THE USE OF LEAF MEALS AS GROWTH PROMOTER IN SNAIL PRODUCTION

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ABSTRACT
The study was conducted to assess the weight gain, feed efficiency and cost implication of snails fed diets containing growth promoters of a mixture of Neem leaf, Bitter leaf and Moringa leaf meal (NBM). The treatment groups were NBM1, NBM2, NBM3 and NBM4 which contained 0, 1, 2 and 3% inclusion of (NBM), respectively. The leaves were air-dried before incorporation with feed ingredients. The management practices were all the same in all the treatments. A completely randomized design was used for the trial and each treatment was replicated four times with 10 snails per replicate. Data were collected on growth performance and cost implications. Significant differences existed in the mean total feed intake of the snails fed a diet containing NBM. The highest Feed intake of 971.2 g was recorded in a diet containing 3% NBM which was not significantly (P>0.05) different from 969.1 g reported in a diet containing 2% NBM. The highest mean total weight of 286.49 g was recorded in NBM4 while the lowest total weight gain of 266.72 g was reported in the diet containing 0% NBM (P<0.05). The mean shell width also was not significantly influenced by dietary treatments and values ranged from 11.48 to 11.51. The cost per weight gain was lowest in snails (NBM4) (₦1,355.38) fed with 3% NBM inclusion and higher in those on 0% NBM1 (₦1,452.57). In conclusion, a 3% NBM enhanced the growth of snails and could be used as a growth promoter in the diet of snails.
Keywords: Feed intake, Growth, Growth promoter, Leaf meals, Snails

INTRODUCTION

The increasing demand for food from the growing world population has highlighted the importance of maximizing the efficiency of animal production (Omole *et al*., 2013; Omole, 2018; Popoola, *et al*., 2020). The use of growth promoters in feed as an approach to enhance the efficiency of nutrient utilization plays a significant role in livestock production. Growth promoters are compounds given to animals to improve growth rate and feed efficiency (Kerr and Shurson, 2013; Robles-Jimenez et *al*., 2021). Natural and synthetic growth promoters are good in improving livestock growth and carcass quality. However, the use of synthetic growth promoters has been banned in some countries because of the negative impacts on human and animal health (Gonzalez *et al*., 2017; Robles-Jimenez *et al*., 2021). There are several plant-based growth enhancers that could improve the growth performance of livestock. A few of them include *Moringa oleifera*, Neem and bitter leaves. Many studies on Moringa leaf as a growth promoter in broilers have been documented. A snail is an animal characterized by a slow growth rate. The addition of plants with potential growth-promoting effects could improve the growth of snails. Therefore, this study was conducted to determine the weight gain, feed conversion rate and carcass quality of snails fed diets containing mixtures of Neem leaf, Bitter leaf and Moringa leaf (NBM) meals.

MATERIALS AND METHODS

Experimental location, snail management and evaluation of growth performance

The experiment was carried out at the Snailery Unit of the Institute of Agricultural Research and Training (IAR&T), Moor Plantation (Longitude 03°51E, Latitude 07°23N and Altitude 650) in the humid zone of Southwestern Nigeria, with a mean annual rainfall of 1220 mm and mean temperature of 26ºC. The snails were reared in a cage of 12 compartments and each compartment had a dimension of 0.5x 0.5m2. The leaves were harvested within the Institute and air dried before incorporation with other feed ingredients to compound diets as depicted in Table 1. The dietary treatment groups were NBM1, NBM2, NBM3 and NBM4 and contained 0, 1, 2 and 3% inclusion levels of (NBM), respectively. All management practices were adhered to. Feed intake and weight gain were measured daily and weekly using a sensitive weighing scale. Feed intake was calculated by subtracting the left-over feed from the feed offered. The weight gain was calculated by deducting the initial weight from the final weight. Shell length and width were measured with a Vernier caliper while shell thickness was measured using a Micrometer screw gauge. Measurement of shell length, width and thickness was done weekly. The feed conversion ratio was calculated as the ratio of feed intake to weight gain. The market price of ingredients was used to estimate the feed cost and cost per weight gain.

Experimental design and statistical analysis

A completely randomized design was used for the experimental design. The treatment groups were replicated four times with 10 snails per replicate. All data were subjected to statistical analysis using analysis of variance (ANOVA) and the means were separated using Duncan Multiple Range Test (SAS, 2000).

Table 2: Gross composition of experimental diets

	Percentage inclusion of NBM leaf meal				
Ingredient (%)	Cost (₦/kg)	NBM_1 (0%)	NBM_2 (1%)	NBM_3 (2%)	NBM_4 (3%)
Maize	800	44.0	44.0	44.0	44.0
NBM	150	0.0	1.0	2.0	3.0
GNC	856	26	26	26	26
Fish meal	1.225	2.5	2.5	2.5	2.5
Brewer Dry Grains	356.89	15.5	14.5	13.5	12.5
*Other fixed ingredients	234.6	27.5	27.5	27.5	27.5
Total		100.0	100.0	100.0	100.0
Cost/kg (N)		410.34	410.21	410.01	399.23
Calculated Composition					
Crude protein (%)		24.22	24.21	24.13	24.08
ME (kcal/Kg)		2605.2	2599.3	2589.45	2572.12

ME = Metabolizable energy; GNC= Groundnut cake NBM= Neem, Bitter and Moringa.

*Others fixed ingredients: Bone meal= 2.3; Oyster shell= 9.70.

RESULTS AND DISCUSSION

The gross composition of the experimental diets is shown in Table 1. The Protein content and energy level of the control diet (NBM1) were in accordance with the recommended levels suggested by Omole (2018). There was a significant ($P<0.05$) difference in the mean total feed intake of the snails fed diet containing *NBM*. The highest feed intake of 971.2g was recorded in the snails' diet fed diet containing 3% NBM though not significantly ($P>0.05$) different from 969.1g observed in snails fed diet containing 2% NBM. However, feed intake was lower (944.9g) in snails fed a diet containing 0% NBM. The mean total weight gain of 286.49g was highest in NBM4 and lowest (266.72g) in a snails fed diet containing 0% NBM. The feed conversion ratio was better in snails offered 3% N. There was no significant difference in the mean shell length, width and thickness across treatments. The mean shell width ranged from 11.48 to 11.51mm. The significant improvement in feed intake, weight gain and feed conversion ratio in snails fed diets with *NBM* inclusion at 2-3% revealed the growth-promoting potential of neem, bitter and Moringa leaves in the diet of grower snails. Neem, bitter and Moringa leaves are reportedly rich in protein, iron and vitamins (Kerr and Shurson, 2013; Robles-Jimenez *et al*., 2021) which possibly contributed to improved growth in the snails. Reduced cost per weight gain and lower feed conversion ratio in snails fed diet of NBM at up to inclusion, further buttress the growth-promoting potential of the leaf mixtures in the diet of a snail at reduced cost.

Table 2: Performance of Snail fed diets containing mixtures of Neem, bitter and Moringa Leaf Meal

Parameters	NBM_1 (0%)	NBM_2 (1%)	NBM_3 (2%)	NBM_4 (3%)	**± SEM**
Initial weight (g)	83.14	83.09	83.59	83.45	1.96
Final weight (g)	349.86^{c}	352.74^{b}	368.62^{a}	369.94^{a}	13.90
Total weight gain (g)	266.72^{c}	269.65^{b}	285.03^{a}	286.49^{a}	17.12
Total feed intake (g)	944.19^{a}	951.87^{a}	969.10^{a}	971.2^{b}	12.88
Feed conversion ratio (g)	3.54^{b}	3.53^{b}	3.40^{b}	3.39^{a}	0.24
Shell length increment (mm)	13.34	13.37	13.38	13.42	0.32
Shell width increment (mm)	11.48	11.48	11.50	11.51	0.24
Shell thickness increment (mm)	0.17	0.17	0.18	0.18	0.03
Cost/kg feed (₦)	410.34	410.21	410.01	399.23	
Total feed cost (₦/Kg)	387.43	390.47	396.46	387.73	
Cost/weight gain (₦/Kg)	1452.57^{a}	1448.06^{a}	1391.08^{b}	1355.38^{c}	

^{abc}= Means along the same rows with different superscripts are significantly different ($P<0.05$)

CONCLUSION

It can be concluded that Neem leaf, bitter leaf and Moringa leaves can be used as growth promoters at up to 3% of the entire diet.

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