

NUTRITIONAL POTENTIAL OF AFRICAN YAM BEAN MEAL AS SUBSTITUTE FOR SOYBEAN MEAL IN THE DIETS OF GROWING SNAILS (*ARCHACHATINA MARGINATA*)

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ABSTRACT

The study was conducted to determine the effect of replacing soyabean meal with different levels of African Yam Bean meal (AYB) in the diet of growing snails. A total of one hundred and twenty growing snails (*Archachatina marginata*) of mean weight 73.42 ± 2.5 g of about 3 months of age were used for the feeding trial. Four diets were formulated to contain African Yam beans (AYB) at 0% (AYB₁) Control, 50% (AYB₂), 75% (AYB₃) and 100% (AYB₄) as replacement for maize fraction in the diet of growing snails. Completely randomized design was used for the trial and each treatment was replicated thrice with 10 snails per replicate. The mean feed intake in 0% and 75% replacement of SBM with AYB were not significantly affected by the dietary treatments ($P > 0.05$). The mean weight gain in AYB₁, AYB₂ and AYB₃ were relatively the same ($P > 0.05$). The feed conversion ratio (FCR) was relatively the same in all the treatments. The mean shell width increment was relatively the same across the treatments ($P > 0.05$). The lowest cost/weight gain was recorded in the diet containing 75% AYB as replacement for soybean meal while the highest cost/weight gain was recorded in the diet containing 100%SBM. African Yam Bean meal could be harnessed as alternative feed resource for snail production. It could be recommended that 75% of AYB could be used to replace soybean meal fraction of the diet in order to reduce feed cost

Keywords: African yam bean meal, cost per weight gain, feed intake, soybean meal, weight gain,

INTRODUCTION

Snail meat contains low fat and low cholesterol level which makes the meat a good antidote for fat related diseases. The cost of production in terms of housing and feed is relatively low compared to other conventional livestock (Odeyinka, 2014). One of the major limitations to the efficient snail rearing is the availability of quality feed at affordable price (Omole, *et.al.*, 2016). Quality feed at affordable price has negative effects on livestock production in Nigeria and Africa in general. A lots of livestock farms have been closed down which has resulted in to high cost of livestock products such as meat, eggs and other products (Omole, *et.al.*, 2016). Conventional feed ingredients such as soyabean meal, groundnut cake meal and fish meal which are major sources of protein in diet of livestock are expensive (Omole, *et.al.*, 2016; Odeyinka, 2014). The cost of groundnut cake meal and soya bean meal as of the time of conducting this study were ₦135 and ₦160 respectively hence there is need to look for alternative source of protein which is available and affordable (Agbulu *et al.*, 2010). It has been established by authors that substituting conventional feed ingredients with unconventional ones has led to reduction of cost (Odeyinka, 2014). African yam beans is common in Nigeria but it is considered as underutilized legume (Adewale, *et al.*, 2013). There is paucity of information in the use of African yam bean meal in the diet of snails hence the study was conducted to determine the effect of replacing soyabean meal with different levels of African yam bean meal in the diet of growing snails.

MATERIALS AND METHOD

A total of one hundred and twenty growing snails (*Archachatina marginata*) of mean weight 73.42 ± 2.5 g of about 3 months of age were used for the feeding trial. Four diets were formulated to contain African Yam beans (AYB) at 0% (AYB₁) Control, 50% (AYB₂), 75% (AYB₃) and 100% (AYB₄) as replacement for Soybean fraction in the diet of growing snails. Completely randomized design was used for the trial and each treatment was replicated thrice with 10 snails per replicate. The diets were formulated to contain about 24% crude protein and energy of 2400 kcal/kgME. (Table 1). The snails

were reared in a cage of 12 compartments and each compartment had a dimension of 0.5x 0.5m². All management practices were adhered to. African Yam beans (AYB) was purchased from a market in Ibadan, Oyo state, Nigeria. It was toasted and ground before incorporated with other feedstuffs. Feed intake and weight gain were measured on daily and weekly basis with the use of sensitive weighing balance. Feed intake was calculated by subtracting the left-over feed from the feed given while the weight gain was calculated by deducting the initial weight from the final weight. Shell length and width were measured on weekly basis with vernier caliper. Micrometer screw gauge was used to measure the shell thickness on weekly basis. Feed conversion ratio was calculated as the ratio of feed intake to weight gain. Feed cost and cost per weight gain were also calculated. The feeding trial lasted for 12 weeks. The chemical composition of the experimental diets and the foot were done according to the method of A.O.A.C. (1990). All data were subjected to statistical analysis using analysis of variance and the means were separated if they were significantly different using Duncan Multiple Range Test (SAS,2000).

RESULTS AND DISCUSSION

The results of growth performance of the snails fed varying levels of AYB in the diet is shown in Table 2. The mean total feed intake was significantly influenced by the varying inclusion of AYB in the diet ($P < 0.05$). The highest feed intake was recorded in AYB₁. The mean feed intake in 0% and 75% replacement of SBM with AYB were not significantly affected by the dietary treatments ($P > 0.05$). The values ranged between 930.39g to 928.35g for the twelve weeks. The mean weight gain was significantly influenced by the varying inclusion of AYB as substitute for SBM in the diets of growing snails ($P < 0.05$). The mean weight gain in AYB₁, AYB₂ and AYB₃ were relatively the same ($P > 0.05$). The highest mean weight gain was ($p < 0.05$) was recorded in the control diet containing 0% AYB as replacement for soybean meal. The feed conversion ratio (FCR) which is the ratio of feed intake to weight gain was relatively the same in all the treatments as shown in Table 2. The relatively the same FCR reported in the study is an indication that AYB could be used to replace SBM in the diet of growing snails. The FCR reported in this study was in agreement with observation of several authors (Omole *et al.*, 2016; Hamzat and Longe *et al.*, 2014). The mean shell length increment was not significantly influenced by the dietary treatments ($P > 0.05$). The mean shell width increment was relatively the same across the treatments ($P > 0.05$). The shell thickness were not significantly influenced by the dietary treatments ($P > 0.05$) as shown in table 2. This observation also buttressed the fact that AYB could be used as replacement for SBM. Also there was no case of shell deformity in all the treatments. The low mortality recorded in all the treatments could be due to proper management practice such as cleaning of the environment, regular washing of feeding and water troughs, proper shading and others as recommended by different authors (Omole *et al.*, 2016; Hamzat and Longe *et al.*, 2014). The zero mortality reported could also be due to fact that the test ingredient used in this study was well processed and preserved and did not have any deleterious effect on the snails. (Agbulu *et al.*, 2010). The report of zero mortality was an indication that AYB could be used as feed resource for snail. The lowest cost/weight gain was recorded in the diet containing 75% AYB as replacement for soybean meal while the highest cost/weight gain was recorded in the diet containing 100%SBM. The reduction in feed cost was due to low cost of AYB compared to soybean meal.. The prevailing market price of AYB and soybean meal during the course of the experiment was ₦135/kg and ₦160/kg respectively. This buttressed the reports of authors that replacing the conventional feedstuffs with unconventional ones led to reduction in the cost feed and total cost of production (Hamzat and Longe *et al.*, 2014; Omole *et al.*, 2016). The lowest cost/weight gain reported in AYB₃ implies that AYB could replace soybean meal fraction of the diet of growing snails partially up to 75%.

CONCLUSION:

The lowest cost/weight gain was recorded in the diet containing 75% AYB as replacement for soybean meal while the highest cost/weight gain was recorded in the diet containing 100%SBM. African Yam Bean meal could be harnessed as alternative feed resource for snail production. It could be recommended that 75% of AYB could be used to replace soybean meal fraction of the diet in order to reduce feed cost.

Table 1: Gross Composition of Experimental Diet.

Ingredient (%)	Cost (₦ /kg)	AYB₁ (0%)	AYB₂ (50%)	AYB₃ (75%)	AYB₄ (100%)
Maize		22.0	22.0	22.0	22.0
Soybean meal		24	12.00	4	0.0
African yam beans		0.0	12.0	20.0	24.0
Fish meal		4.0	4.0	4.0	4.0
*Othersfeed ingredients		54.0	54.0	54.0	54.0
Total		100.0	100.0	100.0	100.0
Cost/kg (N)		110.23	108.78 ^a	104.45	103.12
Calculated Composition					
Crude protein (%)		24.22	24.21	24.13	24.08
Metabolizable energy (kcal/KgME)		2605.2	2599.3	2589.45	2572.12

*Others fixed ingredients: G.N.C. – 10.0; rice-bran -14.0; Bone meal -2.3; Brewer dry grain-9.45, Oyster shell – 9.70; Methionine - 0.1; Lysine - 0.1; Premix 0.25; Salt-0.1.

Table 2 Summary of Performance and Cost benefits of Snail fed diets containing African Yam bean meal (AYB).

Parameters	AYB₁ (0%)	AYB₂ (50%)	AYB₃ (75%)	AYB₄ (100%)	± SEM
Daily weight gain(g)	3.97 ^a	3.96 ^a	3.95 ^a	3.89 ^b	0.12
Total weight gain (g)	278.56 ^a	277.98 ^a	277.12 ^a	271.12 ^b	4.68
Total feed intake (g)	930.39	928.45	928.35	924.52	12.88
Daily feed intake (g)	10.34 ^a	10.32 ^a	10.32 ^a	10.27 ^a	0.21
Feed conversion ratio (g)	3.34	3.34	3.35	3.41	0.25
Shell length increment (mm)	14.23	13.58	13.57	13.59	0.35
Shell width increment (mm)	11.87	11.88	11.78	11.76	0.24
Shell thickness increment (mm)	0.15	0.15	0.14	0.14	0.03
Total feed cost (₦)	102.52 ^a	101.16 ^a	97.1 ^b	94.87 ^b	1.78
Cost/weight gain (₦ /kg)	366.07 ^a	361.26 ^a	346.78 ^c	351.37 ^b	5.89

Means along rows with different superscript are significantly different from each other ($P < 0.05$)

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