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Short Communication

Preliminary investigation of growth performance of giant land snail *(Archachatina marginata)* fed with selected household wastes

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The effect of selected household waste fed to common giant land snail *(Archachatina marginata)* on growth performance was investigated in a twenty week experiment. Four experimental diets A (Paw paw leaves), B (maize bran) C (guinea corn bran) and D (Plantain peels) were used for the study. Proximate analysis of the diets showed that diets B (maize bran) and C (Guinea corn bran) were high in protein and mineral contents while diets A had the least value Growth parameters (weight gain, shell length gain shell circumference gain) were determined. The result of the study showed that higher growth performance for all parameters for *Archachatina marginata* was favoured by guinea corn bran (diet C) while paw-paw leaves (diet A) had the least for all the parameters. There was significant difference in ($P < 0.05$) in weight gain and shell length, while there was no significant difference ($P>0.05$) in shell circumference of the snails fed with the experimental diets.

Key words: Giant land snail, growth performance, diets.

INTRODUCTION

Most of the developing countries of the world, especially Africa is currently been plagued with the alarming drop in per capital income and food production, particularly in the last few decade(s). The food deficient situation is indeed more serious with protein deficiency when compared to the availability of calories. The alarming increase in population implies that many people require the supply of protein in their diet because of its important role in human well being which include growth, maintenance of hormonal and enzymatic activities and improvement of the defense mechanism of the body (Ademolu et al., 2004).

Most of the conventional animal protein sources like beef, goat, pork, and mutton have become too expensive for an average citizen. This major sources are being decreased by persistent drought, diseases, high cost of feed, primitive animal husbandry techniques and low productivity of local animal breeds. In order to provide a cheaper source of animal protein for consumption there is need for intensive system of rearing snails instead of gathering snails from the bushes. It has been observed that snails collected from the wild cannot meet man's demand as a source of animal protein. Hence there is need to rear them on household and commercial basis.

Omole et al. (2000) reported that different breeds of snails are found in Nigeria and they are characterized by their best efficiency of nutrient transformation into quality protein.

Snail meat is a high quality food that is rich in protein, low in fats and a source of iron (Orisawuyi, 1989) calcium, magnesium and zinc (Ademosun et al., 2004). Imevbore and Ademosun (1988) assessed the nutritive value of Snail meat and discovered that it has a protein content of 88.37%. This value compared favourably with conventional animal protein sources whose value ranges from 82.42% (pork) to 92.75% (beef). Investigation by Akinnusi (1998) revealed that snail meat contains 70% of water while its dry matter is high in essential amino acids such as lysine, leucine, arginine, trytophan and also 30% minerals. Snail is also a source of calcium ortho phosphate, which is a chemical substance for curing kidney disease (Imevbore and Ademosun 1988).

The main problem facing farmers in rearing snails is non availability of food that will meet the nutrient requirement of snails at cheaper cost.

Therefore this present study aims at investigating the effect of some readily available household wastes feed on growth performance of giant land snail (*Archachatina marginata*).

Table 1. Proximate composition of the experimental diet (%).

Parameter	Diet A	Diet B	Diet C	Diet D
Moisture	7.48	8.70	13.58	9.94
Crude Protein	7.0	14.0	12.0	9.0
Crude fat	29.2	27.2	28.0	26.6
Calcium	0.10	0.42	0.38	0.21
Iron	0.20	0.68	0.50	0.41
Zinc	0.32	0.54	0.29	0.27

Table 2. Mean weight of snails fed with selected household waste on group basis.

	A	B	C	D
Initial means weight (g)	86.3 ± 3.36	88.61 ± 9.47	64.40 ± 10.55	85.28 ± 8.92
Final mean weight (g)	89.81 ± 4.51	92.61 ± 9.82	80.71 ± 8.99	86.87 ± 9.72
*Mean weight gain (g)	3.31 ± 0.48^{a}	4.00 ± 0.88^{a}	16.31 ± 3.50^{a}	1.62 ± 4.8^{b}

*Means in the same row with the same superscript are not significantly different.

MATERIALS AND METHODS

The study was carried out at the snailery unit of the Department of Agricultural Technology, the Polytechnic Ibadan, Saki Campus, Oyo State, Nigeria. The dimension of the animal house was 2.5 x 1.5 x 1.5m provided with wire mesh to enhance proper ventilation.

Sixty snails with average weight of 81.50 g ± 12.06 were purchased locally in Saki, Oyo State Nigeria and allotted randomly to four diets treatment of 15 snails per treatment. Each treatment was further sub-divided into 3 replicates of 5 snails each. Paw paw leaves (diet A) were obtained from the paw paw plantation and of the Polytechnic Ibadan, Saki Campus. Diet B (guinea corn bran) and Diet C (Maize bran) were obtained from guinea corn and maize grain purchased locally from Sango Market, Saki, Oyo State, Nigeria. The guinea corn and maize grains were soaked in cold water for two days, milled and filtered. The waste were collected and dried and fed to the snails. Plantain peels Diet D were obtained from the plantain plantation situated at The Polytechnic Ibadan, Saki Campus. Diet and water were supplied to the snails daily in plastic trays inside their respective cages for twenty weeks. Analysis for moisture, crude protein, crude fat and final content of the experimental diets were done by the method adopted by Association of official Analytical Chemist (A.O.A.C.), 1990.

Data were collected on the growth performance of the snails weekly represented by the following parameters; body weight (g), shell length (cm) and shell circumference (cm) and analysis statistically using student t-test.

RESULTS AND DISCUSSION

The result of the proximate and mineral analysis of the experimental diets showed that diet B has the highest crude protein, moisture content and mineral content followed by diet C, D and diet A respectively. Observation of the feed intake and response of the snails to the experimental diets showed that diet C was the most preferred of all the diets (Table 1).

The result of the growth performance in the present study showed an increase in weight gain by the experimental snail. Statistical analysis showed significant difference $P < 0.05$ in weight gain by the snails fed with the experimental diet D. The highest weight gain was recorded for snails fed with diet C followed by snails fed with diet B. Also the snails fed Diet A and diet D gained 3.31 and 1.62g, respectively. However, there was no significant difference in weight gain as a result of Diet A, B and C (Table 2).

There was a gain in shell length by the experimental snails. Snails fed with diet C had the highest shell length gain of 1.99cm followed by snails fed with diet B which gained 1.91cm while snails fed diet A and D recorded shell length gain of 1.37 and 1.62 respectively. There was no significant difference in shell length gain in snail fed diet B and C. Also there is no statistical difference in mean length gain of snails fed diets A and D. However there was significance difference in the shell length gain between snails fed diets A , D, and B,C; $P < 0.05$, Table 3

Statistical analysis of Table 4 showed that there was no significant difference in shell circumference of snail fed on diet A, B, C and D. ($P \leq 0.05$).

The observed highest mean weight, shell length and shell circumference gains recorded in snail fed on diet C might likely be due to high crude protein and mineral content present in the diet (Table 1) and the ability of the snail to utilize the nutrient in body and shell building. It might also be due to high feed intake of the snail on diet C.

The low mean weight, shell length and shell circumference obtain in snails fed with diets A and D might be due to nutrient imbalance as a result of probably due to the taste of the diet

The observed poor performance in the snails fed with diet B might be attributed to low level of protein and minerals as well as high moisture and fat content. This is minerals as well as high moisture and fat content. This is

Table 3. Shell length of snail fed with household diets.

	A	B	C	D
Initial means shell length (cm)	11.04 ± 1.99	9.54 ± 0.63	9.24 ± 0.47	138.18 ± 10.05
Final mean shell length (cm)	12.41 ± 0.77	11.55 ± 0.59	11.23 ± 0.40	139.80 ± 14.68
*Mean shell length gain (cm)	1.37 ± 1.83[a]	1.91 ± 6.50[b]	1.99 ± 9.50[b]	1.62 ± 0.61[a]

*Means in the same row with the same superscripts are not significantly different.

Table 4. Shell circumferences of snail fed with household diets.

	A	B	C	D
Initial shell circumference (cm)	50.20 ± 1.28	47.65 ± 5.41	43.30 ± 3.11	51.87 ± 2.28
Final shell circumference (cm)	50.49 ± 1.00	47.78 ± 2.65	44.69 ± 2.22	52.08 ± 1.70
*Shell Circumference gain (g)	0.29 ± 0.04[a]	0.13 ± 0.06[a]	1.39 ± 0.09[a]	0.21 ± 0.02[a]

*Means in the same row with the same superscripts are not significantly different.

in conformity with the report of Roger (1996) that high moisture and fat content of diets result in animal's poor growth performance.

The high moisture content may favour the growth of microorganism that produces enzyme that may cause the hydrolysis of fats into fatty acids and subsequent peroxidation leading to rancidity. The microorganism may also cause the hydrolysis of protein in the diet, thereby reducing its nutritive value.

Conclusion and Recommendation

The findings of the study showed that higher growth performance was favoured by diet C. (guinea corn bran). Therefore; the use of guinea corn and maize bran, based on nutritive value, in the formulation of feed for snails will positively affect their growth performance.

The use of these materials by snails rearers will provide an effective way(s) of managing waste and achieving profitability as their use as animal feed is relatively economical and dense in nutrients.

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