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Performance Characteristics of Finisher Broiler Chicks Fed Varying Levels of Exogenous Enzyme Supplemented Bambara Seed [*Vigna subterranean* (L) Verdc] Offal as Replacement for Maize

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Abstract: A 28-day feeding trial was conducted using 240 Anak 2000 strain of finisher broilers fed 0, 15, 30 and 45% levels of exogenous enzyme supplemented Bambara Seed Offal (esBSO) in a completely randomized design where esBSO replaced whole maize weight for weight. Each of four dietary treatments was further replicated four times. Routine vaccination and medication typical of broilers were strictly adhered to. The initial weight, final weight, weight gain, feed intake, feed conversion ratio, feed cost/kg and feed cost/weight gain were measured. Results show that birds on control (0%) and 15% esBSO with weight gains 1.73kg each, did not differ significantly ($p>0.05$) and were superior to those of levels 30 and 45% (1.55 and 1.43 kg respectively). Feed conversion ratio, feed cost/kg and feed cost/weight gain declined as the level of esBSO increased from 0-45%, with 0% having the best FCR.

Key words: Whole maize, finisher broiler, enzyme supplemented bambara seed offal (esBSO)

INTRODUCTION

Livestock is the major source of animal protein for man based on their limiting amino acids profile. Unfortunately, livestock-especially the monogastric type-compete with man for feed ingredients. Consequently, in the present biting global inflation, the livestock production industry appears most hit in terms of scarcity and high cost of feed (Madubuike, 1994).

Thus the monogastric livestock industry, has witnessed a rapid decline in production due to high cost of inputs especially the feed ingredient (Ogundipe, 1987; Ndiforn, 1988; Obioha, 1992). This situation has forced many poultry farmers either to reduce the scope of production or fold up. The need to search for alternative and cost effective ingredients for the monogastric livestock has become imperative if man and his livestock must be saved from starvation and possible extinction.

One of such unorthodox feed ingredient with high nutrient potential is the Bambara seed (*Vigna subterranean* (L) Verdc) offal. The Bambara nut (seed) is an under-utilized tropical legume that is indigenous to Africa. It grows in areas where the cultivation of other legumes such as groundnut is too risky due to poor soil conditions or the threat of drought. It yields as much as 3-5 tons/hectare under conditions (Bamford, 1984).

Oyenuga (1982) and Uwaegbule (1978) described Bambara nut as a legume crop which contains higher crude protein than many other legume grains and therefore recommended its incorporation in livestock feeds. Carbohydrates account for approximately 45% of the total dry seed weight and has a lipid content of 6-8% (Poulter, 1981).

Bambara seed offal is a sievate after extracting the flour for human use and it has no industrial use. The supplementation of enzyme and other probiotics are known to improve the digestibility and utilization of feed ingredients by livestock thereby increasing productivity, (Silva *et al*., 2000). The objective of this study is therefore to evaluate the potentials of enzyme supplemented bambara seed offal as a partial replacer for maize in finisher broiler diets, aimed at reducing cost of production while in turn making table birds affordable for consumers.

MATERIALS AND METHODS

Sitting of the experiment: This research work was conducted at the poultry production unit of the Imo State University Teaching and Research farm, Owerri, Nigeria, situated on longitude $7^{o}0^{11}$ 06^{11} E and $7^{o}03^{1}.00^{11}$ E and latitude $5^{o}28^{1}24^{o}$N cross chick and $5^{o}30^{1}.00^{11}$N.

Preparation experimental diets: Bambara seeds were procured from the local market and subjected to hammer milling and thereafter sieving to separate the flour from the offal. The offal was toasted for 10-15 min at 50-60°C after which it was allowed to cool ambient temperature. Toasting was carried out to destabilized and reduce toxic materials (anti-nutritional factors) present in the seed most of which are heat labile. (Onwudike and Egbuakam, 1994; Apata and Ologhogbo, 1997). However, the proximate composition and nutrient quality of the offal were expected to be affected by the processing method used when preparing the flour for use as human food (Amaefula and Osuagwu, 2005).

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Table 1: Proximate composition of bambara seed (*Vigna subterranean* (L) Verdc) offal

Nutrients	Composition (%)
Crude Protein (CP)	21.28%
Nitrogen Free Extract (NFE)	40.23%
Gross Energy or ME	29856 kcal/kg
Ether Extract (EE)	4.60%
Ash	14.77%
Crude Fibre (CF)	9.43%

The offal was subjected to proximate analysis at the research laboratory of the school of agriculture and agricultural technology, of the federal university of technology, Owerri, according to AOAC, 1984. Other named ingredients were procured from reputable local dealers (crushed where necessary) and mixed according to the formulae shown in Table 2. The enzyme Nutrizyn was used to supplement the BSO.

Procurement and preparation of experiment birds: A total of 260 day old *Anak* 2000 broiler chicks were procured from a local distributor, and brooded for 4 weeks on deep litter poultry building. At the end of the 4 weeks period, 240 birds were selected on the basis of apparent physical soundness and assigned to the dietary treatment having 0, 15, 30 and 45% esBSO, each of which was replicated 4 times in a completely randomized design. Sound management practices of sanitation, appropriate medication and vaccination were adopted.

Experiment design, data collection and analysis: The experiment design was Completely Randomized Design (CRD). Each of four treatments had 60 birds and each replicate had 15 birds. Parameters, measured were weight gain, feed intake, feed conversion ratio, feed cost/kg of weight gain.

The birds were weighed individually using a top loading (10 kg Salter weighing scale in the morning hours before the day's feeding (7.00 am to 8.00am) on weekly interval. Initial body weights of the birds were taken at the start of the experiment and this was used to calculate the weight gain as final weight minus the initial weight. Daily feed intake was also measured by subtracting the weight of leftover feed from the weight supplied.

Feed conversion ratio was calculated as follows:

$$\text{Feed conversion ratio} = \frac{\text{Feed intake}}{\text{Weight gain}}$$

Feed cost per kilogram was calculated by adding prevailing prices of the different ingredients per kilogram at the time of the experiment multiplied by their inclusion levels and divided by one hundred. The cost per kilogram of weight gain was calculated as FCR x cost/kg of feed. All the data were subjected to one way analysis of variance (Steel and Tories 1980), while differences in the treatment means were separated using the Duncan's Multiple Test as outlined by Onuh and Igwemma (1998).

RESULTS

Table 3 shows the effect of replacing whole maize with enzyme supplemented Bambara Seed Offal (esBSO) on the performance of finisher chicken.

Results of the experiment show that there were no significant differences ($p>0.05$) for final body weight gain (2.39 and 2.3 kg), total weight gain (1.73 and 1.73 kg) and average daily weight gain (61.79 and 61.79 g) for birds on control 0% esBSO and 15% esBSO) respectively, and these were superior to those of birds on 30 and 45% esBSO diets. Average daily feed intake differed significantly ($p<0.05$) between treatments and increased progressively from 150.67 g in 0% esBSO to 161.00 g in 45% esBSO diets. Birds on 0% esBSO diet produced the best feed conversion ratio (2.45) while 15, 30 and 45% esBSO diets followed with 2.55, 2.78 and 3.15 respectively. Both feed cost/kg of feed and feed cost/kg weight gain differed significantly ($p<0.05$) between treatments with both decreasing as the percentage inclusion rate of esBSO increased.

DISCUSSION

The initial live-weights of the birds did not differ significantly ($p>0.05$) this precaution was taken to avoid bias arising from wide differences in weight. Significant difference ($p<0.05$) were however observed for final live weights of 2.39, 2.19 and 2.08 kg for 0, 15, 30 and 45% levels of esBSO respectively, decreasing with increasing levels of esBSO. However 0% and 15% esBSO levels were similar ($p>0.05$). the declining trend in performance could be attributed to the decline in metabolizable energy level from 2829.83 kcal in 0% esBSO to 2572.54 kcal/kg in 45% esBSO below the (NRC, 1994) recommendation of 2900 kcal/kg, from 2829.8 kcal/kg in 0% esBSO to 2572.5 kcal/kg in 45% esBSO. This birds consumed more feed as the level of esBSO increased (150.67, 158.00, 59.67 and 161.00 g) for 0, 15, 30 and 45% levels which was exactly different of esBSO respectively which differed significantly ($p<0.05$). the birds must have consumed more feed to make up for the shortfall in energy (Uko *et al*., 2001).

Feed conversion ratio differed significantly ($p<0.05$) between treatments increasing as the inclusion level of esBSO increased from 0% in T1 to 45% in T4 with the control (0% esBSO) birds converting better (2.45) than the others, 2.55, 2.78 and 3.15 for 15, 30 and 45% esBSO respectively.

Feed cost/kg of feed declined, as the inclusion level of esBSO increased and differing significantly between treatments. This is expected due to the wide margin

Table 2: Composition of experiment diets (%)

	Diets			
Ingredients	T_1 (0% esBSO)	T_2 (15% esBSO)	T_3 (30% esBSO)	T_4 (45% esBSO)
Maize	45	30	15	0
BSO	0	15	30	45
Exogenous enzyme	-	0.015	0.015	0.015
Brewers spent grain	10	10	10	10
Soyabean meal	20	20	20	20
Palm kernel cake	8.3	8.29	8.29	8.29
Fish meal	5.0	5.0	5.0	5.0
Bone meal	6.0	6.0	6.0	6.0
Groundnut cake	5.0	5.0	5.0	5.0
Common salt	0.3	0.3	0.3	0.3
Vat/min premix (B/F)	0.25	0.25	0.25	0.25
L-lysine	0.09	0.09	0.09	0.09
DL-Methanione	0.06	0.06	0.06	0.06
Total	100	100	100	100
Calculated nutrient composition				
CP (%)	20.99	22.68	24.37	26.06
ME/kcal/kg	2829.83	2710.73	2591.63	2572.54
Crude fibre	5.23	6.37	7.48	8.89
Ether extract	4.18	4.27	2.35	4.45

Table 3: Performance characteristics of finisher broilers fed varying levels of exogenous enzyme supplement Bambara Seed Offal (esBSO) as replacement for maize (*Zea mays*)

	Diets				
Parameters	T_1 (0% esBSO)	T_2 (15% esBSO)	T_3 (30% esBSO)	T_4 (45% esBSO)	SEM
Initial body wt (kg)	0.66^a	0.69^a	0.64^a	0.65^a	0.000
Final body wt (kg)	2.30^a	2.38^a	2.19^b	2.08^c	0.051
Total wt gain (kg)	1.73^a	1.73^a	1.55^b	1.43^c	0.066
Av. Daily wt gain (g)	61.79^a	61.79^a	55.36^b	51.07^c	2.130
Avg. daily feed intake (g)	150.67^c	158.99^{bc}	159.67^b	161.00^a	1.750
Feed Conversion Ratio (FCR)	2.45^c	2.55^{bc}	2.78^b	3.15^a	0.180
Feed cost/kg of feed (N)	87.21^a	76.71^b	66.21^c	55.71^d	0.090
Feed cost/kg of meat (N)	213.66^a	195.61^b	184.06^c	175.49^d	1.780

Means within the same row with different superscripts are significantly different ($p<0.05$)

between the market prices of esBSO (N25.00/kg) and maize (N62/kg) as at the time of this experiment. Feed cost/kg weight gain followed the same trend with both the feed conversion ratio and feed cost/kg differing significantly ($p<0.05$) between treatments. This is understandable since feed cost/kg gain is equal to feed cost/kg x feed conversion ratio.

Conclusion: Results of the experiment indicate that esBSO can replace whole maize up to 45% with 15% as optimal. Replacing whole maize with esBSO reduced the cost of broiler production thereby making animal protein affordable for consumers.

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