Performance of two snail species – *Archachatina marginata* (S) and *Achatina achatina* (L) reared under the same management practices.

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Abstract

The performance and carcass analysis of two popular snail species - *Archatina marginata* (S) and *Achatina achatina* (L) commonly reared in West Africa were evaluated from day old to six (6) months of age under the same housing and dietary conditions in a complete randomized design with two (2) treatments, replicated thrice with sixty (60) snails per treatment. The study revealed that at day old treatment 1 (T1) had the higher live weight of 4.03g, while treatment 2 (T2) had 0.31g which showed a statistical significant difference at $P < 0.05$. The shell length and shell width of the hatchlings also showed statistical significant difference ($P < 0.05$) between the two treatments. The mean feed intake (g/day) for T1 was 2.89 and 1.96 for T2. Higher mortality (8.33%) was recorded in T2. T2 was also found to be the better converter of feed to edible meat with feed conversion ratio of 7.26 to 72.3 recorded in T1. The higher dressing out percentage (40.14) was recorded in T1. The result showed that snails generally have slow growth. T1 was found to grow faster than T2 hence it is recommended to the populace because it has higher potential to meet animal protein supply than T2. Research on improvement and nutrition of snails should therefore be encouraged.

Keywords: Performance, snails, carcass analysis, management practices.

Introduction

In Nigeria, the shortage in food production is aggravated by natural disasters and the menace of pests and diseases. The resultant effect is malnutrition and associated human diseases. Children and youths are mostly affected. To attain the envisaged self-sufficiency in animal production in order to meet the animal protein requirement by the people, the production of micro-livestock such as snail, grasscutter, bush fowl and giant rat should be stepped up.

The problem of animal protein intake in Nigeria has forced the researchers to look for another

source of animal protein, which can be reared with little or no capital. Micro-livestock such as snails, grasscutter and rabbits have been domesticated and a lot of works are going on to make them available at reduced prices.

Snail farming according to Akinnusi (1998) is environmentally friendly and can be reared with little capital and skill. Snails belong to a group of invertebrates called mollusks. They are one of the most compact groups of animals which show a wide diversity (Odunaiya, 1995). They have soft bodies which are not segmented, slippery skins, no limbs and may or may not have shells (Awesu, 1980). Snails are noiseless and have

potentials for very high returns on investment (Odunaiya, 1995)

Snail meat is a good source of animal protein, the protein content ranges between 15.76 – 18.28 % (Awesu, 1980 and Omole, 1998). The fat content ranges between 0.96 and 3.0% (Imevbore and Ademosun, 1998), which is very low when compared to 9.6, 21.4 and 23.0% found in chicken egg, mutton, and duck respectively. The low fat content makes it useful for hypertensive patients and those who are obsessed (FAO, 1986 and Odunaiya, 1995).

In Nigeria, there are different species of snails and they vary in size, colour, adaptability and performance (Odunaiya, 1995; Amusan and Omidiji, 1999). These include *Archachatina marginata*, *Achatina achatina*, *Achatina fulica*, *Limicolaria spp*, and *Thapsia spp* (Odunaiya, 1995). *Archachatina marginata* is bigger than others, the shell is wider at the posterior compared to others.

The conventional feeds of snails are mainly of plant origin i.e. fruits and leaves of pawpaw, cocoyam, sweet potato, oranges, water leaves, cassava leaves, mango eaves, guava leaves and plantain/banana leaves (Odunaiya, 1991 and Akegbejo and Akinnusi, 2000). These feeds are seasonal, perishable and cannot supply all the nutrients needed for the optimum performance of snails. Tropical forages are nutritionally adequate only when the plants are very young (Odeyinka and Ijiyemi, 1998).

This study was designed and undertaken as a preliminary study on the performances of two species of Edible African Land Snails i.e. *Archachatina marginata* and *Achatina achatina* fed pawpaw leaves.

Materials and Methods

The experiment was carried out in Ago-Iwoye, which is located in Rain Forest Belt of Ogun State, Nigeria.

Experimental Design and Management of the Snails:

A total of 120 day-old snails made of 60 snails of each specie were randomly selected from the hatching, which were produced from a previous experiment. The hatchlings were allotted to two treatments replicated 3 times with 20 snails per replication using a completely randomized design – *Archachatina marginata* (T1) and *Achatina achatina* (T2). The snails in the two treatments were subjected to the same conditions of housing, mulching, climate and feeding. The experiment lasted for six months i.e. twenty-four weeks.

The snails were raised in wooden cages (0.75m x 0.75m x 0.75m each). The bottom of the cages were perforated to allow for free drainage of water when wetting the soil and the top covered with mosquito net reinforced with chicken wire. The cages were filled with sandy loam soil to a depth of 15cm.

Measurements and Analyses:

The snails were fed with known quantities of pawpaw leaves once a week (Awesu, 1980 and Odunaiya, 1991). The remnants were collected at the end of the week and reweighed. The following data were collected: feed intake (g), weekly weight gain (g/week) and shell length gain (g/week) and shell width gain (g/week). Live weight gain (g/day) and feed conversion ratio was calculated from the data.

At the end of the experiment, 15 snails from each treatment were randomly selected and starved overnight for carcass evaluation. The snails were killed by breaking the shell at the bottom. The edible part (foot), the shell and the viscerals were

then, separated and weighed with electric weighting balance separately. The dressing percentage was calculated as ratio of foot to total live weight.

The chemical composition of the soil and diet used for the experiment were also analyzed in the laboratory using standard methods approved by A.O.C (1990).

Data collected were subjected to T-test statistical analysis (Steel and Torrie, 1980)

Results and Discussion

The chemical composition of the soil used for the experiment is shown in Table 1. The result showed that the soils were rich in carbon (0.85%) calcium (5.88me/100g) and the pH tended toward neutrality. The soil type was sandy loam, which has been reported as the required soil for snails (Awesu, 1980; Odunaiya, 1991 and Omole, 1998). The chemical composition of the pawpaw leaves used for the experiment is shown in Table 2. The choice of pawpaw leaves is in line with the observations of Awesu (1980), Odunaiya (1991), Akinnusi (1998) and Imvbore and Ademosun (1998) that snails preferred pawpaw leaves to other feed materials. The result shows that

pawpaw leaf is rich in crude protein (31.45%) and ash (9.56%) which are necessary for good performance in snails.

The average live weight of the two snail species differed significantly ($P < 0.05$) at day old. The higher average live weight of 4.03g was recorded for *Archachatina marginata* while 0.31g was recorded for *Achatina achatina* as shown in Table 3.

Table 3 also show that the shell length and shell width of the snails at day old showed statistical significance ($P < 0.05$). The shell length gained of 0.5cm/day for T1 and 0.03 for T2 agreed with the findings of Hodasi (1984) and Odunaiya (1991). The average feed intake (g/day) was statistically different for the two species at $P < 0.05$. The average feed intake increased from day old to 6 months of age, the higher feed intake of 2.89g/day was recorded in T1 while 1.96g/day was recorded in T2. This result could be due to the fact that *Achachatina marginata* is bigger in size and is more adaptable to the environment when compared to *Achatina achatina*.

The feed conversion ratio of 7.23 was recorded in T1 while that of T2 was 7.26. Feed conversion

Table 1: Chemical composition of the experimental soil

Parameter	Me/100g
Soil type	Sandy loam
P.H	6.89
%Nitrogen	0.11
%Carbon	0.85
%Base saturation	97
Cation Exchange capacity	0.08
Magnesium	1.54
Calcium	5.89

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Table 2: Chemical composition of the experiment diet.

Parameters (g/100g DM)	Percentage %
Dry matter	22.41
Crude protein	31.45
Crude fibre	9.50
Ether extra	1.80
Ash	9.56
Nitrogen free extract	59.34
Gross Energy (Kcal/g DM)	0.41

Table 3: Summary of performance of two snail species from day- old to 6 months of age.

Parameters	T1	T2
Initial live weight (at day old) (g)	4.03a	0.31b
Final live weight (at 6 months) (g)	75.96a	48.74b
Mean live weight (g)	40.00a	24.53b
Live weight gain (g/day)	0.40a	0.27b
Shell length gain (g/day)	0.05a	0.03b
Shell width gain (cm/day)	0.03a	0.02b
Feed intake (g/day)	2.89a	1.96b
Dry matter intake (g/day)	0.65a	0.44b
Gross Energy intake (keal/day)	0.27a	0.18b
Crude Protein intake (g/day)	0.20a	0.14b
Ash intake (g/day)	0.06a	0.04b
Feed Efficiency	0.14a	0.14b
Feed conversion ratio	7.23b	7.26b
Mortality (%)	1.67	8.33

^{a,b} – Means along the same row with different superscripts are significantly different ($P < 0.05$).

ration is a function of feed intake to live weight gain. The result showed *Achatina achatina* is a better converter of feed.

The higher mortality of 8.33% was recorded in T2. This is supported by the work done by Omole (1998) who observed that mortality of *Achatina achatina* is higher in the SouthWestern part of Nigeria and that it required more humid environment.

Table 4 showed the carcass analysis of the experiment snails. Dressing out percentage of the snails showed statistically significant difference between the treatments ($P < 0.05$). The higher dressing out percentage of 40.14 T1 agreed with the findings of Awesu (1980) who reported 37.39 for *A. marginata*. T2 however recorded higher visceral to live weight percentage of 25.40 ad 26.54 respectively. The result showed that shell to live weight percentage is inversely

Table 4: Carcass analysis of experimental snails at 6 months of age.

Parameters	T1	T2
Number of Snails	15	15
Average liveweight (g)	69.86a	41.62b
Dressing out Percentage (%)	40.14a	36.48a
Visceral/liveweight (%)	21.33b	25.40a
Shell/liveweight (%)	25.44b	26.54a

^{a,b} – Means along the same row with different superscripts are significantly different ($P < 0.05$).

proportional to the dressing out percentage. This is supported by the observations of Ajayi et al (1978) who reported that the shell accounts for as much as 26% of the body weight of *A. marginata*.

Conclusion and Recommendations

It can be concluded from the results that *Archatina mrginata* has higher potential to meet animal protein supply than *Achatina achatina* because it grows faster. Further research should therefore be carried out on the genetics and nutrition of snails.

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