

EFFECT OF GARLIC (*ALLIUM SATIVUM*) SUPPLEMENT ON PERFORMANCE AND CARCASS CHARACTERISTICS OF BROILER CHICKENS

Ibrahim *, H¹., Egbewande, O.O., Aliyu, Z., Oluwawuni, T.B. and Awolola, G

Department of Animal Production, Faculty of Agriculture, Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria.

*Corresponding Author : ihadiza080@gmail.com

GSM No- 08036101761

ABSTRACT

The study was conducted to investigate the effect of garlic supplement on the growth performance and carcass characteristics of broiler chickens. One hundred and twenty day old chicks of mixed sexes were randomly allotted into four treatment groups, thirty birds per treatment and were replicated three times with ten birds per replicate in a complete randomized design. Four test diets were formulated and designated as Diet 1 for control, while Diet 2, 3, and 4 with inclusion levels of garlic powder at 0g/kg, 10g/kg, 15g/kg and 20g/kg respectively. The study lasted for eight weeks. The parameters investigated were performance, Cut-up parts and Visceral organs. Data generated were subjected to analysis of variance and significant differences separated using Least Significant Difference. The results on performance showed that there were no significant ($P>0.05$) difference in the parameters measured except percentage dressed weight that showed significant difference with T1 having a higher value of 64.33% closely followed by T4 with 62.60% , T2 with 61.10 % and the least value was T3 with 54.53% , highest percentage of mortality were recorded on birds fed with T1 (10.00%), followed by diet 2 (6.67%), T3 (6.67%) and T4 recorded the least of percentage of mortality with the value (3.3%) results obtained for cuts off parts also showed non significant difference except wings and backs that were significantly different across the treatment groups. The same trend of non significant difference were observed in Visceral organs of broiler chickens fed garlic supplement except abdominal fat and intestine that were significantly different across the treatment groups. From the result obtained , Birds fed with inclusion rate of garlic at T4 had the lowest mortality rate, this may have great impact on production of the broilers chicken and can be recommended as the best diet to be fed to broiler chickens

Keywords: Supplements, Chickens, Carcass, Characteristics, Garlic

INTRODUCTION

Poultry that can efficiently solve the problem of animal protein shortage in most of the developing countries like Nigeria (Olabanji *et al.* 2009). Poultry industry in Nigeria occupies a prominent position as a important source of animal protein supply to the citizen. Over the years, the growth of poultry industry has followed a pattern closely dictated by the economic fortunes of the countries. The sector contributed about 25% of the agricultural domestic products of the Nigerian economy (FAO, 2009) Nigeria. Currently rated as the leading country in Africa with respect to egg production and fourth in broiler production, Garlic (*Allium sativum* L) is bulbous vegetable, well known spice and medicinal plant, which belongs to the family *Liliaceae* and genus *Allium* (Simon and Jenderek, 2003). The importance of garlic in recent years, has to a wide range of useful properties, it has been increasingly used as an additive in nutrition and health of farm animals (pigs, poultry, cattle, sheep). The objectives of the present study, therefore was to determine the effects of garlic supplement on growth performance and carcass parameters of broiler chickens.

MATERIALS AND METHODS

Location of experimental site: The experiment was conducted at the Poultry Unit of the Teaching and Research Farm, Department of Animal Production, Faculty of Agriculture, Ibrahim Badamasi Babangida University Lapai, Niger State, Nigeria.

Processing of Test ingredient (garlic)

Fresh garlic gloves were peeled and washed to remove adhering debris and cut/ sliced into small sizes after which they were dried for three days, and then ground into powdery form and finally incorporated into the starter and finisher diets for the birds.

Experimental birds and their management

One hundred and twenty (120) mixed sex day-old broiler chicks were bought from Karmadex Nigeria Plc, Ibadan and used for this experiment. They were allotted into four treatments of three replicate each containing ten birds. The birds were placed on the experimental diet on their arrival. The chicks were brooded on deep liter and heat was supplied using charcoal pot and kerosene lanterns as sources of heat and light. The birds were vaccinated against endemic diseases in the area via drinking water. Feed and water were supplied *ad-libitum*.

Experimental design

Experimental diets were formulated and fed at graded levels of inclusion of 0g/kg, 10g/kg, 15g/kg and 20g/kg of garlic powder respectively and designated as T1=0g/kg, T2=10g/kg, T3=15g/kg and T4=20g/kg of garlic powder respectively (Table 1 and 2).

Table 1: Composition of experimental broiler starter diets

Ingredients (%)	T1 0kg	T2 10kg	T3 15kg	T4 20g/kg
Maize	54.40	54.40	54.40	54.40
Groundnut	32.00	32.00	32.00	32.00
Wheat Offal	5.00	5.00	5.00	5.00
Fish Meal	5.00	5.00	5.00	5.00
Bone Meal	0.50	0.50	0.50	0.50
Premix	0.50	0.50	0.50	0.50
Limestone	2.00	2.00	2.00	2.00
Salt	0.50	0.50	0.50	0.50
Lysine	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10
Garlic g/kg	0.00	2.00	1.50	1.00
Total	100.00	100.00	100.00	100.00
Calculated Values				
Crude Protein	23.10	23.10	23.10	23.10
ME Kcal/kg	2877.37	2877.37	2877.37	2877.37
Fibre	3.25	3.25	3.25	3.25

Key:ME =Metabolizable Energy, T1 = contained only feed ingredient without garlic powder (Control), T2 = contained feed ingredient with 20g/kg of garlic powder, T3 = contained feed ingredient with 15g/kg of garlic powder, T4 = contained feed ingredient with 10g/kg of garlic powder

Data Collection

Data were collected on growth performance as seen below ,

- Mean weight gain = Mean final weight(g) – mean initial weight(g)
- Mean daily feed intake = $\frac{\text{mean total feed intake}}{\text{Number of days}}$

$$\text{Feed conversion ratio} = \frac{\text{mean of feed intake}}{\text{Mean of weight gain by birds}}$$

The carcass characteristic was carried out at the end of the experiment. Three birds per treatment were randomly selected, slaughtered and dressed with hot water (scalding). After dressing, the visceral organs and the cut-up parts were weighed in grams. Statistical analysis: All data obtained from the experiment were subjected to Analysis of Variance (ANOVA) according to the procedure of Gen Stat, (2014)

Table 2: Composition of experimental broiler finisher diets

Ingredients (%)	T1 0	T210	T3 15	T4 20
	0g/kg	10kg	15kg	20kg
Maize	54.40	54.40	54.40	54.40
Groundnut	28.40	28.40	28.40	28.40
Wheat Offal	10.50	10.50	10.50	10.50
Fish Meal	3.00	3.00	3.00	3.00
Bone Meal	2.00	2.00	2.00	2.00
Premix	0.25	0.25	0.25	0.25
Limestone	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25
Lysine	0.10	0.10	0.10	0.10
Methionine	0.10	0.10	0.10	0.10
Garlic powder g/kg	0.00	2.00	1.50	1.00
Total	100.00	100.00	100.00	100.00
Calculated Values				
Crude protein	20.26	20.26	20.26	20.26
ME Kcal/kg	2917.04	2917.04	2917.04	2917.04
Fibre	3.65	3.64	3.64	3.64

Key:ME =Metabolizable Energy, T1 = contained only feed ingredient without garlic powder (Control), T2 = contained feed ingredient with 20g/kg of garlic powder, T3 = contained feed ingredient with 15g/kg of garlic powder, T4 = contained feed ingredient with 10g/kg of garlic powder

RESULTS AND DISCUSSION

The result on the effect of garlic supplementation on performance parameters of broilers chicken is presented in Table 3 . The results showed that broiler chickens fed diet supplemented with garlic powder were not significantly ($P>0.05$) different in all the parameters across the treatments groups except Dressing percentage that was significantly ($P>0.05$) different from T4 20g/kg (62.60) but having similar value with T1 0g/kg (64.33). This could be attributed to the high amount of garlic powder inclusion in the treatment diet and is not in accordance with the finding of Raeesi *et al* (2010), who reported that it is better to use garlic as growth stimulator periodically than continuously

Table 3: Performance characteristics of broiler chickens fed garlic supplement

Parameter	T1	T2	T3	T4	SEM	LSD
	0kg	10kg	15kg	20kg		
Initial weight	0.037	0.036	0.034	0.038	0.002	NS
Final Body weight	1.03	1.10	1.06	1.06	0.12	NS
Weekly body weight gain (kg)	0.12	0.13	0.13	0.13	0.01	NS
Dressed weight (kg)	0.83	0.66	0.67	0.73	0.93	NS
Percent Dressed weight	64.33 ^a	61.10 ^a	54.53 ^b	62.60 ^a	3.31	*
Feed Intake (kg)	0.53	0.45	0.45	0.49	0.04	NS
FCR	0.24	0.30	0.29	0.27	0.04	NS
Mortality (%)	10.00	6.67	6.67	3.33		

Means in the same row with different letters in superscript are significantly different ($P < 0.05$) Mean \pm Standard deviation, FCR = Feed Conversion Ratio, SEM =Standard Error Mean, LSD = Level of Significant Difference

Result of Internal organ weights of broiler chickens expressed as percent of live weight is presented in (Table 4) . The parameters considered here were not significant ($P<0.05$) affected in birds fed diets containing garlic powder as supplement except abdominal fat and intestine with T3 recorded highest value 4.25 and that could result from higher proportion of test ingredient in the inclusion

level in the diet and effect of garlic on increase of mass of internal organs as explained by Otunola *et al* (2010) which is not in agreement with the studies by Raeesi *et al* (2010), who reported that the consequences of adverse effect of garlic derive from its chemical composition, and intestine recorded similar values across the treatment groups

Table 4: Visceral organs or internal organs of broiler chickens fed garlic supplement

Visceral organ (g)	T1	T2	T3	T4	SEM	LSD	
	0kg	10kg	15kg	20kg			
Liver	31.67	24.83	24.33	31.67		5.88	NS
Kidney	9.50	8.10	5.83	8.10	1.55		NS
Heart	7.33	6.67	6.17	7.17	1.01		NS
Spleen	1.25	0.82	0.42	0.42	0.57		NS
Pancreas	3.00	3.50	3.17	2.50	0.57		NS
Gizzard	40.50 ^a	35.67 ^c	40.83 ^a	39.17 ^b	4.49		NS
Abdominal fat	2.83	4.25	2.50	2.25	0.94		*
Proventriculus	7.83	7.50	8.10	9.00	1.38		NS
Intestine	111.17 ^a	104.33 ^b	106.00 ^b	108.67 ^b	14.18		*

Means in the same row with different letters in superscript are significantly different ($P < 0.05$) Mean \pm Standard deviation, SEM =Standard Error Mean, LSD = Level of Significant Difference

Result of the Cut-up parts of broiler chickens fed garlic powder supplement is presented in Table 5 Cut up difference among the treatment groups except on the neck and back that were significantly ($P < 0.05$) were not affected by the test ingredient. Stanacev *et al* (2010) and Raeesi *et al* (2010) also obtained similar result in their studies that revealed no significant different effect of garlic on cut up parts. Control treatment (zero inclusion) had a significantly higher proportion of back and wing compared with other treatment groups, which was in agreement with results of these authors Stanacev *et al.* (2010).

Table 5 : Cut-up parts of broiler chickens fed garlic supplement

Cut-up Parts (g)	T1	T2	T3	T4	SEM	LSD	
	0kg	10kg	15kg	20kg			
Head	43.17	37.00	36.67	38.33	38.33	3.00	NS
Neck	51.67	40.33	42.33	47.83	47.83	4.60	NS
Wings	98.00 ^a	81.81 ^c	91.00 ^a	86.33 ^b	86.33 ^b	6.38	*
Drumsticks	123.00	100.67	101.83	110.67	110.67	22.33	NS
Thigh	141.50	114.83	117.33	117.00	117.00	14.91	NS
Chest	193.16	161.00	170.83	175.33	175.33	22.70	NS
Back	170.67 ^a	133.83 ^b	126.83 ^c	147.67 ^b	147.67 ^b	13.88	*
Shank	55.17	49.50	51.59	52.50	52.50	5.46	NS

Means in the same row with different letters in superscript are significantly different ($P < 0.05$) Mean \pm Standard deviation, SEM =Standard Error Mean, LSD = Level of Significant Difference Error Mean, LSD = Level of Significant Difference

CONCLUSION

Based on results obtained in this trial, garlic Supplementation on performance and carcass characteristics of broiler chickens can be improved specially at T4 20g/kg of garlic. Carcass characteristics were not significantly ($P > 0.05$) influenced by the garlic dietary inclusion levels

RECOMMENDATION

From the above, it could be concluded that Birds fed with inclusion level of garlic at T4 20g/kg of garlic can be recommended as the best diet to be fed to broiler chickens

REFERENCES

- FAO, (2009): Food and Agriculture Organization of the United Nation. Statistic Division. Garlic production crop/world region/production Quantity. © *FAO Statistics Division*
- Olabanji, R. O., Farinu, G.O., Akinlade, J.A., Olabiyi O.O., Odinsi A.A., Akingbade, A.A. (2009). Studies on haematological and serum biochemical characteristics of broilers fed different levels of wild sunflower (*Tithonia diversifolia*) leave blood meal mixture. *International Journal of Agriculture apiculture Res.*
- Otunola, G.A., O.B. Oloyede, A.T. Oladiji, A.J. Afolayan, (2010): Comparative analysis of the chemical composition of three spices – *Allium sativum L. ZingiberofficinaleRosc. And Capsicum frutescens L.* commonly consumed in Nigeria. *African Journal of Biotechnology* 9, 6927-6931.
- Raeesi, M., S.A. Hoseini-Alibad, A.A. Roofchae, Z. Shahneh, S. Pirali, (2010): Effect of Periodically Use of Garlic (*Alliumsativum*) Powder on Performance and Carcass Characteristics in Broiler Chickens. World Academy of Science, *Engineering and Technology* 68, 1213-1219.
- Simon, P.W., M.M. Jenderek. (2003). Flowering, Seed Production, and the Genesis of Garlic Breeding. *Plant Breeding Reviews* 23, 211-244
- Stanačev, V., N. Milošević, S. Kovčun, N. Plavša, S. Bjedov, V. Stanačev, (2010) Effect of different garlic levels in broiler chicken food on production parameters. *Contemporary Agriculture* 59, 86-91.