



## The replacement value of plantain peels for maize in snail *Achachatina marginata* diets

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### ARTICLE INFO

#### Article history:

Received: 1 June 2014;

Received in revised form:

22 November 2014;

Accepted: 6 December 2014;

#### Keywords

Diets,  
Plantain peels, Feed intake,  
Feed efficiency.

### ABSTRACT

The study investigated the replacement value of plantain peel meal for maize on feed intake, live weight gain and feed efficiency of a snail species (*Achachatina marginata*). Four diets were formulated as follows: diet 1, 30.7% maize without plantain peel; diet 2, 20.7% maize and 10% plantain peel; diet 3, 10.7% maize and 20% plantain and diet 4 ; 30.7% plantain peel without maize. 48 medium size snails were randomly divided into four groups and each group was fed with one of the experimental diets for 3 months. The snails were examined for performance using live weight gain, feed intake and feed efficiency. The statistical analysis showed no significant difference among the treatments (experimental diets) but the result revealed that snails fed with diet 1 had the highest performance in live weight gain (5.67) and feed efficiency (0.56) while diet 4 had the least in live weight gain (4.03) and efficiency (0.41) but the greatest in feed intake (10.83). However, plantain peel is a feed ingredient that has no side effect on the snails although poorly consumed. Its inclusion in the diet should not exceed 10% based on the result of the study.

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### Introduction

*Achachatina marginata* is one of the several giant African Snail which grows up to 326mm long (1 feet). It originated from the South of sahara in East Africa (Akinnusi, 1998).

Snail production yields reasonable and medicinal benefit to mankind through the provision of highly valued animal protein and very nutritious meat (Amusan et.al.,1999). It was reported by Ajayi et. al.,(1978) that out of the 5.8kg of protein reported to be available to an average person in Nigeria, only 8.8g come from animal source. It could feed on varieties of feed mostly in the night and at dusk or during the day when it rains. Hodaisi, (1979), Akinnusi, (1998), Imerbore (1990) and Awesu (1980) confirmed that the feeds varieties for snails comprise breadfruit, pineapple, coconut, sweet potato tuber, and cocoyam tuber. These feeds are mostly of plant origin which cannot supply all the nutrients needed for optimum performance. They are seasonal, perishable and relatively scarce. Moreover, they are edible to human, if they are used in formulation of feeds in feeding snails there is every tendency that competition will set in between man and snails in terms of consumption. Plantain peels, a waste from plantain is observed to have some nutritional values as it contains about 12% crude protein, 16% crude fibre and 1300kcal/kg energy on dry matter basis (Aduku, 1993, Ajayi et al., 2004). This waste is known to constitute a menace to the society thereby adding to the worse problem of environmental pollution particularly in places where ruminants (sheep and goat) are not allowed to roam about. Omole et al., (2008) reported no significant difference in the weight gain of weaned rabbit fed 15% plantain peels in place of maize. Further study by Tewe (1983) revealed that fresh plantain peels are good sources of energy for broilers. Although information is available on the utilization of plantain peels by ruminants. Hence, there is a need to replace maize with another household waste like plantain peels in order to reduce pressure and competition between man and animal on maize. Therefore, this study is

intends to develop a snail mash or ration that is balanced in nutrient and as well lesser in cost.

### Materials and Methods

Four different diets representing the treatment were compounded with this following crude protein and energy values. Diets I (15.98% cp), 2.633.89kcal): diet 2(15.72%cp) (1.495.75kcal): diets 3(14.72%cp): (1,952.4kcal) and diet 4(13.0%cp) (1,495.75kcal). The ingredients and the proportion of each of the feed were formulated and analyzed at CAPS FEED MILL, OLUYOLE ESTATE, IBADAN, OYO STATE. Each of the diet was given to nine snails which constituted 3 replicates. The proximate analysis showing the proportion, quantity of the ingredients and the subsequent critical result are shown in table 1 below:

Chemical composition of Plantain peel meal(g/100g)

Crude protein: 15.94

Crude fibre: 31.88

Methabolised energy: 47.82

Source: Ogunsipe and Agbede 2010

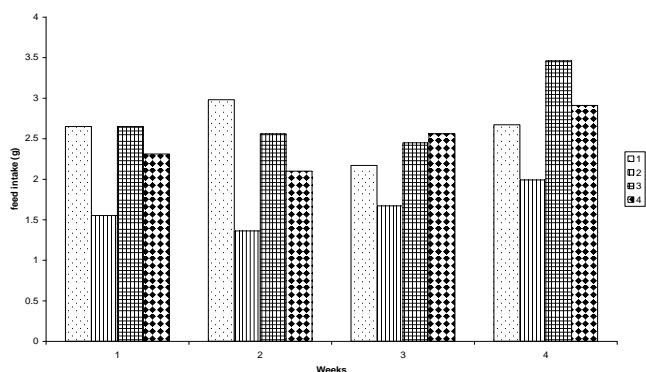
A wooden cage was constructed for the experimental animal and their housing. This wooden cage was raised on four legs. The topmost layer of the cage was covered with wire mesh upon which old banana leaves were arranged. The floor of the cage was fill with top soil reaching a depth of 0.1m and the bottom layer of the cage was perforated to allow water drainage. The snails were fed daily between the hours of 6-7 pm because of their nocturnal nature, they were watered frequently. The feeds which were in powdered form were weighed and moistened with water to feed the snails. Each of the diet was given to nine snails which constituted 3 replicates. The experiment was subjected to statistical analysis (ANOVA) using completely randomized design. The performance of the snail were determined using live weight gain, feed intake and feed efficiency. All the parameters assessed were subjected to analysis of variance

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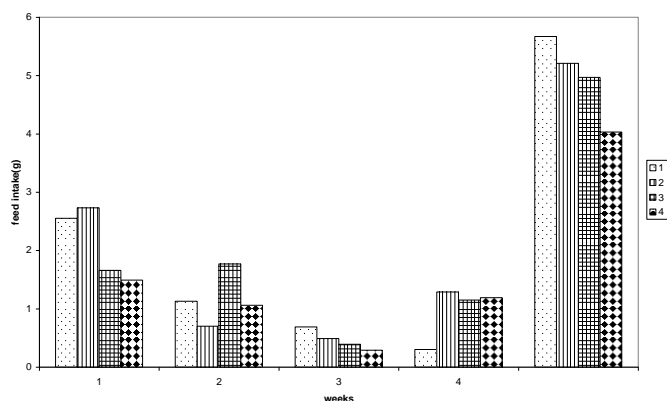
## Result And Discussion

Fig 2: average feed intake per snail



The table above shows that the highest feed intake was obtained with diet 4 and the least with diet 1. The higher feed intake of snails on treatment 4 could be attributed to low protein (13.01) and energy (1,496kcal) value of the feed. This agrees with (Scot et al.1969) which stated that the higher consumption of lowly protein diets is good in order to maintain body needs.

Fig1:The total feed intake per snail for four weeks

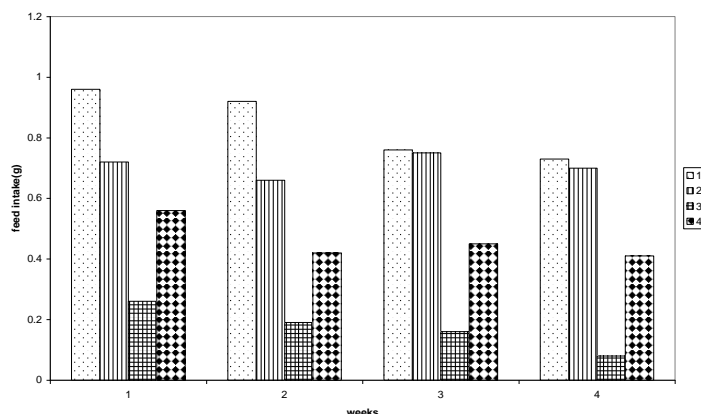


There were no significant differences in average daily live weight gain among the four treatment for four weeks of experimental duration.

The average live weight per snail before the test, were 148.9g 156.9g and 157.7g for treatment 1,2,3 and 4 respectively. The average daily live weight gain of the snails on treatment 1 was greater than those of 2, 3 and 4 as showed in table 3; the average body weight gain was a reflection of differences in crude protein content, energy values and essential amino acids in the respective treatments. Despite the fact that more of diet 4 was consumed less live weight gain was achieved by the snails that fed on it. The result agrees with the fact that positive linear

correlation exists between weight gain and crude protein level of feeds (Baker and Han,1994)

Fig3:Average Daily efficiency per snail in four weeks



There were no significant differences among the treatments means for average feed efficiencies throughout the few weeks of the experimentation. The average feed efficiencies is shown in table 4. There was a decrease in the daily feed efficiency per snail, treatment 1 to 3 has the greatest while diet 4 showed the least. This trend of feed efficiency expressed the effect of variances in crude protein content of the feeds (scot, et al. 1969). The result established the fact that more feed was converted to flesh hence increase in efficiency and body live weight.

## Conclusion

The results shown in table 1 to 4 were obtained during this experiment which was designed to investigate the extent to which replacement of maize grain with plantain peel would affect the growth characteristics of snail (*Achachatina marginata*). Results showed that all the diets had influence on the feed intake, live weight gain and feed efficiency of the snail. However, treatment 4 with 30.7% plantain peel recorded least values in terms of all the characteristics examined. This was a result of low crude protein, low energy value as well as the physical quality of the feed.

There was no significant difference in the feed intake, live weight gains and feed efficiencies. this result goes in conformity with the work of (Ayodele and Ashimalowo,1999) which showed no significant difference in feed intake, live weight and feed efficiency, this is because snails are very low eaters of plantain peels.

This experiment had established the fact that plantain peel has effect on snails. The inclusion of it in any diet compounded for snails should be at minimal level not exceeding 10% of the entire feed content

Table 1. Proximate Analysis of the Diets

Component	DIET 1(%)	DIET 2(%)	DIET 3(%)	DIET 4(%)
Maize	30.7	20.7	10.7	-
Rice Bran(RB)	21.7	21.7	21.7	21.7
Plantain peel(Pp)	-	10.0	20.0	30.7
Wheat Bran	10.3	10.3	10.03	10.3
(PKC)Palm Kernel Cake	23.4	23.4	23.4	23.4
Fish Meal	1.6	1.6	1.6	1.6
Soyabean Meal(SBM)	3.0	3.0	3.0	3.0
Bone Meal	3.6	3.6	3.6	3.6
Groundnut Cake	5.0	5.0	5.0	5.0
Salt	0.1	0.1	0.1	0.1
Methionine	0.2	0.2	0.2	0.2
Lysine	0.2	0.2	0.2	0.2
Crude Fibre	7.5	7.25	7.05	6.08
Calcium	1.55	1.51	1.51	1.70
Available Phosphorus	0.81	0.80	0.79	0.87
Lysine	0.77	0.80	0.78	0.77
Methionine	0.49	0.48	0.46	0.45
Metabolised Energy(kcal)	2,633.89	2,295.04	1,952.04	1,495.75

**Table 2: Average Daily Feed Intake Per Snail (G) Periods Mean Feed Intake Per Snail (G)**

Week	1	2	3	4
1	2.65	2.98	2.17	2.67
2	1.55	1.36	1.67	1.99
3	2.65	2.56	2.45	3.46
4	2.31	2.10	2.56	2.91

**Table 3. Average Live Weight Gain Periods Mean Feed Intake Per Snail (G)**

Week	1	2	3	4
1	2.55	2.73	1.66	1.49
2	1.13	0.70	1.77	1.06
3	0.69	0.49	0.39	0.29
4	0.30	1.29	1.15	1.19
Total	5.67	5.21	4.97	4.03

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