International Journal of Science and Technology Volume 4 No. 4, April, 2015

Performance of Broiler Chicken Fed Diets Containing Cassava Peel and Leaf Meals as Replacements for Maize and Soya Bean Meal

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ABSTRACT

A 49-day feeding trial was carried out in a completely randomized design to evaluate growth performance of broilers fed cassava leaf meal and cassava peeling meal used as replacement of soya bean meal and maize at 20% respectively. One hundred and eighty, day–old broilers Abhor Acre were randomly allotted to four experimental diets such that each dietary treatment was replicated three times with fifteen birds per replicate. Feed intake, body weight gain, feed conversion ratio of birds fed feed of groups A, B, C and D. Group A served as control (cassava leaf meal (0%) and peelings meal (0%)) were superior ($p<0.05$) to the group on B (20% cassava peelings -20% leaf meal), C (20% leaf meal -0% cassava peelings),D (20% cassava peelings-0% cassava peelings). The cut parts of the carcass showed superior values ($p<0.05$) in the A (control) treatment and they differed significantly ($p<0.05$) from broilers on to the group on B (20% cassava peelings-20% leaf meal), C (20% leaf meal-0% cassava peelings), D (20% cassava peelings-0% cassava peelings). Up to 20% inclusion of cassava leaf meal and 20% cassava peelings as replacement for soya bean meal and maize respectively could be used in both broiler starter and finisher diets without any deleterious effect on growth and carcass yield of broilers.

Key words: *Cassava peeling meal, Cassava leaf meal, Carcass yield, Broiler.*

1. INTRODUCTION

Poultry meat and egg account for about 10% of the total amount of all meat, eggs and milk produced in the world each year. Poultry, through the provision of meat and egg continue to serve as an excellent and cheap source of animal protein for Nigerians. Feed accounts for 60-80% of the total cost of production in intensive poultry production (*Daghir, 1995;* Tewe, 1997*; Oruseibio and Smile, 2001*). This invariably has lead to an increase in the cost of poultry production prices of poultry products which is getting out of reach of the common man in most developing countries, including Nigeria.

Energy sources are the most important and expensive feedstuffs, maize which accounts for the largest proportion of about 50-55% of the poultry diet (*Afolayan et al., 2002*). The ever rising cost of maize is brought about by its declining production conditions and stiff competition for its use by man and other livestock species (*Agbede et al., 2002; Hamzat et al., 2003*). Prices of these conventional protein sources have soared so high in recent times that it is no longer economical to use them in poultry feeds (Esonu *et al*., 2001).

The increasing cost of feed resources in livestock production have been identified as a serious impediment to meeting the demand for animal protein particularly in developing countries (Adejinmi *et al.*, 2000).

This continually recurring challenge has compel the search for alternatives to the expensive grains and protein concentrates (Adeyemi, 2005). This interest had resulted in Animal nutritionist researching for alternatives that could help to reduce the cost of feeding without negatively impacting on the performance of the birds. Replacement of expensive conventional feed ingredients with cheap and available substitutes represents a suitable strategy at reducing feed cost and encouraging production. Several research have been carried out in the search for alternatives to soybean in poultry diets. These efforts involve the use of oilseed meals such as Castor oil seed (Ani and Okorie,2009), Mucuna (Iyayi and Taiwo,2003; Tuluen and Patrick,2007),*Alchonia cordifolia* seed meal (Udedibie and Opara,1998; Emenalon *et al.*,2011), rubber seed meal (Ijaiya *et al*.,2011). The results of some of these efforts were not really established and variable hence further processing as most of them are bedeviled by the presence of antinutritional factors.

Leaf meal from some tropical legume and plants are cheap source of protein. Leaf meal have been reported to be a rich source of protein and also some vitamins, minerals and oxycarotenoids, which cause yellow color of broiler skin, shank and egg yolk (D'Mello *et al*., 1987). The cassava plant is traditionally grown for the production of roots. It yields about 10 – 30 t ha-1 of leaves that is usually wasted or used as manure (Bokanga, 1994), also cassava peels are a major by-product of cassava processing and constitutes about 10-13 % of whole root weight (Tewe *et al.*, 1976). However, the leaves have become increasingly important as a source of protein for monogastric and ruminant animals (Wanapat 2002). Cassava leaves are rich in protein but they are low in sulfur amino acids (Gomez *et al* 1985; Phuc *et al* 2000). The leaf protein is reported to be limiting in methionine and tryptophan but rich in lysine, with overall biological value of 49-57% (Frochlich *et al* 2001).

This study is therefore designed to determine the performance of broilers fed diet containing cassava leaf meal and cassava peeling meal used as replacement of soya bean meal and maize at 20% respectively.

2. MATERIALS AND METHODS

The experiment was conducted at the Poultry Unit of the Teaching and Research Farm, University of Ibadan.

Management of birds

A total of 180 day-old Abhor acre broiler were sourced from a commercial hatchery in Ibadan and allocated into four dietary treatments of fifteen birds per treatment in three replicates. The birds were brooded and fed a common diet for one week. The birds were raised on a conventional open-sided deep litter house. All vaccination schedules and management procedures were followed. Feed and water were provided *ad-libitum* and the experiment lasted for 49 days.

Experimental diets and design

Fresh cassava peels and leaves (sweet variety) were collected from` a farm in Eruwa in Oyo State. The cassava peel were sun- dried for 4 days before being packed in bags and stored properly after which they were ground to powdery for easy incorporation and preservation. Four experimental diets were formulated for the starter phase. Diet one (T1), the control diet contained no cassava peels and no cassava leaf meal. Dietary treatments T2, T3 and T4 has replacement of cassava peels and leaves. In treatment two (T2), 20% of maize is replaced with cassava peels and 20% of soya bean is replaced with cassava leaves. In treatment three (T3) 20% of soya bean meal is replaced with cassava leave meal. In treatment four (T4) 20% maize replaced cassava peel while the soya bean is kept constant. The finisher diets had same replacements as described for the starter diets. The gross compositions of the starter and finisher diets are in Tables 2 and 3.

Parameters measured

Performance

The birds were weighed at the beginning of the experiment and then weighed on a weekly basis. Birds were weighed in the morning before given feed and water. Record of the feed given to the birds was taken and the left over feed in troughs was subtracted from the initial feed given, to obtain the feed consumed daily.
Weight gain and the feed intake values were used to determine the conversion rate of the feed.
The feed conversion ratio was determined by measuring the weight gain and dividing this
by the feed intake. This is given as: Feed intake÷ weight gain.

Analyses

Proximate analysis

Proximate composition of the experimental diets were carried out using the procedure of AOAC (1995).

Statistical analysis

All analytical determinations were done considering the replicates. Data was subjected to a two-way statistical analysis of variance (ANOVA) using SAS (2001).

Table 1: Proximate composition of Cassava leaf (CL)and Cassava peeling(CP).

Constituent (%)	Cassava leaf	CassavaPeel
Moisture	8.60	9.73
Crude Protein	25.37	2.53
Ether Extract	11.77	0.70
Ash	8.47	3.17
Crude Fibre	10.63	9.03
Total Carbohydrate	73.00	74.83
Cyanide	0.1	0.2

CL-Cassava leaf
CP-Cassava peelings

Table 2: Gross Composition of Experimental Starter Diet

Ingredients (%)	T1	T2	T3	T4
Maize	50	40	50	40
Cassava peel	0	10	0	10
Soya bean meal	35	28	28	35
Cassava leaf meal	0	7	7	0
*others	15.0	15.0	15.0	15.0
Total	**100**	**100**	**100**	**100**
Calculated values				
Crude protein (%)	22.9	21.9	21.7	22.7
ME(kcal/kg)	2974	2791	2931	2835
Crude fibre (%)	3.9	3.3	3.5	3.8
DL-Methionine (%)	0.34	0.52	0.54	0.34
L-lysine (%)	1.0	0.92	0.99	0.96

* Wheat offals (7.23); Di calcium phosphate (1.5); Oyster shell (0.5); Palm oil (2.5); Premix (0.25); Table salt (0.25); DL-Methionine (0.15); L-Lysine (0.06); Avatec (0.06); Fish meal (2.5)

Table 3: Gross Composition of Experimental finisher Diet

Ingredients (%)	T1	T2	T3	T4
Maize	50	40	50	40
Cassava peels	0	10	0	10
Soya bean meal	30	24	24	30
Cassava leaf meal	0	6	6	0
*others	20.0	20.0	20.0	20.0
Total	**100**	**100**	**100**	**100**
Calculated values				
Crude protein (%)	20.87	19.24	19.61	20.50
ME (kcal/kg)	3023.7	2846.9	2986.5	2884.1
Crude fibre (%)	4.83	4.35	4.51	4.87
DL-Methionine (%)	0.27	0.27	0.26	0.26
L-lysine (%)	0.83	0.82	0.78	0.76

*Wheat offals (11.24); Di calcium phosphate (1.5); Oyster shell (1.0); Palm oil (2.5); Premix (0.25); Table salt (0.25); DL-Methionine (0.10); L-Lysine (0.06); Avatec (0.06); Fish meal (1.5)

Table 4: Proximate composition of experimental Starter Diet

Constituent	Treatment			
(%)	1	2	3	4
Moisture	9.1	9.3	9.6	9.1
Protein	22.7	22.3	22.7	22.8
Ether Extract	14.5	15.1	15.3	14.9
Ash	6.5	6.2	6.0	5.8
Crude Fibre	10.3	9.8	9.0	9.0
CHO	40.4	38.5	38.5	37.0
Cyanide	0	0	0	0

Table 5: Proximate composition of experimental Finisher Diet

Constituent	Treatment			
(%)	1	2	3	4
Moisture	8.7	9.7	9.2	9.5
Protein	20.8	19.7	19.3	20.5
Ether Extract	11.3	11.1	10.8	12.2
Ash	5.8	5.3	5.2	5.4
Crude Fibre	11.3	12.1	11.0	12.2
CHO	49.2	49.1	48.5	49.2
Cyanide	0	0	0	0

Table 6: Performance characteristic of broilers fed cassava peel and leave at different inclusion.

Parameters	Treatment				
	T1	T2	T3	T4	SEM
Intial Bodyweight/bird(g)	196.3	200	198.6	197.6	0.00043
Final body weight/bird (g)	2210^{a}	1826.7^{c}	2043.3^{b}	2096.6^{ab}	0.04
Weight gain/bird /day(g)	45.1^{a}	37.3^{c}	41.6^{b}	42.8^{ab}	0.09
Total feed consumed/bird(g)	4672.7	4487	4679.0	4680.0	0.04
Total feed/day/bird	95.4	91.6	96.2	95.5	0.07
FCR	2.32^{d}	2.76^{a}	2.56^{b}	2.46^{c}	0.012
survival ability	100	100	100	100	0

a'b: Mean within rows having different superscripts are significantly different ($p<0.05$)

3. RESULTS AND DISCUSSION

The proximate composition of the test ingredient (cassava leaf meal and cassava peel meals), experimental diets and Proximate composition of diets are shown in Table 1-5.
Data on the performance is shown on Table 6. Feed intake of the birds fed the different dietary treatments were observed to be similar T3 has the highest numerical value over the period

of the experiment, this can be attributed to the acceptability or other factors.(Tewe 1993; Onyimoyi and Ugwu, 2007). Birds are known to eat more when diets are acceptable and coarse than when they are finely ground and acceptable (Leeson 2000). Also the numerical increase in mean daily feed intake may be in part, due to the relative decrease in energy level of the diet. This observation agrees with those of (Osei,(1992) and Oruwari, *et al* (1996), who respectively indicated that feed intake decreased with increase in energy level. It also corroborates the scientific evidence that birds eat to satisfy their energy requirement (Tewe and Egbuike ,1992), Akinfala, *et al.*, (2002) and Aderemi, *et al*.(2006).

The feed conversion ratio (FCR) in the different treatment indicated that T1 (control) is the best, while T2 (20% cassava peelings/20% cassava leaf meal) is the poorest, thus demonstrated that maize meal appeared to be better utilized by the broiler chicken than cassava leaf meal and cassava peeling meal in growth, which corroborate the findings of Obikaonu, and Udedibie, (2006) that the feed conversion ratio of Sundry cassava meal is poor when compared with maize.

In this study, No mortality was recoreded throughout the period of the experiment, this is in agreement with Akinfala *et al.*, (2002) which reported that cassava products do not cause any fatal death to broilers at the starter phase.

4. CONCLUSION

From the result of this study, it appear that up to 20% of cassava leaf and 20% cassava peeling meals can be incorporated in a single diet of broilers both in the starter phase and the finisher phase without a marked detrimental effect on the growth and performance. Hence, cassava leaf meals and cassava peelings meals in partial replacement of soya bean meal and maize may go a long way in reducing the cost of energy source and protein source and on the long run the sustainability of poultry production. Further research is necessary to determine how to increase the nutritive value of cassava peeling and leaf meal for monogastric animals in view of its cheapness and abundance.

REFERENCES

Adejinmi, O. O., Adejinmi J. O., and Adeleye I. O. A. (2000). Replacement value of fish meal with soldier fly larvae meal in broiler diets. Nigerian Poultry Science Journal. 1:52– 60.

Aderemi, F. A., Lawal, T.E., Alabi, O.M., Ladokun, O.A and Adeyemo, G.O.(2006). Effect of enzyme supplementated cassava root sieviate on egg quality, gut morphology and performance of egg type chickens.*Intl Journal of Poultry Science* 5: 526-529

Adeyemi O. A. 2005. Nutritional evaluation of broilers diets formulated with enriched unpeeled cassava root meal fermented with rumen filtrate. Ph. D. Thesis. University of Agriculture Abeokuta, Nigeria. 185 pp.

Afolayan G. G., Olorode B. R., Uko J. O., Junaidu A. U. and Fanimo A. O. (2002): The replacement value of maize bran for maize in broiler finisher diets. Proceedings of 27th Annual Conference Animal Science of Nigeria.91-93

Agbede JO, Ajaja K AND Aletor V.A. (2002): Influence of Roxazyme G. supplementation on the utilization of sorghum dust-based diets for broiler-chicks Proceedings of 27th Annual Conference of Nigeria Society of Animal Production 105-108.

Akinfala, E.O, Aderibegbe, A.O. and Matanmi, O. (2002) Evaluation of the nutritive of whole cassava plant as replacement for maize in the starter diets for broiler chicken. *Livestock Research for Rural Develpoment* 14: 1-6.

Ani, A. O. and A. U. Okorie. 2009. Performance of broiler finishers fed graded levels of processed castor oil bean (*Ricinus Communis* L.) meal supplemented with DL methionine. Nig. J. Anim. Prod. 36 (1): 61-73.

AOAC (1995). Official Methods of Analysis, 15th Edition, Washington, DC Bokanga, M. 1994. Processing of cassava leaves for human consumption cassava safety. Acta Horticulturae 375:203-207.

Daghir, N.J. 1995. Present status and future of the poultry industry in hot regions. In: Daghir; N.J. (ed). *Poultry Production in hot Climates*. Pp1–10 CABI Publishing, United Kingdom.

D'Mello, J. P. E.; T. Acamovic and A. G. Walker. 1987. Evaluation of Leucena leaf meal for broiler growth and pigmentation. Trop. Agric (Trinidad) 64: 33-35.

Emenalom, O. O.; E. B. Etuk, B. O. Esonu and L. C. Nwaiwu. 2011. Phytochemical and nutritional evaluation of raw and fermented *Alchornea cordifolia* seed meals on the performancce of broiler chicks. Nig. J. Anim. Prod. 38 (1): 92-99.

Esonu, B.O., F.C. Iheukwumere, O.O. Emenalom, M.C. Uchegbu and E. B. Etuk, 2002. Performance, nutrient utilization and organ characteristics ofbroilers. Hitt: //www, cipavorg. Co/I rd//Irrd14/6/eson/146 htn.

Frochlich Y and Tháii Văn Hùng. 2001. "Sử dụng lá khoai mì trong công nghiệp chế biến thức ăn gia súc". Sắn Việt Nam, hiện trạng định hướng và giải pháp phát triển những năm đầu thế kỷ thứ XXI. Viện Khoa học Kỹ thuật Nông nghiệp Miền Nam. 173-174.

Gomez, G., M. Vadic Viso, J. Santos and C. Hoyos, (1985). Evaluation of cassava root meal prepared from low and high cyanide containing cultivars in pig and broiler diets. Nutr. Report Int., 28: 693-704.

Hamzat R. A., Tiamiyu A. K. and Raji A. M. (2003): Effect of dietary inclusion of Kola Pod Husk (KPH) on growth performance of West African Dwarf (WAD) goats. Proceedings of 28th Annual Conference of Nigeria Society of Animal Production 21-273.

Ijaiya, A.T.; I. C. Alemede and R. A. Erhuanga. 2011. Replacement value of rubber seed (*Hevea brasiliensis*) meal for full-fat soya bean meal on performance, carcass characteristics and blood parameters of broilers. Nig. J. Anim. Prod. 38 (2): 34-45.

Iyayi, E. A. and V. O. Taiwo. 2003. The effects of diets incorporating mucuna (*Mucuma puriens*)seed meal on the performance of laying hens and broilers. Tropical and Sub-Tropical Agroecosystems 1(2-3):239-246.

Leeson, S., 2000. Is Feed efficiency still a useful measure of broiler performance? Department of Animal and Poultry Science, University of Guelp, Ministry of Agriculture, Food and Rural Affairs Canada

Obikaonu, H. O. and Udedibie,A.B.I.(2006). Comparative evaluation of sun-dried and ensiled cassava peel meals as substitute for maize in broiler starter diets. *Intl Journal of Agriculture and Rural development* 7: 52-55

Onyimoyi, A. E. and Ugwu, S. O. C. 2007. *Bioeconomic indices of broiler chicks fed varying ratios of cassava peel/bovine blood*. Faisalabad, Pakistan: ANSI, Asian Network for Scientific Information, 6: 318-321

Oruseibio S. M. and Smile G. O. (2001): Evaluation of palm kernel cake in replacing soybean meal as a protein source in broiler chicken production. Proceedings of the 6th Annual Conference of Animal Science Association Nigeria, 39-42.

Oruwari, B.M., A.O. Aniebo and D. M. Nkanta (1996). Effect of replacing maize with cassava brewers, dried yeast blend (cassava yeast) on performance of broiler chicks and feed cost in southern Nigeria. *Nig. J. Anim Prod.* 30 (2):169-178.

Osei, S.A.. (1992) Sun-dried cassava peel as a feed ingredient in broiler diets. *Tropical Agriculture* 69: 273-275.

Phuc, B. H. N.; B. Ogle and J. E. Lindberg. 2000. Effect of replacing soybean protein with cassava leaf meal in cassava root meal based diets for growing pigs on digestibility and N retention. Anim. Feed Sci. and Tech. 83: 223-235.

Udedibie, A. B. I. and C. C. Opara. 1998. Responses of growing broilers and laying hens to the dietary inclusion of leaf from *Alchornea cordifolia*. Animal Feed Science Technology. 71 (2): 157-164.

Wanapat, M. 2002. The role of cassava hay as animal feed in research and development in Asia: ExploringNew Opportunities for an Ancient Crop, R. H. Howeler (ed.). Proceedings of the 7th Regional Cassava Workshop.

SAS (2001). SAS/STAT Guide for Personal Computers, Version and Edition, Cary, North Carolina SAS Institute.

Tewe, O. O., T. A. Job, J. K. Loosli and V. O. Oyenuga (1976). Composition of two local cassava varieties and the effect of processing on their hydrocyanic content and nutrient utilization by rat. *Nigerian Journal of Animal Production* 3 (2): 60-66.

Tewe, O.O. and Egbuike , G.N. (1992) Utilization of cassava in non-ruminant livestock feeds. Cassava as livestock feed in Africa. Proceeding of the IITA/ILCA/University of Ibadan workshop on the potential utilization of cassava as livestock feed in Africa. Nigeria. 28-38.

Tewe, O. 1993. *Thyroid cassava toxicity in animals*. Pages 114-118 in Cassava toxicity end thyroid: research and public health issues, Proceedings, international Workshop on Cassava Toxicity, edited by F. Delange and R. Ahluwalia, 31 May- 2 June 1993,Ottawa, Canada. IDRC-207e:Ottawa.

Tewe, O. O. (1997). Sustainability and Development Paradigm from Nigeria's Livestock Ind. Inaugural Lecture delivered on behalf of faculty of Agriculture and Forestry, U. I. Pg 50.

Tuleun, C. D and J. P. Patrick. 2007. Effect of duration of cooking *Mucuna utilis* seed on proximate analysis, levels of antinutritional factors and performance of broiler chickens. Nig. J. Anim. Prod. 34 (1): 45-53.

