COMPARATIVE PERFORMANCE OF BROILER CHICKENS FED TOASTED *DANIELLIA OLIVERI* SEED MEAL AS REPLACEMENT FOR GROUNDNUT CAKE.

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Abstract

A 56 day experimental trial was conducted using 120 day-old Marshal unsexed broiler chicks to evaluate the growth performance, dressed percentage and organ weights of Daniellia oliveri seed meal (DOSM) as replacement for groundnut cake at 0, 50 and 100%, presented as diets T_1, T_2 and T_3, respectively. The birds were randomly divided into three experimental groups, replicated 2 times (20 birds each) using Complete Randomized Design. The results of the experiment showed significant ($P<0.05$) decrease in final body weight with values of 1488.75g for T_1, 1345.22 for T_2 and 1209.00g for T_3, weight gain values of 1453.85 for T_1, 1310.33 for T_2 and 1174.00g for T_3 and feed conversion ratio of 2.25 for T_1, 2.47 for T_2 and 2.72 for T_3. The feed intake was similar ($P>0.05$) but numerical higher values of 3269g for T_1, 3227.60g for T_2 and 3211.18 g T_3 were obtained. The weights of the heart and kidney were not significantly ($P>0.05$) affected. There were significant decreased ($P<0.05$) among treatment means for liver and full gizzard weights. The relative organ weight of the pancreas of birds on diets T_1 and T_2 were not affected ($P>0.05$) but were significantly ($P<0.05$) heavier from birds on T_3. It is concluded that DOSM could replace groundnut cake at levels not exceeding 50%.

***Keywords*:** Growth performance, carcass and organ weights, Daniellia seed, broiler chicks

INTRODUCTION

The stiff competition between man and livestock as well as industries for conventional feed stuff has made feed a major cost of production (Muriu *et al.*, 2002; Obun and Ayanwale, 2006). However, there exits thousand tones of forest seed species like *Daniellia oliveri* which are of little or no used to man and industries, and if exploited it could serve as a potential alteration for conventional feed stuff (Hassan *et al*., 2008). *Daniellia oliveri* seed is one of the numerous forest species wasting yearly which has potential as alternative for conventional feed stuff in poultry ration.

Daniellia Oliveri is found in Amazon, South America, Nigeria and other African countries (El-Mahmood *et al.,* 2008). It belongs to the family *Fabecae*. It is a perennial tree about 48 m high with leaves deciduous to touch. Nutritionally, *D. oliveri seeds* on dry matter basis have been reported to contained57.84% carbohydrate, 0.60% crude fibre, 27.74 % crude protein, 9.67% lipid and 4.17% ash (Hassan *et al*., 2008). However, the often high biological value of the seeds is impeded by the presence of substances such as phytate, oxalate, hydrocyanide, tannin and nitrate (Hassan *et al*., 2008 and El-Mahmood *et al.,* 2008; Obun and Adeyemi, 2012). Different traditional processing methods such as roasting, toasting, cooking and fermenting are pronounced in reducing anti nutritional factors and raising nutrients bioavailability (Ragai *et al*., 2010).

There is no much information in the literature about the nutrition potential of toasted *Daniellia oliveri* seed meal in the poultry production. The main objective of the present study was to compare feed utilization efficiency, growth performance, dressed percentage and organ weights of *Daniellia oliveri* seed meal (DOSM) as replacement for groundnut cake in broiler chickens.

MATERIALS AND METHOD

Experimental site

The experiment was carried out at the experimental Unit of Federal College of Wildlife Management, New Bussa, Niger State, located at longitude $4^0$31''E and latitude $4^0$33''E 7.3^0N and 10.00^0N. The study area has minimum and maximum temperatures of 25 and 38.5^0C, relative humidity of 61% and monthly rainfall of 83.5 mm (Abu, 2003).

Source and preparation of *Daniellia oliveri* seed meal

The *Daniellia oliveri* seeds (DOS) were sourced within the college premises during fruiting period. The seeds were roasted using firewood with iron pot mixed with sand and seeds in ratio of 1:2. The seeds were ascertained okay when the white endosperm of the seeds turned brown colouration at about 30-35 minute of toasting. The seeds were mechanically cracked to remove the hard coat before milling using 2 mm particle size hammer mill.

Experiment diets

Three diets were formulated with diet 1 serving as control {no *Daniellia oliveri* seed meal (DOSM} while diet 2 contained 50% toasted seed meal and diet 3 contained 100% toasted *Daniellia oliveri* seed meal (TDOSM), respectively (Table 1).

Experimental bird and management

A total of one hundred and twenty day old boiler chickens were used in the experiment. The birds were randomly allocated to the three experimental treatments each treatment had 40 birds, replicated twice with 20 birds each in a Completely Randomize Design (CRD). Deep litter system was used with wood shaving serving as litter material. Heat was supplied from electricity and coal pot at 39^0-32^0C for the first week and reduced by 2^0C each week until temperature stabilizes at 26^0C. The birds were vaccinated against Gumboro (infection bursal disease) through water at day 7^{th}. The birds were given vitalyte for first 5 days to reduce stress and also treated against any possible infection using antibiotic diluted in water according to the recommended level. Coxy-tet was used to prevent against coccidiosis at the rate of 30 g per litre of water.

Data collections

Feed Intake: Daily feed consumption was weighed until termination of the feeding trial at 56 days.

Weight Gain

The experimental bird's weight was recorded at the start of the experiment and subsequent weight at the end of each week throughout the fifty-six (56) days period. The average weight gain was obtained by subtracting the initial weight of birds from the final weight.

Feed conversion ratio **(**FCR) = was calculated as ratio of feed intake to weight gain.

Carcass and organ weights

At the end of the feeding trial, three birds per replicate were randomly selected, starved overnight and slaughtered. The birds were eviscerated and organ of liver, heart, kidney, gizzards, pancreas and gall bladder were removed and weighed using electronic scale. The dressed weight was obtained by subtracting carcass weight from final weight and expressed as percentage.

Chemical Analysis

Proximate composition of *Daniellia oliveri* seed meal and diets were analyzed for crude protein, crude fibre, ash and fat according to the methods of AOAC (1990).

Statistical analysis

Data collected were subjected to analysis of variance according to SAS (2001) and significant means were separated using Duncan's Multiple Range Test (Duncan, 1995).

RESULTS AND DISCUSSION

The result of the performance of broiler birds is presented in Table 3. The final body weight (FBW) of birds was 1488.75 g for T_1, 1345.22 for T_2 and 1209 g for T_3. The body weight gain followed a similar trend to final body weight (FBW) with values of

1453.85 g (T_1), 1310.33 g (T_2) and 1174.07 g (T_3). The feed intake of birds was not significantly ($P>0.05$) different across the treatments. Feed conversion ratio of birds fed the control diet was superior (2.25) compared with those on T_2 (2.47) and T_3 (2.72) (Table 3).

The results of the live weight and organ characteristics are shown in Table 4. The percentage dressed weight followed a similar trend as the live body weight of the birds. There were significant decrease ($P<0.05$) among treatments for liver and full gizzard weights. The relative organ weight of the pancreas of birds on diets T_1 and T_2 were not affected ($P>0.05$) but was significantly ($P<0.05$) differed from birds on diet T_3.

Discussion

The trend of the growth rate did not corroborate previous observations of Obun and Adeyemi (2012), who recorded the highest weight gain in birds on diet containing 5% *Daniellia oliver* seed meal (DOSM). Variations observed in weight gain at different levels of DOSM could be attributed to differences in the strain of broilers type and physiological state of the experimental animal used.

Feed intake was not significantly affected by the dietary treatments. This observation differs from a previous report by Obun and Adeyemi (2012) that inclusion of DOSM in broiler diet did not affect feed consumption. The numerical increased in feed consumption by birds on the control diet may also be associated with the higher body weight gain (BWG) of birds on these treatment. The heavier body weight may be attributed to increased nitrogen consumption also arising from increased feed consumption. This observation is consistent with a report by Sengar (1987) in which lowering dietary crude protein also reduced body weight gain and feed efficiency of chicks. The lower BWG of birds on 50 and 100% DOSM diets as opposed to those on control diet could have been due to inadequate levels of one or more essential amino acids in the diet. Experience has also shown that at higher inclusion levels, unconventional feedstuff may alter the texture, color, taste and odor of diets. Feed consumption and ultimately utilization might be affected by each of the above factors independently or in combination (Ander, 1992; Nir *et al*., 1994; Odunsi *et al*., 1996). Higher feed conversion ratio (FCR) of the DOSM-based diets compared with the control suggests inferior quality of the DOSM at higher replacement levels for ground nut cake.

The poor carcass quality of birds on DOSM based diets might be due to reduction in Feed and impairment in utilization of nutrients attributed by the high level of the meals which may contain some traces of residual anti nutrient. Roschack *et al*. (1986); Aletor and Ojo (1989) and Schrews (2000) demonstrated that nutrition exert several influence on the development of carcass trait, organs and muscular growth in broilers.

The lower dressing percentage of broilers fed the DOSM based diets may have resulted from their smaller live weight as reported by Broadbent *et al*. (1981), since the surface area and the weight determine the amount of feathers and visceral required respectively. The values of kidney and heart across the diets were not significantly ($P>0.05$) affected. The weight of the kidney and heart of birds fed DOSM based diets were slightly lower compared with those of the control birds though not statistically ($P>0.05$) different, still indicating the effect of the degree of differences in the quality of the seed meal.

Conclusion

The study revealed that toasted *Daniellia oliver* seed meal (DOSM) supported the survivability and growth of broiler chicks. At 100% DOSM level of inclusion in broiler chicks' diets, delayed the growth performance beyond the stipulated eight weeks period. The optimum level of DOSM inclusion should be at 50% replacement for groundnut cake.

References

Abu, J. E. (2003). An overview of the Federal College of Wildlife Management, Daybis limited, Ibadan p. 3-4.

Aletor,V. A. and Ojo, O. I. (1989). Changes in differently process soybean and Lima beans with particular reference to their mineral and some inherent anti-nutritional constituents. DieN'ahrung, 33:1009-1016.

A.O..A.C. (1990)**.** Association of Official Analytical Chemists. "Official Methods of Analysis. 14th Ed. published by the A.O.A.C, Washington, D.C., USA.

Ander, K. O. (1992). Some Physical Characteristics of diets containing graded levels of Palm kernel and Corn offal and dressing characteristics of broilers fed these diets. M.Sc. Thesis, Department of Animal science; University of Ibadan, Nigeria.

Broadbent, L. A., Wilson, B. J. & Fisher, C. (1981). The composition of broiler chicken at 56 days of age: Output components and chemical composition. *British Poultry Science*, 22: 4 -10.

Duncan, D. B.(1955). Multiple range and Multiple Test Biometrics, 11:1-42.

El-Mahmood, A. M., Doughari, J. H. & Chanji, F. J. (2008). *In vitro*antibacterial activities of crude extracts of *Nauclea latifolia* and *Daniellia oliveri.* Scientific Research and Essay, 3 (3):102-105.

Hassan, L. G., Dangoggo, S. M., Umar, K. J., Saidu, I. & Folorunsho, F. A. (2008). Proximate, minerals and anti nutritional factors in *Danellia oliveri* seed kernel. Nigerian Journal of Basic Applied Science, 31-35.

The effect of substituting maize with varying levels of high tannin sorghum in the diet on feed intake, digestibility, average gain and feed conversion efficiency for growing rabbits

Muriu, J. I., Njoka–Njiru, E. U., Tuitock, J. K. & Nanya, J. N. (2002). Agri Trop Subtrop, 35: 149–155.

Nir, I., Twina, Y., Grossman, E. & Nitsan, Z. (1994). Quantitative effects of pelleting on performance, gastro intestinal tract and behaviour of meat type chicken. *Br. Poult. Sci*., 35: 589-602.

Obun, C. O & Adeyemi, O. A. (2012**)**. Effects of raw and toasted *Daniellia oliveri* (Rolfe) seed meal on broiler performance. Nig. *Journ. Anim. Prod*., 39(2): 218-227.

Obun, C. O and Ayanwale, B. A. (2006). Utilization potential of *Afzelia africana* seed meal in the diets of starter chicks. *Trop. Journ. of Anim. Sci. (TIJAS), Nigeria,* 9(1): 55- 61.

Odunsi, A. A., Farinu, G. O. and & Akinola, J. O. (1996). Influence of dietary wild sunflower (*Tithonia diversifolia* Helms A. Gray) leaf meal on layers performance and egg quality. Nig. J. Anim. Prod., 23: 28-32.

Ragabi, H. I., Kijora, C., Abdel Ati, K. A. & Danier, J. (2010). Effect of Traditional Processing on the Nutritional Value of Some Legumes Seeds Produced in Sudan for Poultry Feeding. *International Journal of Poultry Science*, 9 (2): 198-204.

Rosochacki, S. R., Grosley, B. & Keller, J. S. (1986). Effect of feed intake on some lysozomal proteolytic activities in pectoral and leg muscles of growing chickens. Achive for Gefugelkinde, 50:7-12

Schrews, F. J. G. (2000). Post mortem changes in chicken muscle. *World Poultry Science Journ.,* 56:319-346.

SAS institute (2001). SAS user's guide: Statistics, Version 10th Edition. SAS institute Inc., Cary NC.

Table 1: Composition of the experimental starter and finisher diets.

Ingredients	Dietary levels of *Daniellia oliveri*					
	Starter phase			*Finisher phase*		
	O% (T_1)	**50% (T_2)**	**100% (T_3)**	**O% (T_1)**	**50% (T_2)**	**100% (T_3)**
Maize	54.00	54.00	54.00	60.00	60.00	60.00
Wheat bran	6.00	6.00	6.00	9.00	10.00	10.00
Ground nut cake	30.00	15.00	0.00	22.00	11.00	0.00
Daniellia oliveri	0.00	15.00	30.00	0.00	11.00	22.00
Fish meal	5.00	5.00	5.00	3.00	3.00	3.00
Bone meal	2.00	2.00	2.00	2.00	2.00	2.00
Oyster shell	2.00	2.00	2.00	2.00	2.00	2.00
Lysine	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25	0.25
*Premix**	0.25	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00	100.00
Calculated analysis						
Crude protein (CP)	22.07	21.35	21.18	**19.20**	19.05	19.00
M. E (Kcal/kg)	29.00	2920.00	2940.00	3000	3012	3017
Analyzed values						
Crude protein	22.20	22.78	22.55	20.17	20.30	20.11
Crude fibre	4.00	4.50	4.62	5.05	4.30	5.00
Fat	4.04	4.50	5.90	4.09	5.30	5.76
Ash	3.70	3.12	4.20	3.79	4.00	3.70

***Starter Premix** to provide per kg diet: Vitamin A 15,000 I. U., Vitamin D_3 3,000 I. U., Vitamin E 15 I.U., B_{12} 0.013 mg, Vitamin K 4 mg,Riboflavin 10 mg, Folic acid 2 mg, Nicotinic acid 44 mg, Pantothenic acid 13 mg, Biotin 0.064 mg, Vitamin B_1 2.2 mg,Vitamin B6 5.5 mg, Choline Chloride 350 mg, Copper 6.25 mg, Iodine 1.5 mg, Zinc 62.5 mg, Manganese 62.5 mg, Selenium0.1mg,BHT(Antioxidant)100mg, Zinc Bacitracin10mg.*

***Finisher premix**: vitamin A 500,000 IU, vitamin D3 100,000IU, vitamin E 12000IU, Niacin(PP) 1200mg, iron 8000mg, folic 200mg cal pen 4000mg, vitamin K3 1200mg, vitamin B 1800mg, vitamin B6 1600mg, zinc 1200mg, manganese 1600mg, iodine 400mg, selenium 60mg cabeit 80mg, Antioxidant 1200mg.*

Table 2: Performance of birds fed toasted *daniellia* seed meal (gm/bird).

	Dietary levels of *Daniellia oliveri* seed meal			
Parameters	**DOSM0**	**DOSM50**	**DOSM100**	**SEM**
Initial body weight	34.90	34.89.00	34.93	0.02
Final body weight	1488.75[a]	1345.22[b]	1209.00[c]	30.66
Body weight gain	1453.85[a]	1310.33[b]	1174.07[c]	31.32
Daily body weight gain	25.96	23.39	20.96	0.54
Total feed intake	3269.00	3227.60	3211.18	18.55
Daily feed intake	58.37	55.63	57.11	0.64
Feed conversion ratio	2.25[a]	2.47[a]	2.72[b]	0.04

abc Means on the same row with different superscripts are significantly different (P<0.05)

Table.3: Carcass and organ weights of broiler chicks fed toasted *daniellia* seed meal (gm)

	Dietary levels of *Daniellia oliveri* seed meal			
Parameters	**DSM0**	**DSM50**	**DSM100**	**SEM**
Live weight	1488.75[a]	1345.22[b]	1209.00[c]	30.66
Carcass	1045.55[a]	935.47[a]	8209.11[b]	12.57
Dressed percentage (%)	70.23	69.54	67.90	0.20
Organ weights				
Heart	6.06	4.05	3.72	0.55
Liver	22.45[a]	18.40[b]	14.27[c]	1.55
Full gizzard	42.07[a]	35.55[b]	26.70[c]	2.83
Kidney	1.26	0.97	0.70	0.14
Pancreas	1.82[a]	1.87[a]	1.37[b]	0.11
Gall bladder	2.42[a]	1.05[b]	1.17[b]	0.29

abc Means on the same row with different superscripts are significantly different (P<0.05)