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Comparative Analysis of Snail Growth using Different Local Feeds

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Abstract

This study aimed at comparing growth performance, establishing different locally available feeds and determine the most efficient among the feedstuff for snail using four different feeds (Moringa oleifera leaves, Carica papaya leaves, Citrillus lanatus peels and broiler starter mash for 16 weeks at the Forest Institute of Nigeria (FRIN). Forty (40) Archachatina marginata (African Snail) of 8 weeks were used for the study. The snails were randomly divided into groups of 10 snails each. The groups were randomly assigned to 3 local diets and a concentrate (manufactured feed) in a Completely Randomized Design (CRD). The snails were housed in motor tyres and each was half filled with hot water-treated loamy soil 5cm depth .The soil was moistened two times daily by sprinkling of tap water. Pits were made round the tyres, filled with water mixed with condemned motor engine oil to scare away or trap ants and insects on entering the tyres to avoid disturbance. Feeds and water were provided throughout the study period which lasted for 16 weeks. Other management practices such as removing the leftover food, changing of water, removal of excreta were observed. The performance of the Archachatina marginata was assessed on the basis of weight gained, shell length and shell width. These parameters were measured using weighing balance and venier caliper. The Archachatina marginata treated with water melon peels showed better performance than other in terms of shell length (13.62 ± 0.31a) while the ones treated with concentrate were weightier (94.40 ± 1.07a). For circumference of

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the snail, the snails fed with concentrate performed better (32.36 ± 0.99), followed by 30.00 ± 0.92, 28.28 ± 0.35 and 25.32 ± 0.48 respectively. Similarly, significant weight difference($p<0.05$) was noticed with the highest found in the snails treated with water melon peel (94.40 ± 1.07a) followed by Carica papaya leaves (87.00 ± 1.37b), followed by concentrate (80.00 ± 1.41c) then, Moringa oleifera leaves (74.40 ± 2.29d). It is recommended that, more natural feeds be experimented in feeding snails to test for growth and reproduction and government should sensitize and empower local farmers for snail farming.

Keywords*:* Snail Farming, Growth Performance, Local Feedstuff, Papaya Leaves, Moringa Oleifera, Feed Efficiency, Sustainable Aquaculture

INTRODUCTION

The major sources of meat protein for Nigerians, which are basically from livestock in the form of poultry, beef, mutton, and pork, are being decreased by persistent drought, disease, high cost of feed, primitive animal husbandry techniques and low productivity of local animal breeds. The increasing growth of human populations (Oyenuga, 1968) together with rising standard of living has also placed a great pressure on the existing sources of animal protein (Fagbuaro, 2006), snail meat competes favourably with other conventional sources of animal protein like beef, pork and poultry meats. The low cholesterol level and high iron content of snail meat makes it a good antidote for fat related diseases. Soup prepared with snail meat is good for pregnant women for easy movement of the foetus, easy delivery and good source of iron for a nursing mother (Bright, 1996). The shell could be used to replace bone meal. Snail farming is also an important source of income to farmers (Omole & Kihinde, 2005). There is a flourishing international trade of snails in Europe and North America, which has the capacity the level of poverty in rural areas of Nigeria. In spite of the considerable external and local demand, commercial snail farmers such as those in Europe, South-East Asia and America do not exist in Africa. In Nigeria, Ghana and Cote d'Ivoire where snail meat is particularly popular, most of the snails continually collected from the forest. In recent years, however, wild snail populations have declined considerably, primarily because of the impact of human activities such as deforestation, slash and burn, pesticide usage and collection snails before they reach maturity (Aravind, 2005) Climate change is considered to be a great threat to many species of snails (Pound *et al.*, 1994, 1999). Many snail farms have been established at the present time, in part to

compensate for the decrease in natural populations in certain countries and in part in order to produce good quality snails for consumption (Gomot, 1998). In captivity, snails have been fed with leaves, unripe fruits and other plant materials which are of low nutrient content. This has resulted in slow growth and long maturity time. Intensive indoor rearing, supported by formulated served feed may enable harvesting of matured snails earlier than i their wild state (Akinnusi, 1998). Some efforts have been made to feed compounded diets to the snails in order to enhance productivity (Stievenart, 1992; Omole *et al,* 2000; Ejidike, 2001). Adyemo (2005) observed that snails do well when they are fed with compounded diets. There is however, scanty information on the effect of this formulated diet on the growth and reproductive performance of *Archachatina marginata* compared to the local feeds. This study therefore aimed at investigating the effect of compounded feed and local feeds on the growth performance of *Archachatina marginata.*

MATERIALS AND METHODS

Location

The study was carried out at the snailery unit of the forestry Research Institute of Nigeria (FRIN) Jericho, Ibadan North West Local Government Area of Oyo State. It is located between latitude 7.28^{o} N and longitude 3.51^{o} E. Ibadan North covers an area of 26km, with a population of about 152,834 people according 2006 National Population Census.

Experimental Design

Forty (40) snails of eight (8) weeks old *Archachatina marginata* were used for the study. The snails were randomly divided into 4 groups of snails each. The groups were randomly assigned to 3 local diets and a concentrate in a Completely Randomized Design (CRD). The snails were housed in motor tyres and each was half filled with hot water-treated loamy soil to 5cm depth. The soil was moistened two times daily by sprinkling of tap water. The tyres were placed on levelled ground and pits were made around them. The pits were filled water mixed with condemned engine motor oil to prevent termites and ants disturbance. Feed and water were provided throughout the period of the study which lasted for 16 weeks. Other routine management practices such as removal of leftover food, renewal of drinking water cleaning of the surrounding were observed.

Treatment

T_1- *Moringa oleifera* leaves

T_2- *Carica papaya* (pawpaw) leaves

T_3- Citrillus lanatus (Water melon) peels

T_4- Concentrate (broiler starter mash)

Data Collection

The weight of the snails was measured at weekly intervals using a weighing scale and the length and shell and width of the snails were also measured using the venier caliper.

Data Analysis

Data collected were subjected to Duncan Multiple Range Test to separate the mean difference, ANOVA and Regression and weight of the snails to establish the relationship between the snails shell and weight.

RESULTS

Analysis of variance was conducted to ascertain the significant difference at $p \leq 0.05$ for effect of diet on shell length, shell circumference and weight. The result showed that there is significant difference in shell length, shell circumference and weight.

The result in table 1 showed that, for shell length (cm), the highest performance was found in snails fed with treatment T_1, followed by T_2, T_3 and T_4 with means values 13.62 ± 0.31, 12.58 ± 0.25, 11.00 ± 0.38 and 10.40 ± 0.33 respectively.

Table 1: Duncan Multiple Range Test (DMRT) to separate the mean difference for shell length (cm)

Treatments	Mean ± SE
T_1	11.00 ± 0.38c
T_2	12.58 ± 0.25b
T_3	13.62 ± 0.31a
T_4	10.40 ± 0.33c

Table 2 showed significant difference in the shell circumference of the snails. The result showed that the highest shell circumference was found in T_4 followed by T_3, T_2 and T_1 with mean values of 32.36 ± 0.99, 30.00 ± 0.92, 28.28 ± 0.35 and 25.32 ± 0.48 respectively. The highest shell circumference was found in treatment T_4.

Table 2: Duncan Multiple Range Test (DMRT) to separate the mean difference for shell circumference (cm).

Treatment	Mean ± SE
T_1	25.32 ± 0.48
T_2	28.28 ± 0.35
T_3	30.00 ± 0.92
T_4	32.36 ± 0.99

Source: Field work, 2023

Table 3 represents the analysis of variance conducted which showed that, there is significant difference in body weight (g) across the treatments. Consequently, treatment T_3 (94.40 ± 1.07a) had the highest weight, followed by T_2 (87.00 ± 1.37b), T_4 (80.00 ± 1.41c) and T_1 (74.40 ± 2.29d) respectively.

Treatment	Mean ± SE
T_1	74.40 ± 2.29d
T_2	87.00 ± 1.37b
T_3	94.40 ± 1.07a
T_4	80.00 ± 1.41c

Source: Field work, 2023

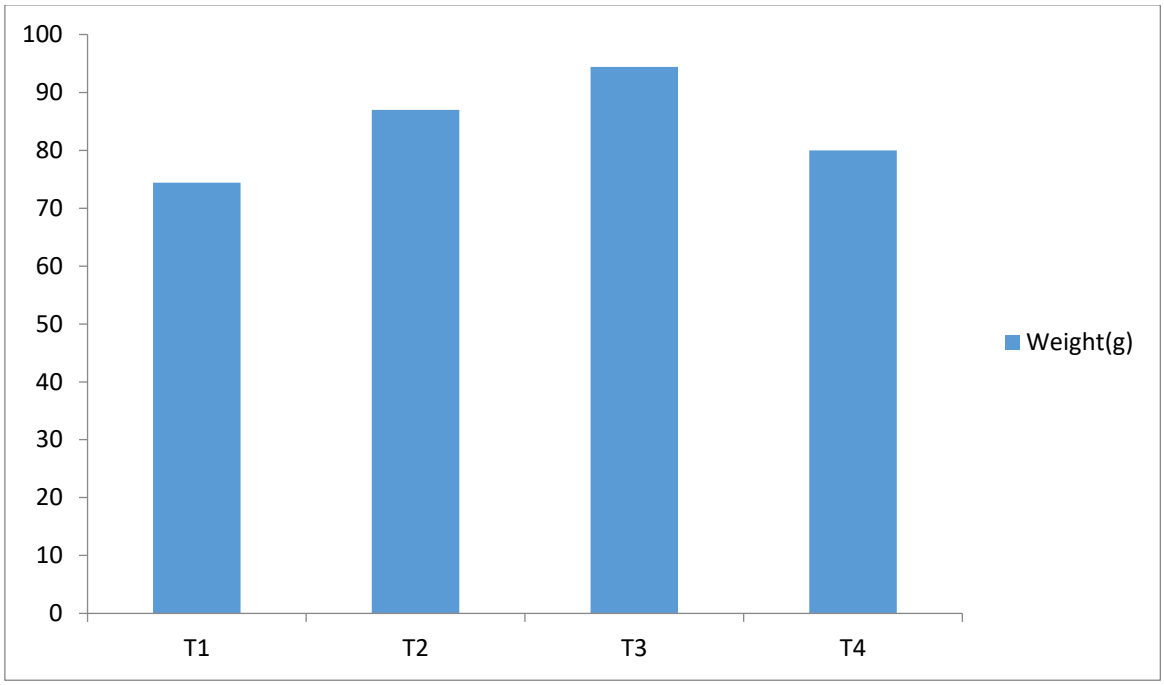

Figure 2: Bar chart showing mean weight of snails with different treatments

Figure 2 revealed the various mean weight gained by snails for different treatments. Consequently, treatment T_3 had the highest weight, followed by T_2, T_4 and T_1 respectively.

DISCUSSION

This study revealed that *Moringa oleifera* leaves, *Carica papaya* (pawpaw) leaves, Citrillus lanatus (Water melon) peels and Concentrate (broiler starter mash) can be used in feeding snails. The results on the length, circumference and weight of the snails in all the treatments showed great performance. This agrees with the findings of Siyanbola (2008) who reported that the use of different feed material provides nutrients to snails and it is an effective way of managing wastes. However, the snails treated water melon peels showed better performance in shell length and weight compared to other feeds.

The results on weight showed that snails treated with Citrillus lanatus (Water melon) peels) were weightier than all other snails treated with other feeds. This is in tandem with the report of the findings of Ejidike and Affolyan (2010), they reported that, compounded diets have potentials of sustaining snails farming especially during scarcity of

snails natural foods. Even though compounded diets perform well, some natural foods do better.

CONCLUSION

This study is a comparative assessment of growth performance of Afrian giant snail (*A. marginata*) fed with different natural feeds and a concentrate (manufactured feed). The results indicated that all the diets were very effective in supporting the growth of snails. Snails are easy to rear and grow very fast, throughout the period of the study none of the snails died, this shows that snails have low mortality rate. High cost of rearing other sources of meat can be substituted by rearing snails with minimal cost and alleviating poverty.

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