EFFECT OF FEEDING GRADED LEVELS OF ENZYME TREATED AND UNTREATED BAMBARA GROUNDNUT OFFAL ON DIGESTIBILITY COEFFICIENT OF BROILER CHICKENS FED MAIZE-SOYBEAN BASAL DIET

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Abstract

Effect of enzyme (Natuzyme) fortification of bambara groundnut (Voandzeia subterranea L) offal diet on digestibility coefficient of broiler chickens was investigated. 216 day old commercial broiler chicks were randomly divided into 8 groups of 27 birds each. The groups were randomly assigned to diets in a 3 × 4 factorial arrangement involving four levels (0, 10, 20 and 30%) of treated and untreated Bambara groundnut offal with control diet (0) in a complete randomized design. Each treatment was replicated three times with nine birds per replicate. Increasing treated and untreated bambara groundnut offal levels depressed (P < 0.05) nutrient absorption as evidenced by significant reduction in the retention of dry matter, crude protein, crude fibre, ether extract and ash. Final body weight and average daily weight gain of control diet, feed conversion ratio at the 10, 20 and 30% treated and untreated bambara groundnut offal levels, and reduced average daily feed intake and feed cost per kg weight gain at all the bambara groundnut offal (BGO) inclusion levels. The results of the study indicate that 20% bambara groundnut offal treated and untreated can be included in broiler diet without adverse effects on broiler chickens digestibility coefficient and also to reduce cost of production.

Key words: Bambara groundnut offal, dietary enzyme fortification, broiler chickens, performance, digestibility coefficient.

Introduction

High cost of feed is a limitation to monogastric animal production in Nigeria which has been rated at 70 - 80 percent of total cost of production (Madubuike and Ekenyem, 2001). The overdependence on imported livestock products, ignorance, inadequate technical skills, diseases and parasitism, environmental stress and high cost of ingredients and competition between man and livestock for feed grains and inadequate production of farm crops to meet human and livestock needs have been implicated as remote causes of poor animal protein intake among Nigerians (Babatunde *et al.*, 1990). Consequently, the fight to reduce the cost of poultry production becomes critically urgent in order to salvage Nigerians from the scourge of sub-optimal animal protein intake and malnutrition. The poultry industry has a key role to play in many parts of the world as a most economical source of protein (Augusto *et al.*, 1999). The poultry industry is one of the fastest growing segments of the livestock industry. Poultry are highly prolific and very efficient in converting feed nutrients into high quality animal protein (Smith, 2001).

It is therefore very important to use unconventional materials such as cowpea waste, soybean waste, bambara groundnut offal, etc., that are locally available and can be obtained at lower prices. The inclusion of graded levels of raw bambara nut (*Voandzeia subterranea L*) offal in the diets of broiler chickens will help to enhance production by reducing the cost of production. Bambara groundnut is widely cultivated in the Northern and Southern States of Nigeria where the seeds are processed into flour and consumed as moi moi (Enwere, 1998). The processing of the seeds into flour results in the production of the waste that contains 16.40% crude protein (Okeke, 2000). Bambara groundnut waste has been used in the feeding of poultry and rabbits (Okeke, 2000; Ani and Okafor, 2004; Ani, 2007). However, its use in the feeding of monogastric animals is limited by the presence of high fibre and antinutritional factors (Ensminger *et al* 1996; Enwere, 1998). Poultry cannot fully utilize high fibre diets because they lack the digestive framework that can elaborately digest large amount of fibre. It becomes imperative, therefore, to incorporate exogenous enzymes into their diets in order to enhance the breakdown of the non-starch polysaccharides (NSPs) present in fibre (Doku and Karikari, 1981; Ensminger *et al.*, 1996; Enwere, 1998). Besides antinutritional factors, another limitation is its high fibre content. The enzyme being considered in this study is Natuzyme which has been shown to increase digestibility of fibrous feed ingredients by disrupting the plant cell walls, and by reducing the

viscosity of the gut contents, thereby enhancing nutrient absorption (Choct and Annison, 1992; Bedford *et al.*, 1992; Acromovic, 2001). The present study was therefore conducted to determine the effects of graded levels of raw bambara nut waste and supplementary enzyme (Natuzyme) on the coefficient of digestibility and growth performance of growing broiler chickens.

Materials and Methods

The study was conducted at the Poultry Unit of the College of Animal Science Teaching and Research Federal University of Agriculture, Makurdi, Benue State, Nigeria. The Bambara groundnut sievate was procured from a bambara groundnut processing mill in Makurdi town, Other feed ingredients used in the study were purchase from the Livestock feed stores. 216 day-old broiler chicks were obtained from a commercial farm. The birds were randomly assigned to 8 treatments and 3 replicates per treatment with nine (9) birds each. The groups were randomly assigned to diets in a 3 × 4 factorial arrangement involving four levels (0, 10, 20 and 30%) of treated and untreated Bambara grandnut offal with control diet (0) in a complete randomized design. Each treatment was replicated three times with nine birds per replicate. These chicks were weighed at the beginning of the experiment to obtain their initial weight per replicate. The chicks in each replicate were housed in clean and disinfected separated pens. The birds were brooded and vaccinated against Newcastle disease (i/o) at day old, Gumboro vaccine administer 7th and 14th days, while the Newcastle vaccine "Lasota" administered at 21st days respectively. Standard hygienic conditions and biosecurity of the environment was maintained.

Table 1: Percentage composition of broiler finisher chick diets containing different inclusion level of Bambara Groundnut Offal

Ingredients	**Treatments**			
	T_1/T_2	T_3/T_4	T_5/T_6	T_7/T_8
Maize	52.47	45.94	37.54	29.75
SBM	21.32	19.17	16.94	14.80
GNC	10.66	9.58	8.47	7.40
Maize Offal	10.00	10.00	10.00	10.00
BGO	-----	10.00	20.00	30.00
Palm Oil	1.00	2.00	2.50	3.50
Bone Meal	3.50	3.50	3.50	3.50
Salt	0.30	0.30	0.30	0.30
Methionine	0.30	0.30	0.30	0.30
Lysine	0.20	0.20	0.20	0.20
Vitamin Premix	0.25	0.25	0.25	0.25
Enzymes	-/+	-/+	-/+	-/+
Total	**100.00**	**100.00**	**100.00**	**100.00**
Calculated analysis.				
CPC %	20.00	20.00	20.00	20.00
ME (Kcal/kg)	2,929.97	2,923.78	2,894.89	2,888.5
CF(%)	4.17	4.78	5.37	5.96
Ca (%)	1.36	1.37	1.37	1.37
Meth(%)	0.58	0.60	0.65	0.61
Lysine(%)	1.12	1.16	1.20	1.24
Phosphorus (%)	0.73	0.71	0.69	0.67

Vitamin-mineral premix (animal care ^{R}) will supply the following additional nutrients per kg of feed. Vitamin (1,200,000 I.U), D_3 (300,000 I.U), E (3,000mg), k_3 (250mg), folic acid (10mg), Niacin (4,000mg), Calpan (1,000mg), B_2 (500mg), B_{12} (2mg), B_1 (9,200), B_6 (350mg), Biotin (8mg), Antioxidant (12,500mg), Minerals; Cobalt (25mg), Selenium (25mg), Iodine (120mg), Iron (4,000mg), Manganese (700mg), Copper (800mg), Zinc (6,000mg), Chlorine Chloride (20,000mg, BGO-Bambara groundnut offer, SBM-Soya bean meal, GNC-Groundnut cake.*

Natuzyme (R) is added at the rate of 0 (-) or 250mg (+)/kg of diet.

Data were collected on the initial body weight, final body weight, weight gain, feed intake, feed conversion ratio and digestibility Study was done**.** At end of 8 weeks of the finisher phase, two (2) birds were selected from each of the three (3) replicate, such that the weights was determine by the average weight of the whole replicate. The birds were transferred into metabolic cages and allowed an adjustment period of three days. The birds were fed with weighed amounts of feed daily for three days. Leftover feed was weighed to determine feed intake, faecal dropping was collected on daily basis, weighed and dried to a constant weight. The faecal sample collected from each replicate were thoroughly mixed to obtain a homogenous mixture, milled and subjected to proximate composition analysis.

Results and Discussions

The effect of feeding graded levels of enzyme treated and untreated BGO in diet of broiler chicken on coefficient of digestibility is as shown in table 2.

Table 2: Treatment effect on digestibility coefficient

	Treatment						
Parameter	T_1	T_2	T_3	T_4	T_5	T_6	T_7
DM	97.10±0.34^{a}	95.50±0.29^{b}	96.33±0.39^{ab}	95.51±0.34^{b}	95.82±0.25^{b}	95.95±0.33^{b}	95.85±0.09^{b}
CP	96.66±0.45^{a}	95.29±0.16^{b}	96.06±0.38^{ab}	95.90±0.36^{ab}	95.31±0.34^{b}	95.65±0.29^{ab}	95.35±0.0.3^{b}
EE	95.88±0.28^{a}	96.87±0.17^{a}	96.40±0.57^{a}	96.36±0.34^{a}	97.83±0.38^{a}	92.76±1.28^{b}	93.60±0.21^{b}
Ash	95.49±0.43^{a}	92.79±0.32^{b}	92.39±0.78^{b}	88.47±1.73^{b}	90.45±1.06^{bc}	91.27±0.83^{b}	92.40±0.36^{b}
CF	85.23±1.78^{b}	84.71±1.20^{b}	87.56±1.59^{b}	87.81±1.37^{b}	86.47±1.80^{b}	92.77±0.55^{a}	92.17±0.17^{a}

^{abc}…Means with different superscript along the same row are significantly ($p<0.05$) different

T_1-Control T_2-0BGO+250mg enzyme T_3-10%BGO+mg enzyme T_3-10%BGO + 250mg Enzyme

T_4-20%BGO + 0mg Enzyme T_5-20%BGO +250mg Enzyme T_6-30%BGO +0mg Enzyme T_7-30%BGO +250mg Enzyme DM-Dry matter CP-crude protein EE-Ether extract CF-crude fibre.

Dry Matter digestibility (DMD) was significantly ($p<0.05$) different across the treatment groups.This similar to result other rearchers(Ani and Omeje,2012; Ani 2007) Treatments 1 which is the control had the highest value (97.10 %) of DMD while the least value (95.50 %) was observed in treatment 2. The Crude protein (CP) was significantly ($p<0.05$) different among the various treatment groups. Control group had the best CP digestibility (96.66 %) while treatment 2 had the least CP digestibility value (95.29 %). Ether extract was also significantly ($p<0.05$) across the different groups. While treatment 5 had the highest EE digestibility value (97.83 %), the least value (92.76 %) was observed in treatment 6. Digestibility of ash in treatment 1 (Control) was 95.49 % which was higher ($p<0.05$) the value of 88.47 % observed in treatment 4. Crude fibre digestibility was higher ($p<0.05$) in treatment 6 (92.77 %) with treatment 2 having the least value (84.71 %). In digestibility coefficient generally, all the birds fed the various diet containing both treatment and untreated BGO recorded high in all the parameters measured. In apparent digestibility coefficient of Dry Matter (DM), crude protein, ash and crude fibre. The results suggest that the broilers were able to digest and derive nutrients from the diets with the same level of efficiency, except EE digestibility. However, the high Crude Fibre (CF) content of the diets had the least value (84.71%). this agree with Ani (2007), poultry cannot utilize high fibre diets fully because they lack the digestive framework that can elaborately digest large amount of fibre. The recommended levels could have been responsible for the observed apparent digestibility coefficient of nutrients in this study.

Conclusion and recommendation

The result of this study showed that raw Bambara groundnut can be incorporated in broiler chicken diet at 20% inclusion level, without any deleterious effect on the coefficient of digestibility and performance of the birds. The study also showed that raw bambara groundnut offal can be used to supplement soya bean meal and maize in broiler chicken diets as in other birds and rabbit diets. Further investigation should be done in determining the proper inclusion rate of BGO as a feed resource.

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