EFFECTS OF AFRICAN WALNUT (*Tetracarpidium conophorum*) LEAF AND ITS EXTRACT ON GROWTH PERFORMANCE OF BROILER CHICKENS AT STARTER AND FINISHER PHASES

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Abstract

The main objective of this study was to evaluate the effects of African walnut (Tetracarpidium conophorum) leaf and its extract on the growth performance of broiler chickens. Five experimental diets were formulated with the inclusion of Tetracarpidium conophorum Leaf Powder (TCLP) and its Extract (TCLE). The diets were made as followings: (T1) control and basal diet; (T2) T1 + 250mg TCLP kg/diet; (T3) T1 + 500mg TCLP kg/diet; (T4) T1 + 25mg TCLE kg/diet; (T5) T1 + 50mg TCLE kg/diet. This study was conducted from 7 to 49 days of age. A total of 135 seven days old, unsexed broiler chickens were used. They were individually weighed and randomly distributed into five dietary treatments; each treatment included three replicates each with a total of nine birds per replicate on the basis of their weight. Data were collected on growth performance and subjected to one way of analysis of variance in a Completely Randomized Design. At the starter phase, birds fed the control diet had significantly ($p<0.05$) greater average weight gain (420.55g), average feed intake (2201.45g) and lower feed conversion ratio (2.86) compared to other treatment groups. At the finisher phase, no significant ($p>0.05$) difference was observed on growth performance across the dietary treatments. Based on the results, it is therefore concluded that growth performance of the broiler chickens both at starter and finisher phases were not influenced by Tetracarpidium conophorum leaf powder and its extract.

Keywords: African Walnut leaf, broiler chickens, and growth performance

Introduction

Antibiotics have been utilized as growth promoters and to prevent outbreak of diseases (Phillips *et al.*, 2004). However, the benefit of the use of antibiotics as growth promoters has some disadvantages; these include drug toxicity, residual effects and development of bacteria resistance (Ogbe and John, 2012). These problems have led to the ban on the use of antibiotics as growth promoters by the European Union (Catalá-Gregori *et al.*, 2008). Thus, attention to safe and natural alternatives such as plants to replace antibiotics (phytobiotics) is on the increase. Therefore, for a long time antibiotics have been supplemented to animal diets to allow animals to cope better with these harsh conditions. This led to the ban of antibiotics in animal diets in the European Union in 2006. As a result, many substances belonging to the groups of prebiotics, probiotics, organic acids, enzymes, silicates and herbs and spices have been tested for their potential to replace AGPs in animal diets, also for poultry.

African walnut (*Tetracarpidium conophorum*), like many plants in Africa and other parts of the world has been proven to have nutritive, medicinal, agricultural and industrial values over the years. Phytochemical analysis of Africa walnut indicates that it contains bioactive compounds such as oxalates, phytates, tannins, saponins and alkaloids which partly show the use of the seeds, leaves and roots in herbal medicine (Ayoola *et al.* 2011. Studies have shown that *T. conophorum* possesses some properties that are required for wound healing like antibacterial and antioxidant activities (Amaeze *et al.*, 2011) and immuno stimulating activities (Animashaun *et al.* 1994).

Extracts of *T. conophorum* leaves have been shown to possess good antibacterial activities especially against Gram positive organisms. Results from a study conducted by Onwuli *et al.* (2014) suggested that *T. conophorum* nuts have antihyperglycaemic and antimicrobial activities. A research conducted by Okon *et al.* (2014) discovered that albino wistar rat fed with a standard, commercial diet (control group) or a diet *containing T. conophorum* seeds for 60 days reduced the level of cholesterol and triglyceride in the rats compared with the control group fed with standard diets.

Based on the aforementioned bioactive compounds and properties of (*Tetracarpidium conophorum*) the plant, there is need to know whether (*Tetracarpidium conophorum*) leaf and its extracts could be used as feed additives for broiler chickens in producing safe and cost effective meat. Therefore, the

objective of the present study is to evaluate the effects of African walnut (*Tetracarpidium conophorum*) leaf and its extracts on the growth performance of broiler chickens.

Materials and methods

Experimental Site

This experiment was carried out at the poultry unit, Federal College of Agriculture, Moor Plantation, Ibadan, Nigeria.

Sourcing and Processing of Test Ingredients

Tetracarpidium conophorum leaves were obtained from a farm in Omi adio, Ibadan. They were washed with clean water and allowed to air dry under shade and thereafter were ground into powder and stored in the dark in airtight plastic bags at ambient temperature. The Proximate analysis of the test ingredient was analyzed in the laboratory according to AOAC (1999). The *Tetracarpidium conophorum* leaf extract was obtained by soaking the *T. Conophorum* powder in ethanol (as an extracting solvent) for 48 hours. The ratio of ethanol volume (mL) and sample weight (g) was 40:1. Then, the extract solution was concentrated at a temperature of 50°C using a rotary evaporator. The leaf and seed extracts were stored in separate dark airtight plastic bags at ambient temperature.

Experimental Diet

Five experimental diets were formulated with the inclusion of *Tetracarpidium conophorum* Leaf Powder (TCLP) and *Tetracarpidium conophorum* Leaf Extracts (TCLE). The diets were made as followings:

(1) T1, control and basal diet; (2) T2, T1 + 250mg TCLP kg/diet, (3) T3, T1 + 500mg TCLP kg/diet (4) T4, T1 + 25mg TCLE kg/diet and (5) T5, T1 + 50mg TCLE kg/diet

Experimental Design and Management

This study was conducted from 7 to 49 days of age. A total of 135 day old, unsexed broiler chickens were purchased from a commercial hatchery in Oluyole, Ibadan, Nigeria. On arrival, all chickens were fed a commercial broiler starter for 7 days. Then, at 7 days of age, they were individually weighed and randomly distributed into five (5) dietary treatments; each treatment included three (3) replicates each with a total of nine (9) birds per replicate on the basis of their weight. Routine managements, vaccinations and medications were duly followed throughout the course of the study and the experiment lasted for six (6) weeks.

Data collection

Chemical Analysis: Proximate analysis of the test ingredient was carried out according to the method of AOAC. (1990).

Growth Performance Evaluation: Records of live weight (g), feed intake (g), weight gain (g) and feed conversion ratio (FCR) were determined on weekly basis.

Statistical analysis: All data were analyzed using one way analysis of variance (ANOVA) and means was compared by the Duncan's multiple range test when ANOVA analysis is significant (SPSS 16).

Results and Discussion

Table 2 shows the effect of varying levels of Africa walnut leaf Powder and its extract on growth performance of broiler chickens at starter phase. Birds fed the control diet (T1) had significantly ($p<0.05$) greater final weight, weight gain and feed intake than other treatment groups. The final weight (FW) values ranged between 503.89g and 555.78g with the highest value for the bird fed the control diet (T1) and least value for the bird fed 250mg TCLP kg/diet (T2). The inclusions did not increase the growth performance. Table 3 shows the effect of varying levels of African walnut leaf Powder and its extract on growth performance of broiler chickens at finisher phase. No significant ($p>0.05$) differences in final weight, average weight gain, average feed intake and feed conversion ratio observed in broilers fed *Tetracarphidium conophorum* leaf powder and its extract at finisher phase. These results are in accordance with the reports of Botsoglu *et al.,* (2002) and Lee *et al.,* (2004) who found that dietary supplementation of oregano essential oil (100 and 50 mg/kg, respectively) did not affect the broilers' performance. Likewise, supplemental PFA containing turmeric extract, citrus extract, grape seed extract, Chinese cinnamon essential oil, Chilean boldo leaves, and fenugreek seeds had no effect on growth performance of broilers (Fascina *et al.,* 2012).

Table 1: Composition of the basal diet of broiler chickens

Items	Starter Phase 7-21days	Finisher Phase 22-49 days
Ingredients (%)		
Maize	58.00	63.00
Soybean Meal	37.00	32.00
Limestone	2.50	2.50
Dicalcium Phosphate	1.50	1.50
Dl-Methionine	0.20	0.20
Lysine	0.30	0.30
Mineral Premix	0.25	0.25
Salt	0.25	0.25
Total	100	100
Calculated analysis		
Crude Protein	23.00	20.00
Metabolisable energy (kcal/kg)	3000	3200
Lysine (%)	1.30	1.00
Methionine (%)	0.52	0.38
Calcium (%)	1.00	0.90
Phosphorus (%)	0.80	0.75

*****Premix to provide the following: Vitamin A 12,000,000I.U; Vitamin D3 3,000.000I.U; Vitamin E 30,000mg;Vitamin K 2,500mg; folic acid 1,000mg; Niacin 40, 000mg; Cal Pan 10,000mg; Vitamin B12 20mg; Vitamin B12,000mg; Vitamin B6 3,500mg; Biotin 80mg; Antioxidant 125,000mg; Cobalt 250mg; Selenium 250mg; Iodine1,200mg; Iron 40,000mg; Manganese 70,000mg; Copper 8,000mg; Zinc 60,000mg; Chlorine 200,000mg.

Table 2: Effect of African walnut (*Tetracarpidium conophorum*) leaf powder and its extract on growth performance of broiler chickens at starter phase (7-28 days)

Parameters	T1	T2	T3	T4	T5	±SEM
IW (g/bird)	135.26	134.85	135.07	135.59	135.70	±0.25
FW (g/bird)	555.78^{a}	503.89^{b}	548.29^{ab}	522.00^{ab}	524.28^{ab}	±7.34
AWG (g/bird)	420.55^{a}	369.04^{b}	413.22^{ab}	386.41^{ab}	388.58^{ab}	±7.34
AFI (g/bird)	1201.45^{a}	1172.98^{ab}	1195.26^{a}	1095.98^{b}	1166.76^{ab}	±14.21
FCR	2.86	3.18	2.90	2.87	3.00	±0.06

^{a,b} means along the same row with different superscripts are significantly different (P<0.05)
IW- Initial Weight, FW- Final Weight, AWG- Average Weight Gain, AFI- Average Feed Intake,
FCR- Feed Conversion Ratio, SEM: Standard Error of Mean

Table 3: Effect of African walnut (*Tetracarpidium conophorum*) leaf powder and its extract on growth performance of broiler chickens at finisher phase (28-49 days)

Parameters	TI	T2	T3	T4	T5	±SEM
IW (g/bird)	555.78^{a}	503.89^{b}	548.29^{ab}	522.00^{ab}	524.28^{ab}	±7.34
FW (g/bird)	1534.03	1464.00	1531.36	1408.11	1518.63	±24.67
AWG (g/bird)	978.25	960.11	983.06	960.11	994.34	±22.73
AFI (g/bird)	2246.41	2206.01	2387.79	2291.92	2377.65	±65.16
FCR	2.30	2.31	2.44	2.59	2.38	±0.06

^{a,b} means along the same row with different superscripts are significantly different (P<0.05)
IW- Initial Weight, FW- Final Weight, AWG- Average Weight Gain, AFI- Average Feed Intake
FCR- Feed Conversion Ratio, SEM: Standard Error of Mean

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