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The Growth Performance of Young *Archachatina marginata* Swaison (African Giant Snail) Fed with Mulberry (*Morus alba*) and Siam-weed (*Chromoleana odorata*) Leaf Meal Supplementary Diet

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Abstract: Two of the most costly sources of protein ingredients in livestock feed are soya and fishmeals. These ingredients are now becoming scarce due to their multiple uses, hence the needs for sourcing for substitutes. A six weeks Completely Randomised Design experiment was conducted at the FRIN Snailery unit, Ibadan to evaluate the growth perfomance of *Archachatina marginata* Swaison on mulberry and chromoleana leafmeals. Thirty (30) young snails of 3-5 weeks old were fed with mulberry and siam-weed leafmeals in addition to the unripe pawpaw fruit. Concentrate feed containing soya and fish meals serves as the control. Average feed intakes, body weight gain, shell length and circumference of snails were the parameters assessed. The results showed that highest feed intake and feed conversion ratio were obtained in chromoleana leafmeal treatment but snails fed with mulberry leafmeal performed best in terms of average body weight gain, shell length and circumference of snails. This indicated that leaves of some tropical plants especially especially mulberry and siam-weed could be used as a good substitutes in snail supplementary ration and help to reduce the cost of production in snail farming.

Key words: Soya, fishmeals, mulberry, siam-weed, chromoleana leafmeals

INTRODUCTION

Archachatina marginata Swaison (African Giant Snail) is one of the important minor forest products. The meat has a high protein content of about 83-93% (Imevbore and Ademosun, 1988), making it compare favourably with conventional protein sources. In order to avoid the remaining wild populations from getting into extinction, serious attempts must be made at encouraging captive rearing. Slow growth which is one of the major problems in snail farming could be addressed through improved nutrition. Soya bean and fish meals, the major supplier of protein in the supplementary ration of snails which are increasingly becoming scarce and costly due to their multiple uses (Akanji, 2002), could equally be substituted with leaves of some tropical plants of nutritional qualities similar to what could be obtained from these ingredients. *Morus alba* (Mulberry plant) and *Chromoleana odorata* (Siam weed) are two promising tropical plants with protein content of about 18.6% (Shayo, 1997) and 18.7% (Fasuyi *et al*., 2005) respectively. The major constraint to the use of leaf meal in feeding animals is the presence of anti-nutritional factors in some plants (Checke and Myer, 1975) and this probably could be avoided by adopting proper harvesting and sun-drying procedures (Fasuyi *et al*., 2005). This study aimed at evaluating the effects of substituting soya and fishmeals with mulberry and chromoleana leaves in the supplementary ration of young *Archachatina marginata* (African Giant Snail).

MATERIALS AND METHODS

The study was carried out at the snailery unit of the Forestry Research Institute of Nigeria (FRIN), Ibadan between May and June, 2009. Thirty (30) baby snails of about 3-6 weeks old, with weights ranging between 5-16 g were used for the experiment. The snails were sorted into six groups and then allotted to three experimental diets in a completely randomly design (Table 1). The experiment was carried out in a 6-chambered wooden box (30 cm x 25 cm) with four legs. Unripe pawpaw fruit was also served as a natural feedstuff in addition to supplementary feed every other day. Water from untreated bore hole was also served to the snails. Leaves of mulberry and siam weed were sun-drying for about 5 days, squee-zed, sieved into powdery form and then mixed with the concentrated feed without soya and fish meals. Concentrated feed with soya and fish meals ser-ved as a control, Average dry matter intake of the two feed types (Unripe pawpaw and concentrate feed) given were being taken every other day. Average weight gain, length and circumference of the snail shell were also being assessed fortnightly with a sensitive weighing scale and caliper graduated in centimetres. Mean values of all the data obtained were analysed using a one way Analysis of Variance (ANOVA). Least Significant Test was also used to determine the level of significant among the means according to Steel and Torrie (1980). Amino-acids in significant and low concentrations in the leaves of mulberry plant-Alanine, Arginine, acid, Cistein,

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Glutamic acid, Glycine, Histidine, Isoleucine, Leucine, Phenyl-alamine, Proline, Serine, Threonine, Tryptophan, Tyrosine, Valine, Amino-benzoic acid, Choline, Glutathione, 5Hydroxylpipecolic acid, Pipecolic acid and Sarcosine Adenylic acid, Cytidylic acid, Guanylic acid, Hydroxanthine, Trigoneline and Uridylic acid (Benavides, 1991).

Table 1: Gross composition of experimental diets

	Experimental diets		
Ingredients	Diet 1	Diet 2	Diet 3
Maize	1.37	1.37	1.37
Wheat bran	0.62	0.62	0.62
Fish meal	0.25	-	-
Soya meal (65%)	0.92	-	-
Groundnut cake	0.37	0.37	0.37
Bone meal	0.01	0.01	0.01
Limestone	0.25	0.25	0.25
Palm kernel cake	0.25	0.25	0.25
Mulberry leaves	-	1.17	-
Chromoleana leaves	-	-	1.17
Calculated crude protein (%)	18.50	16.40	25.01
Nutrients composition (%)			
Crude protein content	18.5	16.4	25.0
Crude fibre content	6.4	6.4	5.0
Either extract	3.1	3.1	4.4
Ash	2.3	2.3	4.7
Calcium	0.07	0.07	0.31
Phosphorus	0.42	0.42	0.66
Lysine	2.21	0.41	1.30
Methionine	0.57	0.17	0.48

Table 2: Overall performance characteristics of the snails fed with the three experimental diets

Parameters assessed	Diet 1	Diet 2	Diet 3
Av. qty of unripe pawpaw fruit (g)	210	210	210
Av. dry matter intake (g)	95.1[a]	107.8	103.0[a]
Av. Feed conversion ratio	0.04[a]	0.06[a]	0.03[a]
Av. qty. of concentrate feed served	48.3	48.3	48.3
Av dry matter intake (g) (conc.)	45.6	44.7	45.5
Av. Feed conversion ratio	0.09[a]	0.15[a]	0.08[a]
Av. Initial body weight of snails (g)	8.57	12.83	10.50
Final body weight of snails (g)	12.55	15.25	14.25
Av. body weight gain (g)	4.0[a]	2.42[a]	3.75[a]
Av. Initial length of shell (cm)	4.21	4.82	4.52
Final length of shell (cm)	4.56	4.82	4.52
Av. length increase (cm)	0.35[a]	0	0.31[a]
Av. Initial circumference of shell (cm)	7.17	8.58	7.97
Final circumference of shell (cm)	7.86	8.48	8.12
Av. circumference increase (cm)	0.69[a]	0	0.15[a]

All values with the same superscripts within the rows are not significantly different (p>0.05)

RESULTS AND DISCUSSION

Gross composition and nutrient analysis of the experimental diets used were presented in Table 1. Percentage crude protein content of the experimental diets ranges from 25.01% (highest) to 16.4% (lowest) values in the control and chromoleana leafmeal treatments respectively. There were no significant differences in the average values obtained in all the parameters assessed, the highest feed intake and Feed Conversion Ratio (FCR) were obtained in chromoleana leafmeal treatment while mulberry leafmeal treatment was best in terms of body weight gain, shell length and circumference of snails. This tallies with the observations of Omar *et al.* (1999) that mulberry has excellent nutritional value and *in-vitro* Organic Matter Digestibility (IVOMD) of above 80%.

Conclusion: Since the two leafmeals used in the experiment performed better than the control ration with soya and fish meals. It can therefore be concluded that mulberry and siam-weed are very rich nutritionally to act as a good substitutes for replacing soya and fishmeals in the diet of young snails. Mulberry could be established easily and siam-weed are common weed that can be found in our agricultural ecosystems.

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