African Journal of Food Science and Technology (ISSN: 2141-5455) Vol. 1(5) pp. 098-101, May, 2011
Available online http://www.interesjournals.org/AJFST

Full Length Research Paper

Evaluation of Processed Cassava Flour and Blood (PCB) in feed for Broiler Chickens

Zanu H.K.[1] and Dei H.K.[2]

[1]Department of Animal Science Education, University of Education, Winneba, Ashanti Mampong, Ghana. P.O. Box 40 Ashanti Mampong – Ghana. Telephone: 233-024-4093301 Email: holy_zanu@yahoo.com
[2]Department of Animal Science, University for Development Studies, Tamale, Ghana. P.O. Box TL 1882

Accepted 6 December, 2010

A six (6) week feeding trial was conducted to assess the effect of processed cassava flour and fresh blood labeled PCB on the growth performance of broiler chickens. Ninety (90) 2-week old broiler chickens were randomly selected in groups of 15 with mean initial liveweight of 276.6g per bird. Two iso-nitrogenous (19%) and iso-caloric (12.0 ME MJ/Kg) dietary treatments were tested: T_1 (Maize + concentrate + wheat bran) and T_2 (PCB + concentrate + wheat bran). Completely Randomized Design was used and dietary treatment was replicated thrice. There was no significant difference (P<0.05) in weight gain and final weight between birds fed T_1 and T_2. Birds fed maize-based diet (T_1) showed higher (P<0.05) feed intake than their counterparts on PCB-based diet. However, the lower consumption of PCB-based diet did not affect their growth performance. Feed cost was reduced (P<0.05) when PCB was used. No mortality was recorded when PCB was fed to birds. There was no significance difference (P<0.05) in dressed weight, dressing percentage, leg weight and neck between birds fed T_1 and T_2. There was however significant difference (P<0.05) in gizzard weight, head weight and intestine weight between birds fed maize-based diet (T_1) and PCB-based diet (T_2). It was concluded that feeding PCB has favourable nutritional effect on growth performance of broilers and can serve as a substitute for maize in concentrate-based diet.

Key words: Processed Cassava Flour, Blood, PCB and Broiler Chickens

INTRODUCTION

The survival of the poultry industry in most developing countries in the future will, undoubtedly, depend on the ability of poultry industry to compete with humans for the available food supply (Nelson et al., 2007). Many agricultural and agro-industrial by-products that could profitably be used are available locally but are not fully exploited for the feeding of livestock (Rhule et al., 2007).
Recent trend in feeding poultry is the utilization of new feed resources often called novel feeds or non-conventional feeds with acceptable nutritive value to either augment or replace the conventional feed ingredients like maize and fish meal. Attempts to reduce cost of feeding broilers include the utilization of ingredients which are high in both carbohydrate and protein (Osei et al., 1994). Many ingredients are being improved in nutritive value by appropriate processing. Individually or collectively, the new or modified sources of ingredients can be used to increase the nutrients for animal use to improve or enhance the nutritive value of hitherto little used products (Okai et al., 2005).

Cassava flour meal is an agro-industrial by-product that could be exploited as animal feed. Several researchers had earlier confirmed the suitability of cassava for animal feeding including poultry and the potential of cassava meal as a feed substitute for maize, for all classes of monogastrics (Adesehinwa, 2008). However, certain precautions need be taken to guarantee satisfactory performance of animals on cassava meal diets. These were reported to include the removal of cyanide through boiling, drying, grating, soaking, fermenting or a combination of these processes to produce final products

*Corresponding author Email: holy_zanu@yahoo.com

containing not more than 100 ppm HCN, and the prevention of microbial activity during sun-drying, particularly in a humid environment. High cyanide levels and the presence of microorganisms have been demonstrated to reduce performance and induce haematological changes of growing pigs fed sun-dried cassava based rations (Tewe, 2006).

However, the improvement of its protein content has received very little attention (Hahn, 1995). Blood can be used to improve the protein content of cassava flour. Nutritional fortification of cassava flour with blood has shown promising results in broiler chicken ration (Manukure, 2001). Blood is cheap and mostly free at slaughter houses and it is an important source of lysine. Blood contains 80% protein (McDonald, 1995) and important amino acids (North and Bell, 1990).

The purpose of this study was therefore to investigate the usefulness of processed cassava flour and blood in broiler chicken diet.

Materials and Methods

The experiment was conducted at the poultry section of the Department of Animal Science, University for Development Studies, Nyankpala campus,Tamale, Ghana. It lasted for 6 weeks (42 days). This location lies on latitude 9^0 25' N and longitude 0^0 58' W at altitude 183m above sea level. It is generally described as a hot dry Savannah Zone. Rainfall is monomodal and occurs in April to October, with the dry season from November to March. Rainfall averages 1200 mm per annum. Temperature generally fluctuates between 19^0 C (minimum) and 40^0 C (maximum).

The dried cassava used in the study was obtained from the Tamale Central Market. The cassava was ground into smooth flour in a grinding mill. The blood was obtained from the Tamale Abattoir. The fresh blood collected was processed the same day to avoid spoilage.

Processing of cassava flour and fresh blood into one product (PCB)

Water was added in order to increase the volume of cassava flour in the mixture. The cassava flour, fresh blood and water were processed together in a big metal cooking pot in the ratio of 1:1:1.6. The cassava flour, fresh blood and water were weighed separately using a weighing scale. The water was preheated to boiling point before the blood was poured into it. The blood was allowed to cook for 15-30 minutes while constantly stirred. The cassava flour was added and vigorously stirred until it was well cooked between 15 and 30 minutes.

The products were poured out, cooled, molded into small boluses and sun-dried on aluminium sheets for 3-4 days. The dried product was labeled “Processed Cassava and Blood Meal” (PCB). It was stored in sacks and later ground in grinding meal to fine grits for compounding feed.

Experimental diets

Two dietary treatments (Table 1) were formulated and labeled T_1 and T_2. The control diet (T_1) consisted of maize, protein concentrate and wheat bran. Diet T_2 comprised PCB, concentrate and wheat bran. The diets were formulated to be iso-nitrogenous (19% CP) and iso-caloric (12.0 ME MJ/kg). The protein concentrate was made up of protein, (Minimum) 44%; fat (Minimum), 4.50%; Fibre (Maximum), 4.80%; Cysteine, 0.50%; Calcium, 3.40%; Phosphorus, 1.70%; Lysine, 2.8%; Methionine, 1.15% and ME (kcal/kg), 2400.

Commercial strain of broiler chickens (Arbor Acre, Holland) were used in the study. One hundred and fifty (150) day-old chicks were used. The chicks were reared on litter in a brooder house for 14 days. A broiler starter diet with 21% crude protein and 12 ME MJ/Kg was fed to the birds *ad libitum*. At 14 days of age 90 birds were selected and randomly divided into 6 groups and put in 6 pens. The mean initial weight was 276.6g.

Completely Randomised Design was used. There were three dietary treatments with three replicates per treatment.

Data was collected on weight gain, feed intake, feed conversion efficiency, feed cost, carcass characteristics and economy of gain.

Statistical analysis (T test) was conducted on the key parameters and difference between treatments means were subjected to the test of significance at the 5% probability.

RESULTS AND DISCUSSION

Results of the effects of PCB on growth performance and carcass characteristics of broilers are presented in Tables 2 and 3.

The results show that when PCB (T_2) was fed to broilers, there was no significance difference (P>0.05) in weight gain and final weight between them and their counterparts on maize-based diet (T_1). This suggests that PCB can replace maize without any adverse effect on growth. Even though the PCB is as equally good as maize its effects on growth and final liveweight was not higher than that of maize as reported by Manukure (2001) in preliminary studies using the same ingredients. He ascribed the goodness of PCB to its favourable nutrient composition. Occasional scarcity of maize in the market and the high price will therefore not affect broiler production since PCB could serve as a substitute (Table 2). It was reported by Okeke et al (1992) that well processed cassava root can completely replace maize in broiler feed provided protein supplement is added. The limitation of protein in the cassava was ameliorated through the processing of the flour with blood.

The result in Table 3 shows significance difference (P<0.05) in feed intake between birds fed PCB-based and maize-based diets. There was higher consumption of maize-based diet (T_1) than PCB (T_2). However, quantities of both diets consumed by the birds fell within the standard range (88-112g) of feed consumption by broilers from day old to 8-weeks of age (Ranjhan 1993). Since both diets were formulated to be iso-caloric (12.0 ME MJ/Kg) and iso-nitrogenous (19%), it could be concluded that PCB contains relatively higher amount of elements that necessitated growth rate considering the quantity of it consumed as compared to T_2. It could also be that the PCB contained more digestible nutrients that stimulated higher feed conversion efficacy. Feed consumption and feed conversion are positively correlated (Qadoos, 2000). The superior feed conversion efficiency obtained by

Table 1. Percentage Composition of Experimental Diets

Ingredients	Diets	
	T_1	T_2
Maize	50	-
PCB	-	50
Concentrate	30	24
Wheat Bran	20	26
Proximate Analysis:		
Crude Protein (%)	19.0	19.0
Ether Extract (%)	4.05	4.04
Calcium (%)	1.05	1.20
Available Phosphorus (%)	0.42	0.40
Gross Energy (MJ/Kg)	12.00	12.00

Table 2. Effect of PCB on Feed Intake, Weight Gain, Feed/Gain and Feed Cost

Parameters	T_1	T_2	Level of Sig	±SEM
Mean feed intake (g/bird/day	111.33	101.00	0.048	10.33*
Mean final weight (g/bird)	2,263	2,116	0.181	146.66^{ns}
Mean total weight gain (g/bird)	1,987	1,839	0.180	146.00^{ns}
Mean eight gain (g/bird/day)	47.3	43.8	0.141	3.33^{ns}
Feed/gain (g/g)	2.30	2.35	0.061	6.66^{ns}
Economy of gain (₵)	2,067	1,263	0.765	804.33^{ns}
Mortality	-	-	-	-

SEM – Standard Error Mean
ns- Not Significant (p>0.05)
*- Significance (P<0.05)

Table 3. Effect of PCB on Carcass Characteristics of Broilers

Parameters	T1	T2	Level of Sig.	±SEM
Mean dress weight (g)	1,746.67	1,606	0.339	26.09^{ns}
Mean dressing percentage (g)	83.17	76.27	0.313	1.25^{ns}
Mean gizzard weight (g)	53	40	0.016	3.33*
Mean weight of legs(g)	73.33	73.33	0.148	7.45^{ns}
Mean weight of heads (g)	56.67	60	0.016	3.33*
Mean weight of intestine (g)	60	73.33	0.016	6.67*
Mean weight of neck (g)	93.33	80	0.609	8.82^{ns}

SEM – Standard Error Mean
Ns- Not Significant (p>0.05)
*- Significance (P<0.05)

feeding PCB in the present study agrees with the results of Manukure (2001).

Table 3 shows that feed cost per gain of broilers was reduced (P>0.05) when PCB was used. This could be the result of lower price of PCB and the relatively lower quantity of feed consumed (Table 3). This observation agrees with work by Manukure (2001). He reported that by feeding PCB, there was savings of 30.6% hence confirming better economic gain by feeding PCB to broilers. Indeed the use of non-conventional feedstuffs often reduced feed cost (Rhule et al., 2007). No mortality was recorded in this study; hence PCB has no health related problems. Though raw cassava has been noted for its hydrogen cyanide content (Tewe, 2006), further processing of cassava such as soaking, grinding, drying, milling and boiling (Bokango et al., 1991) made it safe for feeding broilers.

It was observed that birds on the maize-based diet recorded greater (P>0.05) dressed weight than those on PCB-based diet. However, the difference was not significant. There was no significant difference (P>0.05) in weights of leg and neck between birds on T_1 and T_2. The combined effect of greater weight of neck and legs on the dressed weight of birds on PCB is partially offset by reduced (P> 0.05) gizzard weight. The weight of intestine may be due to the texture of the PCB (Nitsan *et al.*, 1988).

There was no significant difference (P>0.05) in dressing percentage between birds on control diet and those on PCB-based diet. However, birds on control diet recorded greater (P>0.05) dressing percentage. Nevertheless, the dressing percentage (76.27%) recorded by birds on PCB-based diet was above the accepted value of 75% for chicken (Okorie, 1983)

CONCLUSION

It is clear from result obtained in this study that PCB has higher nutritive value as an ingredient in diets of broiler chickens. From all indications, PCB can serve as a substitute for maize in concentrate based grower diet. Again, it is more economical and profitable to use PCB since it has the potential of reducing the feeding cost of feeding.

ACKNOWLEDGEMENT

The authors are grateful to the Department of Animal Science, University for Development Studies, Tamale, Ghana, for sponsoring this project.

REFERENCES

Adesehinwa AOK, Dairo FAS, Olagbegi BS(2008) Response of growing pigs to Cassava peel based diets supplemented with Avizyme® 1300: growth, serum and hematological indices. Bulgarian J. Agric. Sci. 14(5): 491-499

Bokango M, Otoo E(1991). Cassava based food: How safe are they? Proc. of the 9th Symp. of the International Society for Tropical Root Crops 20-26th October, (1991) Accra, Ghana. Pp 225.

Hahn SR (1995). Traditional processing and utilization of cassava in Africa. Perganon Press. Pp. 34.

Manukure SA (2001). Evaluation of processed cassava flour and fresh blood (PCB) in feed for Broiler Chickens. B.Sc. Dissertation. Animal Science Department. University for development studies, Tamale, Ghana. Pp 1-25

McDonald P, Edwards RA, Greenhalgh JFD and Morgan CA. (1995). Animal Nutrition, 5th Edn. Addison Wesley Longman Limited, UK.

Nelson FS, Ameleke GY, Donkoh A, Lamptey V (2007). Use of locally available agro-industrial by-products (AIBPs) for egg production in the Western Region of Ghana. The results of an on-farm trial. Proceedings of the Ghana Society of Animal Production Symposium, 15:103 - 107.

Nitsan Z, Zvi SI, Cahaner A(1998). Enzyme activity in the gastrointestinal tract of broiler lines divergently selected on abdominal fat. Leanness in Domestic birds. Butterworth and Co. pp 135.

North MO, Bell DD (1990). Commercial Chicken Production Manual, 4th Edn. An AVI Book Publication by Van Nostrand Reinhold, New York, USA. Pp. 42.

Okai DB, Abora PKB, Davis T, Martin A (2005). Nutrient composition, availability, current and potential uses of “Dusa”: A cereal by-product obtained from “Koko” (porridge) production. J. Sci. Technol. 25(1): 33-42

Okeke JE, Agbakoba AM, Otil A (1992). Cassava utilization in the poultry industry. The Nigeria perspective. Proc. 5th Triennial sym. ISTRC AB Kampala, Uganda. 22-28th November, 1992. Pp 89

Okorie JU (1983). A Guide to Livesstock in Nigeria. Macmillan. Pp. 119

Osei SA, Atuahene CC, Donkoh A, Kwarteng, K, Ahenkorah K, Azah BO, Haag W, Twumasi-Afriyie S (1994). Further studies on use of QPM as feed ingredient for broiler chickens. Proc. Ghana Animal Sci. 22:51-55.

Qadoos A(2000). Growth rate and feed conversion ratio of major carps *(Labeo rohita, Catla catla, Cirrhinus mrigala)* fed on rice polish and maize oil cake. M Sc Thesis. Deptt. Zool. Fish., Univ. Agri.Faisalabad.

Ranjhan SK (1993). Animal Nutrition and Feeding Practices. 4th Edn. Viskas Publication House. PVT Ltd. 307.

Rhule SWA, Okai DB, Addo-Kwafo S, Ameleke G(2007). Feed package for pigs in Ghana using AIBPs: solution to feeding constraints. Proceedings of the Ghana Society of Animal Production Symposium**,** 15:135 – 139.

Tewe OO(2006) Cassava products for animal feeding. In: Integrated Cassava project. p. 1-3. http://www.cassavabiz.org/postharvest/lvstock_1.htm 10 Nov.