAC (1990). NDF analysis was followed the Van Soest et al. (1991) and ME was calculated by Janssen (1989).

Statistical analysis

Data were analyzed by using General Linear Model (GLM) of Minitab progam 16.1.0 (Minitab, 2010) and the comparison of significant difference between two treatments was done by Tukey method of Minitab (2010).

RESULTS AND DISCUSSION

Daily intakes of feed and nutrients of growing Tau Vang chicken

Table 4. Daily intakes of feed and nutrient of Tau Vang chicken (g/bird)

Item	Treatments					SE	P
	G0	***G0.05***	***G0.10***	***G0.15***	***G0.20***		
DM	61.6^{b}	62.2^{b}	63.0^{b}	63.6^{a}	63.2^{a}	0.47	0.01
OM	56.5^{b}	57.0^{b}	57.8^{ab}	58.4^{a}	57.9^{ab}	1.85	0.04
CP	11.1^{b}	11.2^{b}	11.4^{a}	11.5^{a}	11.4^{a}	0.07	0.02
EE	2.47^{b}	2.49^{b}	2.53^{a}	2.55^{a}	2.53^{a}	0.04	0.01
CF	2.25	2.27	2.30	2.32	2.30	0.03	0.06
NDF	11.0^{b}	11.1^{b}	11.3^{a}	11.4^{a}	11.3^{a}	0.09	0.01
Ash	5.07^{b}	5.12^{b}	5.19^{a}	5.24^{a}	5.20^{a}	0.06	0.01
ME (MJ/kg/DM)	0.79^{b}	0.80^{ab}	0.81^{a}	0.82^{a}	0.81^{a}	0.01	0.02

Note: ^{a,b}Mean values with different superscripts within the same row are significantly different at P<0.05

Daily intakes of DM, OM, CP, EE and NDF were significantly lower (P<0.05) for the birds given G0 diet than for other diets with the highest values observed in bird group fed G0.15 diet. The DM and CP intakes in the present trial are higher than those of a previous study on Tau Vang chicken (45.9-49.4 gDM/day; 9.17-9.59 gCP/day, respectively) reported by Nguyen Thanh Nhan (2012). The ME intake was significantly higher for the birds in the G0.15 treatment (P<0.05) than for the birds in the G0 treatment, possibly due to higher DM intake.

Effects of dietary different garlic supplement on the growth performance of growing Tau Vang chicken

Table 5. Daily weight gain, final live weight and feed conversion ratio (FCR) of Tau Vang chicken (g/bird)

Item	Treatments					SE	P
	G0	*G0.05*	*G0.10*	*G0.15*	*G0.20*		
Initial live weight	415	438	405	441	472.5	17.2	0.18
Final live weight	1381^{b}	1435^{a}	1409^{ab}	1475^{a}	1475^{a}	15.3	0.01
Daily weight gain	17.2^{b}	17.8^{ab}	17.9^{ab}	18.4^{a}	17.9^{ab}	0.29	0.03
FCR	3.57^{a}	3.49^{ab}	3.52^{ab}	3.44^{b}	3.53^{ab}	0.05	0.01
CP/ weight gain (g/kg)	643^{a}	641^{a}	650^{a}	620^{b}	631^{ab}	9.40	0.02

Note: $^{a, b}$ Mean values with different superscripts within the same row are significantly different at P<0. 05

Table 5 shows that daily weight gain (DWG) was lower for the birds without supplementing garlic (G0 treament) than those fed garlic, and the significantly higher result found in the G0.15 treament (P<0.05). The explanation was that the birds in this treatment had higher DM, OM, CP, EE and ME intakes. The results of DM intake and daily weight gain in a current study are in agreement with the findings that supplementing 3% garlic powder (in DM) in diet for kids which improved feed consumption and weight gain (OkaliUsur, 2020). The DWGs obtained are closed with the results of 18.5g - 19.7 g/bird, but being slightly higher than the values of 15.3 - 16.8 g/bird in previous trials on Tau Vang chicken (Huynh Thanh Yen, 2017; Nguyen Van Nhan, 2017, respectively). Final live weights were significantly higher for the birds supplemented garlic than that of those in the G0 treatment (P<0.05), resulting from higher daily weight gain. The final live weights in this trial are in a range of 1319- 1471g of a previous experiment on Tau Vang chicken (Nguyen Thanh Nhan, 2012). Results of CP consumption/weight gain were significantly lower for the birds in the G0.15 treatment (P<0.05). FCR of Tau Vang chicken was better in the G0.15 treatment (P <0.05), it could be due to higher daily weight gain. The results of FCR are consistent with the values of 3.24-3.53 reported by Pham Tan Nha (2019).

Effects of dietary different garlic supplement on carcass quality of growing Tau Vang chicken

Slaughter weights of chicken were correspondent to the final live weights. Carcass weight was significantly higher in the G0.15 treatment (P<0.05) (Table 6). Percentage of carcass was

closed among the treatments (P>0.05), these results are in a range of 70.9% - 73.5%, published by Huynh Thanh Yen (2017). Breast meat and thigh meat weights were significantly highest in G0.15 treatment. Percentages of breast meat and thigh meat were resembled among the treatments (P>0.05). All internal organs were not significantly different among the treatments (P>0.05).

Table 6. Caracass values and internal organs of Tau Vang chicken supplemented garlic in diets (g.bird)

Item	Treatments					SE	P
	G0	*G0.05*	*G0.10*	*G0.15*	*G0.20*		
Slaughter live weight	1380^{b}	1435^{a}	1409^{ab}	1475^{a}	1475^{a}	27.7	0.017
Carcass weight	983^{c}	1035^{ab}	1022^{b}	1075^{a}	1072^{a}	33.1	0.038
% Carcass	71.2	72.1	72.5	72.9	72.7	1.99	0.767
Breast meat weight	187.7^{c}	199.7^{bc}	209.4^{b}	232.3^{a}	226.3^{a}	9.46	0.004
% Breast meat	19.1	19.3	20.5	21.6	21.1	0.81	0.058
Thigh meat weight	116^{c}	123^{b}	124^{b}	131^{a}	130^{a}	3.13	0.040
%Thigh meat	11.8	11.9	12.1	12.2	12.1	0.46	0.746
Heart weight	9.0	10.3	8.00	10.3	8.67	0.89	0.079
Liver weight	23.0	20.3	24.3	22.7	21.7	4.27	0.670
Cecal length, cm	13.0	11.9	13.5	12.7	13.8	1.24	0.825

Note: $^{a\,.b.\,c}$ Mean values with different superscripts within the same row are different at P<0.05

CONCLUSIONS

It was concluded that garlic supplementation in the diet at a level of 0.15% DM improved the best growth performance for growing Tau Vang chicken production.

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