

MON -79

Response of Broiler Chickens to Yam-Sweet Potato Peel Meal in place of Maize

A.H. Akinmutimi, C.N. Okocha, C.O. Oguiliri, A.C. Ogbonna, A.O. Nzotta and N.O. Nsidinanya
College of Animal Science and Animal Production, Umudike

Corresponding author: A.H. Akinmutimi; E-mail: henryakinmutimi@yahoo.com.au, 07064796927

Abstract

One hundred and twenty broiler chickens of Marshal Breed-were used to investigate the response of yam-sweet potato peel meal mixture in place of maize in broiler chickens diet. They were allocated to four dietary treatments, each treatment was replicated thrice and 10 birds per replicate in a completely randomized design. Diet 1 was maize-based diet (control), while diets 2,3 and 4 contained yam-sweet potato peel meal in a ratio of 3:2 at 5%, 10% and 15% level of inclusion in place of maize respectively. This experiment lasted for 49 days and the birds were fed *ad-libitum*. The proximate and gross energy of test ingredient were as follows: Crude protein (8.69%), Ether extract (1.84%), Ash (11.7%), Crude fibre (8.27%), dry matter (90.11%) and gross energy (3.109kcal/g). The anti-nutritional factors contained in the test ingredient include: hydrogen cyanide (6.34mg/kg), phytate (0.945%), tannin (0.663%) and trypsin inhibitor (0.00TIU/mg). For growth performance, there was no significant difference ($p>0.05$) for all the parameters considered. The feed cost analysis shows that Diet 2 has the least cost/kg weight gain and the highest Gross margin among others. The cost/kg of test diets were significantly ($p<0.05$) lower than the control diet. Considering the least value for cost/kg weight gain at N305.32 and highest value for gross margin, diet 2 at 5% dietary inclusion of test ingredient was recommended.

Keywords:Broiler chickens, yam peel, sweet potato peel, alternative energy

Introduction

Cereal grains (Maize, Sorghum, wheat)serve as a major energy source in poultry feed industry in Nigeria. However, inadequate production of these cereals grains and keen competition between man and livestock over the available grains as major energy source coupled with high cost of these feed ingredients have resulted in increase in cost of production in the last decades (Sogunle *et al.*, 2012). If the future of poultry industry as a means of supplying animal protein is to be adequately protected, then cheap and easily available alternative feed sources that are of low human preference and also have little or no industrial use that can meet nutritional requirement of poultry needs sought for (Akinmutimi *et al.*, 2011). One of such feed stuff which has the potential of been used as energy source in poultry feed is yam-sweet potato peel meal.

Yam is a staple food in Nigeria; it ranks second in production and importance after cassava. Production level was 6.5 metric tonnes in the year 2004 of which 10% consist of the peel. Yam peels contain 11% crude protein and metabolizable energy of about 2604kcal/kg (Akinmutimi and Anakebe, 2011). Sweet potato is a staple food in Nigeria and is one of only seven world food crops with the yearly yield of 12.245 kg/ha (FAO, 1990). The substantial fractional part of the root constitutes the peel (Osuagwu, 2006). The peel is a good source of quality plant carbohydrate, it contains about 6.3% crude proteins and estimated metabolizable energy of about 3411kcal/kg (Akinmutimi *et al.*, 2011). Information on the effect of combined use of these peels meal in broiler chickens diet in place of maize is yet to be documented. This forms the objectives of the study.

Materials and Methods

The experiment was conducted at the Poultry Unit of the Teaching and Research Farm Michael Okpara University of Agriculture, Umudike. One hundred and fifty day-old chicks of Marshal Breed were purchased and Brooded together during which they were fed a commercial starter diet, 120 birds were selected after one week and assigned to four dietary treatments. Each treatment had 3 replicates of 10 birds

per replicate. The birds were managed in deep litter pen during brooding and rearing stages. Experimental feed and clean water were given *ad-libitum*. Heat sources were kerosene stove, lantern and electric bulbs. Birds were vaccinated against new castle disease at day-old (intraocular), Gumboro disease at 10th and 21st day lasota vaccine were given.

The test ingredients (Yam and sweet potato peel) were collected from Aba, sundried, milled to a particular size of 2mm in diameter and used for both chemical analysis and ration formulation. Diet 1 was maize based diet (control) while the test ingredient (sweet potato and yam peel meal in ratio of 3:2) replaced maize at varying levels 5, 10 and 15% respectively as shown in Table 1.

Table 1. Ingredient composition of the experimental diets

Ingredient %	Diets			
	D1 (0%)	D2(5%)	D3 (10%)	D4 (15%)
Maize	45.00	40.00	35.00	30.00
Sweet potato peel	0.00	3.00	6.00	9.00
Yam peel	0.00	2.00	4.00	6.00
Soybean meal	25.5	25.5	25.5	25.5
Palm kernel cake	18.00	18.00	18.00	18.00
Maize offal	4.00	4.00	4.00	4.00
Fish meal	2.00	2.00	2.00	2.00
Blood meal	2.00	2.00	2.00	2.00
Bone meal	3.00	3.00	3.00	3.00
Salt	0.25	0.25	0.25	0.25
Vit/premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
CP	21.33	21.24	21.15	21.06
ME(Kcal/kg)	2824.1	2808.52	2792.92	2768.8

The proximate composition and gross energy of the test ingredient and experimental diets were determined using the procedure of AOAC (1990). The anti-nutritional factors such as hydrogen cyanide, tannins, phytate and trypsin inhibitors were carried out as described by Maga (1982). Data collected were subjected to analysis of variance in accordance with Steel and Torrie (1980) and significant means were separated using Duncan's Multiple Range Test (Duncan, 1955).

Results and discussion

Table 2 reveals the proximate composition and gross energy composition of experimental diets and the test ingredient. The crude protein content ranging from 21.11-21.37% and the crude fibre ranging from 4.05-4.37% for experimental diets. These falls within the normal range for broiler chicks (Durunna, 2006; Akinmutimi, 2001) for straight diet. The crude protein content of 8.69% for the test ingredient, compared favourably with maize (10% crude protein), a major conventional energy source.

Table 2. The proximate composition and gross energy of experimental diets and test ingredient.

Determined Composition %	D1 (0%) 1	D2 (5%) 2	D3(10%) 3	D4(15%) 4	Test ingredient
Crude Protein	21.18	21.37	21.11	21.2	8.69
Ether extract	3.59	3.71	3.67	3.76	1.84
Crude fibre	4.24	4.05	4.28	4.37	8.27
Ash	7.23	7.38	7.52	7.65	11.17
Dry matter	89.89	89.95	90.14	89.97	90.11
Gross energy (kcal/g)	3.092	3.084	3.092	3.089	3.109

Table 3 presents some of the anti-nutritional factors in combined sweet potato and yam peel meal. This study agrees with the earlier work (Akinmutimi *et al.*, 2011) on yam-sweet potato. Among the anti-nutritional factors determined, hydrogen cyanide seems to be more pronounced with 6.34mg/kg.

Table 3: The anti-nutritional factors in combined sweet potato and yam peel meal.

Anti-nutritional factors	Test ingredient
HCN (mg/kg)	6.34
Phytate (%)	0.945
Tannin (%)	0.663
Trypsin inhibitor (Tiu/mg)	0.00

Table 4 reveals the growth performance of broiler chickens fed on combined yam and sweet potato peel meal in place of maize. There was no significant difference ($p>0.05$) for all the parameters considered. Nevertheless diet 2 had numerically high value for final weight and the least value for feed conversion ratio making it a preferred diet since the lower the feed conversion ratio, the better the diet (Akinmutimi *et al.*, 2011).

Table 4. Growth performance of broiler chickens fed combined yam and sweet potato peel meal.

Parameters	D1 (0%)	D2 (5%)	D3 (10%)	D4 (15%)	SEM
Initial weight (kg)	0.20	0.20	0.20	0.20	0.00
Final weight (kg)	1.70	0.00	0.00	0.00	0.09
Weight gain/bird (kg)	0.03	0.03	0.03	0.03	0.00
Feed intake/bird/day(kg)	0.12	0.11	0.12	0.12	0.00
Feed conversion ratio	3.89	3.67	4.00	4.67	0.35

SEM= Standard Error of Means

The feed cost analysis is as shown in Table 5. There was no significant difference ($p>0.05$) for all the parameters measured except for cost /kg feed only. The cost/kg feed for control diet was the highest and it was significantly higher ($p<0.05$) than all the test diets. Also the test diets were significantly different ($p<0.05$) from each other with diet 2 having the highest gross margin and diet 4 the least value. The downward trend could be attributed to the lower price of the test ingredient when compared to that of maize. Although, there was no significant difference ($p>0.05$) for other parameters measured, diet 2 with the lowest cost/kg weight gain show more superior than others, since the lower cost /kg weight gain, the better the diet (Akinmutimi and Ezea, 2006). Also, diet 2 had the highest value of gross margin, still confirming the superiority of diet 2 among others since the higher the gross margin, the more economically viable the diet (Ojewola *et al.*, 2005).

Table 5: Feed cost analysis of diet

Parameter (Naira)	D1 (0%)	D2 (5%)	D3 (10%)	D4 (15%)	SEM
Cost/kg of feed	86.02a	83.27b	80.52c	77.77d	0.00
Cost of feed consumed	491.75	448.83	473.46	457.29	13.71
Cost/kg weight gain	334.52	305.32	322.08	362.93	27.55
Cost of production	491.75	448.83	473.46	533.5	40.50
Revenue	1029	1029	1029	1029	0.00
Gross-margin	537.25	580.17	555.54	495.5	40.50

^{a-b} Means treatment in a row with different superscript are significantly different ($p < 0.05$).

Conclusion

Considering final live weight, feed conversion ratio and least value for cost/kg weight gain and highest value for gross margin, diet 2 (5% dietary level of inclusion) was recommended.

References

- Akinmutimi, A.H., Ihekoronye, C.C. and Ewa, E.U. (2011). Evaluation of nutritive value of Taro, (*Colocasia esculenta* linn) as a substitute for maize on weaner pig diet. *International Journal of Current Research*, 3:084-090.
- Akinmutimi, A.H. (2001). Effect of potash cooked Lima bean (*Phaseolous limatus*) on broiler starter diet. *Nigeria Agric. Journal*, 32:109-118.
- Akinmutimi, A.H. and Anakebe, O.C. (2008). Performance of weaner rabbit fed graded level of yam and sweet potato peel meal in place of maize in a maize based diet. Department of Animal Nutrition and Forage Science. *Pakistan Journal of Nutrition*, 7:700-704
- Akinmutimi, A.H. and Ezea, J. (2006). Effect of graded level of toasted lima bean (*Phaseolus limatus*) meal in weaner rabbit diets. *Pakistan Journal of Nutrition*, 5(4):368-372.
- Duncan, B. (1955). Multiple Range and Multiple F-test Biometrics. 11:1:41 Readdy N.R. Mic press, New York. Pp. 143-153.
- Durunna, C.S. (2006). Aspect of the biochemical compositions of *Anthnonotha macrophylla* seeds. *Animal Production Research Advances* 2(4): 217-220.
- FAO (1990). Food and Agricultural Organization: Trade Year Book, Rome, Italy
- Maga, J.A. (1982). Tannin, its chemistry, occurrence food interaction, nutritional significance and method of analysis. *Journal of Science, Food and Agriculture*, Pp: 30-31
- Ojewola, G.S., Okoye, F.C. and Ukoha, O.A. (2005). Comparative utilization of three animal protein sources by broiler chickens. *International Journal of Poultry Science*, 4:462-467.
- Osuagwu, C.C. (2006). Response of weaner rabbit fed graded level of sweet potato peel meal in place of maize. B. Agric. Project, Michael Okpara University of Agriculture, Umudike.
- Sogunle, O.M., Fanimi, A.O., Abiola, S.S. and Bamgbose, A.M. (2012). Cassava (*Manihot esculenta*) peel meal supplemented with cashew nut (*Anacardium occidentale*) reject meal diets. *Nigeria Journal of Animal Production*, 39:132.
- Steel, R.G. and Torrie, H. (1980). *Principal and Procedure of Statistics. A Biometric Approach*. 2nd ed. Mc-Graw Hill Book inc., New York