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Growth Performance of Broilers Chicken Fed Graded Levels of *Ceiba Pentandra* Leaf Meal

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Abstract: ***The study was carried out to evaluate the effects of feeding Ceiba Pentandra leaf meal (CPLM) on growth performance of Starter and Finisher broiler chicken. Sixty (60) clinically healthy Agrited broiler chicken were used for the study. Four experimental diets were compounded using CPLM at 0 (T1), 5 (T2), 10 (T3) and 15% (T4) inclusion levels respectively. The birds were weighed and randomly assigned to the four dietary treatments replicated three times with five birds per replicate in a completely randomized design. The proximate composition of CPLM showed it contains 8.7% moisture, 35% carbohydrate, 19.28% crude protein, 10.64% fat, 21.38% fibre and 8.00% ash. The following parameters were evaluated body weight gain, feed intake, while feed conversion ratio were calculated. These parameters were evaluated at both the starter and finisher phase of the boiler chicken. The result on growth performance increased significantly (P<0.05) differences with regards to feed intake and feed conversion ratio among the different treatment groups at both phases. It was concluded that CPLM can be fed to starter and finisher broiler chicken up to 10% inclusion levels with no adverse effect on the birds performance.***

Keywords: ceiba pentandra, broilers, body weight gain, feed intake, feed conversion ratio

1. Introduction

It is widely known that feed additives for many years have been widely used to increase animal performance; and has successfully been used in poultry production to improve growth, feed efficiency as well as layers performance (Brannan, 2008; Khan et al., 2012a; Khan et al., 2012b). This has resulted to the emergence of drug resistance micro organisms, side effects of antimicrobials as well as the harmful residual toxicity effects of drugs observed in the food chain. Consequently, there is an interest in the use of alternative antibiotics feed additives (Duke, 1985; Yan *et al.*, 2011; Hady and Zak, 2012; Daneshyar and Kermanshahi, 2012) such as plants. Medicinal plants are believed to have antimicrobial, coccidiostatic or anthelmintic effect which can be harnessed and employed in poultry production (Makeri et al., 2007; Bonsu *et al.*, 2012; Blaney *et al.*, 1990).

These medicinal plants originating in the same environment as the animals have been used successfully for various treatment of these animals. Hence it is viewed that the study to identify and use these plants for animal treatment would be very beneficial (Mills and Bone, 2000; Adu *et al.*, 2009). It is noted that in spite of the fact that these plants have medicinal values, they stimulate appetite, enhance feed utilisation as well as reduce fat content of meat (Noboru and Garcina, 2007; Igugo et al., 2014; Igugo et al., 2016). Thus the purpose of the study is to evaluate the effects of one of these plants known as Ceiba Pentandra on broilers' performance.

2. Material and Methods

The research was carried out at the Poultry Unit, Animal Science Department, Faculty of Agriculture and Natural Resources Management, Enugu State University of Science and Technology, Agbani campus. The experimental birds consists of sixty (60) Agrited unsexed broiler chicks. These clinically healthy chicks were brought from Chunorkmis Veterinary and Consult, 7 Port Harcourt Street, Off Edinburg Road, Ogui, Enugu, Enugu State. The Ceiba Pentandra leaf was sourced from Umueze in Nkanu West Local Government Area of Enugu State. The leaves were air dried in a shade for 5 days until they became crispy. It was then milled using hammer mill and then preserved in air tight plastic container. Portable water and feed were provided ad libitum throughout the period of the experiment. Strict sanitation measures as well as recommended vaccination schedule were adhered to.

3. Experimental Material

The Ceiba Pentandra leaves were sourced from Umueze in Nkanu West Local government area of Enugu State. The leaves were air dried in a clean floor until they became crispy. It was then milled using a hammer mill. The proximate analysis of the leaf meal is as shown below in Table 1.

Table 1: Proximate Composition of Ceiba Pentandra leaf

Parameter	Percentage Composition
Moisture	5.7±0.28
Carbohydrate	35±0.46
Protein	19.28±0.16
Fat	10.64±0.21
Fibre	21.38±0.38
Ash	8.00±0.09

4. Experimental Procedure

The experimental diet had four (4) treatment groups as T_1 the control, T_2 (5%), T_3 (10%) and T_4 (15%) of Ceiba Pentandra leaf meals respectively.. Each treatment had fifteen (15) birds and was replicated three (3) times with five (5) birds per replicate.

The experiment lasted for eight (8) weeks divided into Starter (0-4 weeks) and Finisher phase (5-8 weeks). The composition of the experimental diet is shown in tables 2 & 3 below:

Table 2: Composition of the experimental diet

Ingredient	Treatments			
	T_1	T_2	T_3	T_4
Maize	48.00	48.00	48.00	48.00
Soyabean meal	20.00	20.00	20.00	20.00
Groundnut cake	9.70	9.70	9.70	9.70
Fishmeal	3.00	3.00	3.00	3.00
Wheat offal	15.00	10.00	5.00	0.00
Ceiba Pentandra leaf meal	0.00	5.00	10.00	15.00
Bone meal	2.00	2.00	2.00	2.00
Limestone	1.50	1.50	1.50	1.50
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Lysin	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20
Total	**100**	**100**	**100**	**100**
Calorie Analysis				
Crude Protein %	23.69	23.78	23.89	24.08
M/E(Kcal/kg)	2863.89	2861.89	2861.89	2858.61
Crude Fibre	6.01	7.89	10.48	13.17

Table 3: Composition of the experimental diet

Ingredient	Treatments			
	T_1	T_2	T_3	T_4
Maize	54.00	54.00	54.00	54.00
Soyabean meal	16.00	16.00	16.00	16.00
Groundnut cake	8.00	8.00	8.00	8.00
Fishmeal	2.00	2.00	2.00	2.00
Wheat offal	15.00	10.00	5.00	0.00
Ceiba Pentandra leaf meal	0.00	5.00	10.00	15.00
Bone meal	2.00	2.00	2.00	2.00
Limestone	1.50	1.50	1.50	1.50
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Lysin	0.10	0.10	0.10	0.10
Methionine	0.20	0.20	0.20	0.20
Total	**100**	**100**	**100**	**100**
Calorie Analysis				
Crude Protein %	20.19	20.32	20.16	19.87
M/E(Kcal/kg)	2839.66	2801.73	2784.03	2706.58
Crude Fibre	5.38	6.83	9.49	11.76

4.1 Measurement and Data Collection

Data were collected on the following: feed intake, weight gain and feed conversion ratio for both Starter and Finisher phases.

Feed Intake: This was calculated as total feed given minus the left over for each treatment.
Weight Gain: Apart from initial weight taken on the first day, every other reading was on weekly basis and was done using a sensitive electrical digital scale (Atomic Digital Electronic Scale).
Feed Conversion Ratio (FCR): This was determined by total feed consumed per bird divided by weight gain per bird. That is:
FCR = Feed intake/Weight Gain

4.2 Statistical Analysis

The data collected was subjected to one-way Analysis of Variance (ANOVA) using statistical package for social science (SPSS), version 20 (2012). Where statistical differences were found, mean separation was done using Duncan Multiple Range Test as contained in SPSS version 20 (2012).

5. Results

The effects of feeding graded levels of Ceiba Pentandra leaf meal on broiler performance is summarised below:

Table 4: Effects of Ceiba Pentandra leaf meal (CPLM) on Broiler Starter phase (0-4 weeks)

Parameter	Treatments			
	T_1	T_2	T_3	T_4
Average final weight (g)	660.37^{c}±0.22	715.42^{b}±0.34	865.44±^{a}0.45	755.61^{b}±0.23
Average initial weight (g)	79.80±0.54	80.03±0.67	79.63±0.77	80.61±0.62
Average daily weight gain (g)	20.76^{c}±0.11	22.69^{c}±0.32	28.06^{a}±0.15	24.11^{b}±0.13
Average daily feed intake (g)	41.25±0.33	41.50±0.34	41.00±0.23	39.75±0.45
Feed conversion rate (FCR)	1.99±0.09	1.83±0.04	1.46±0.11	1.65±0.07

means within row with different superscript letters differ by Duncan test with p < 0.05

Table 5: Effects of Ceiba Pentandra leaf meal (CPLM) on Broiler Finisher phase (5-8 weeks)

Parameter	Treatments			
	T_1	T_2	T_3	T_4
Average final weight gain (g)	1840^{c}±0.34	2483^{a}±0.33	2396^{a}±0.42	2196^{b}±0.33
Average initial weight (g)	660.37^{c}±0.45	715.42^{b}±0.56	865.44^{a}±0.55	755.61^{b}±0.45
Average daily weight gain (g)	42.18^{c}±0.24	63.13^{a}±0.26	54.66^{b}±0.31	51.44^{b}±0.39
Average daily feed intake (g)	141.48^{a}±0.34	143.00^{a}±0.33	132.50^{b}±0.44	137.25^{b}±0.35
Feed conversion rate (FCR)	3.36^{b}±0.44	2.26^{a}±0.22	2.51^{a}±034	2.63^{a}±0.22

means within row with different superscript letters differ by Duncan test with p < 0.05

Weight Gain

The result on weight gain showed that during the Starter phase T_3 (865.44) had significantly (P<0.05) higher weight gain than other treatment levels but at Finisher phase T_2 had higher numerical weight than T_3 though not significantly (P<0.05) different. The control had least weight gain compared to the three (3) treatment levels of Ceiba pentandra leaf meal.

Feed Intake

There was no statistical difference (P>0.05) in average daily feed intake for the starter phase though birds fed 5% CPLM consumed most while those fed 15% CPLM consumed the least as shown in table 4. At Finisher phase birds on 5% CPLM diet consumed most which was not significantly different (P<0.05) from birds on control diet but superior (P<0.05) to birds on 10% and 15% CPLM levels.

Feed Conversion Rate (FCR)

The results from tables 4 and 5 showed that birds on 10% CPLM at starter phase had the best FCR and least for birds on zero percent CPLM) which showed no significant difference (P>0.05). At Finisher phase there was no difference between birds fed the 3 graded levels of CPLM though those on 5% level had the best FCR which was significantly different (P<0.05) from the control group.

6. Discussion

Report by (16) showed that overall, average daily feed intake linearly decreased ($P < .05$) with the increase in the level of dietary Ceiba Pentandra Seed meal supplementation in pigs. This was in agreement with the low feed consumption at 10% (T_3) and 15% (T_4) respectively and superior performance of Ceiba Pentandra leaf meal at 5% (T_2) inclusion level for feed intake.

Similarly, *Wafar et al.,* (2017) showed that total feed intake, total weight gain and final body weight of rabbits decreased as the levels of Ceiba Pentandra Seed Meal increased in the diets; this was however at inclusion level above 10% as reported by Olomu (1995) and contrary to the work of Narahari and Rajini, (2003) who found no significant difference at different inclusion levels. The result of this study showed there were differences with noticeable decrease after 10% inclusion level which had superior final body weight gain and feed conversion ratio than at other inclusion levels.

The decrease in final body weight, total feed intake and total weight gain could be attributed to inherent anti-nutrients in the raw Ceiba Pentandra Leaf Meal which probably reached a threshold level beyond the tolerance levels of the snails. Several studies have attributed impaired feed utilization, depressed growth, loss of appetite and pancreatic hypertrophy in the experimental animals to antinutritional factors (Tuleun and Patrick, 2007; Obun *et al.,* 2016; Bagepallis *et al.,* 1992; Olumu, 1995; Sotelo, 1995; Reed, 2001). Rabbits on 0%, 5% and 10% inclusion levels had superior (p<0.01) feed conversion ratio suggesting there was better absorption and utilization of nutrients by the rabbits (Wafar *et al.,* 2017). This agreed with the finding of this study that at Finisher phase, feed conversion ratio was best at 5% inclusion level, followed by 10% then 15% and least at 0%. The good feed conversion ratio made by T_2, T_3 and T_4 were because of the Ceiba Pentandra leaf meal which increased digestibility of feed (Brown, 1995) thus making more nutrient available to broiler chickens. The better feed conversion recorded by the treatment groups containing Ceiba pentandra leaf meal was because the leaves contain biological compounds that enhances the activities of digestive enzymes like pancreatic lipase, amylase and consequently enhances feed conversion efficiency (Khan *et al.,* 2012a; Barnes *et al.,* 2007; Mode *et al.,* 2009; Molla *et al.,* 2012).

In another way, the high weight gain made by the birds fed Ceiba Pentandra leaf meal than those which had none, maybe associated with absorption enhancers, antimicrobial as well as metabolic modification made possible by the inclusion of the various leaf meal (Gill, 1999; Abaza, 2001; Igugo, 2014). It is believed that the phytochemical content of Ceiba Pentandra such as flavonoids, saponin as well as caratenoid lowers broiler intestinal pH at which activities of proteases and beneficial bacteria is optimized and proliferation of pathogenic bacteria is minimized by direct antibacterial effect destroying their cell membrane to ensure

better feed utilization and body weight gain (Partaneen and Mroz, 1999; Griggs and Jacobs, 2005; Emami *et al.*, 2013).

7. Conclusion

The study showed that Ceiba Pentandra leaf meal can be fed to starter and finisher snails up to 10%.

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