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PERFORMANCE OF DIFFERENT BREEDS OF SNAILS UNDER THE SAME MANAGEMENT CONDITIONS

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Target Audience: Small scale farmers, scientists, snail farmers

ABSTRACT

Perfromance and carcass analysis of four popular breeds of snail T_1 (*Archachatina marginata*), T_2 (*Achatina achatina*), T_3 (*Achatina fulica*) T_4 (*Limicolaria spp*) commonly reared in South - Western Nigeria were evaluated from day old to 6 months of age under the same housing and dietary conditions in a complete randomized design with 4 treatments. 3 replicates and 45 snails per treatment.

The study revealed that at day old, T_1 had highest average liveweight of 4.15g, while T_2, T_3 and T_4 had 0.27, 0.50 and 0.30g, respectively (P<0.05). The shell length and shell width of the hatchlings showed statistical significantly differences (P<0.05). The mean monthly feed intake for T_1 was 87.94g/month while T_2, T_3 and T_4 had mean monthly feed intake of 60.10, 43.72 and 29.12g/month respectively (P<0.05). Mean weight gain of 12.16g/month was recorded in T_1 while .68, 4.07 and 1.96g/ month were recorded in T_2, T_3 and T_4 (P<0.05) at the end of six months. Mortality was high in T_2 (13.3%) while no mortality was recorded in T_3 (P<0.05). T_1 was the best converter of feed to edible meat with feed conversion of ratio of 7.23 compared to 14.90 recorded in T

T3 had highest dressing % of 48.20% while T_2, T_3 and T_4 had 39.50, 34.50 and 37.10 % respectively. Snails are generally slow growing animal. *Archachatina marginata* grew faster than others hence it has higher potential to meet animal protein supply than other 3 breeds of snails.

Keywords: Snail types, growth rates, carcass analysis

DESCRIPTION OF PROBLEM

Snail meat is a good source of animal protein, the protein content ranges between 15.76 - 18.28% (1,2). The fat content ranges between 0.96 and 3.0% (1,3) 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 that are 'fat' (4).

In West Africa, there are different breeds of snails and they vary in size, colour, adaptability and performance (5). In South-western Nigeria, the African giant land snail (*Archachatina marginata)* is the most common breed reared and readily found in the market throughout the year. (6). Other breeds commonly found are *Achatina achatina, Achatina fulica* and *Limicolaria spp. Archachatina marginata*

is bigger in size than others, the shell is wider at the posterior compared to others. The fleshy part is dark brown in colour. *Achatina achatina* is mostly found in Ghana and Republic of Benin (4).

Achatina fulica is hardy and is of small size while *Limicolaria spp.* is the smallest species of the four breeds (5)

This study was designed to evaluate the performance of four commonly reared breeds of snails from day old to six months of age under the same housing and dietary conditions.

MATERIALS AND METHODS

The experiment was carried out at snailery unit of the Institute of Agricultural Research and Training (IAR&T), Ibadan which is located in Rain Forest Belt of South-Western Nigeria between March and September, 1999.

Collection and Incubation of the Eggs

Seventy eggs each of four breeds of snail reared in the snailery unit (*Archachatina marginata, Achatina achatina, Achatina fulica and Limicolaria spp.)* were collected from the cages and buried in soil inside wooden cages. The cages used for each breed's eggs had dimension of 1mx1mx0.5m. The bottom of each cage was perforated and sandly loam soil was put inside the cages to a depth of 15cm and placed under a shade with adequate ventilation and the eggs were properly arranged. The soil was wetted every morning for 32 days and the temperature of the environement taken ranged between 26 - 28°C and these conditions were similar to those recommended by FAO (4)

Experimetal Design

A total of 180 day-old Snails made of 45 snails of each breed were randomly selected from the hatchlings and allotted to four treatments replicated 3 times with 15 snails per replicate using a complete randomized design. *Achachatina marginata* (T_1) which served as control while *Achatina achatina, Achatina fulica* and *Limicolaria spp.* were T_2, T_3 and T_4 respectively. The snails in all the treatments were subjected to the same conditions of housing, feeding, mulching and climatic conditions. The trial lasted for six months

Management of the Snails

The snails were reared in 3mx3mx0.5m wooden cage demarcated into 12 space compartments of 0.5x0.5x0.5m each. The bottom of the cage was perforated to allow free drainage of water when wetting the soil and the top was covered with chicken wire mesh reinforced with mosquito netting. Sandy loam soil was put inside the cage to a depth of 15cm

Chopped pawpaw leaves and cut green pawpaw fruits were in a shadow feeding tray served *ad libitum* to the snails in all the treatments. Water was supplied to the snails in a clay water trough. The feed intake was measured daily by deducting left-over feed from feed given using electric weighing balance. Body weight, shell length and shell width were taken at monthly interval from day old till the end of the experiment. Vernier calliper callibrated in centimetre was used to measure shell length and shell width while body weight was measured with electric weighing balance. Record of mortality was taken while the feed conversion ratio was calculated.

Carcass Analysis

At 6 months old, 15 snails from each treatment were randomly selected and starved overnight for carcass evaluation. The snails were killed by breaking the shell with iron rod. The edible part. (Foot), the shell and viscerals were then separated and weighed with electric weighing balance separately. The dressing percentage was calculated as ration of edible portion (foot) to total liveweight.

Chemical Analysis

Data collected were subjected to analysis of variance and where statistical significance was indicated, means were compared using the Duncan's New Multiple Range Test (9)

Statistical Analysis

Data collected were subjected to analysis of variance and where statistical significance was indicated, means were compared using the Duncan's New Multiple Range Test (9)

RESULTS AND DISCUSSION

The chemical composition of the soil used for the experiment is shown in Table 1. The soils were rich in Carbon (0.89%). Calcium 6.00Me/100g and the pH tended toward neutrality. The soil type was sandy loam which is the required soil type for breeding snail (1,4). Table 2 shows the chemical composition of pawpaw leaf and green pawpaw fruits fed to the snails. The choice of pawpaw fruit and pawpaw leaf for the experiment was in line with observations of Imevbore (10) that snails preferred the leaves and fruits of *Carica papaya* (pawpaw) to other feed materials.

Table 1: Chemical Composition of the Experimental Soil

Parameter	Me/100g
Calcium	6.00
Magnesium	1.52
Cation Exchange Capacity	0.08
% Base saturation	99
% Carbon	0.89
% Nitrogen	0.09
pH	6.85
Soil type	Sandy loam

Table 2: Chemical Composition of the Experimental Diet

Parameters (%)	Pawpaw leaf	Green Pawpaw Fruit
Dry matter	19.84	9.51
Crude protein	23.14	12.48
Crude fibre	9.51	5.81
Ether extract	1.80	1.21
Ash	8.28	6.91
Nitrogen free extract	57.27	73.59

At day old, the average live body weight of the snails differed significantly ($P<0.05$). The highest average live body weight of 4.15g was recorded by T_1 (*A. marginata)* while the least average live body weight of 0.03g was recorded by T_4 *(Limicolaria spp.)* As shown in Table 3, the average body weight of 4.15g recorded in T_1 was higher than 2.3g recorded by Akinnusi (7). This could be due to the fact that old mature snails were used as the breeding stocks. The size of the hatchlings were found to be affected by the size of the eggs and the latter depended on the size of the snails that laid the eggs (2, 6). The average weight of 0.27g at day old recorded in T_2 *(Achatina achatina)* was higher than 0.01g observed by Hodasi (11) and this could be due to old mature snails used as breeding stock, good management practices and environmetal factors.

The shell length and the shell width of the snails at day old showed statistical significances ($P<0.05$) as shown in Table 3. The average shell length of 0.75cm recorded in T_2 at day old agreed with the findings of Hodasi (11) who reported 0.62-0.76cm shell length for *Achatina achatina* at day old.

Table 3: Summary of Performance of different breeds of Snails under Management Conditions from Day-old to 6 months of Age

Parameters	T_1	T_2	T_3	T_4
Body weight of day old (g)	4.15^a	0.27^c	0.50^b	0.03^d
Final live weight at 6 months old (g)	77.12^a	46.33^b	22.97^c	11.73^d
Total weight gain (g/month)	12.16^a	7.68^b	4.07^c	1.96^d
Monthly feed intake (g/month)	87.94^a	60.10^b	43.72^c	29.12^d
Shell length at day old (g)	2.39^a	0.75^c	0.94^b	0.12^c
Shell length increment (cm/month)	1.82^a	1.42^b	1.27^c	0.99^d
Shell width at day old (cm)	1.29^a	0.55^b	0.64^b	0.18^c
Shell width increment (cm/month)	1.05^a	0.80^b	0.64^c	0.49^d
Feed conversion ratio	7.23^d	7.95^c	11.68^b	14.90^a
Mortality	2.2	13.3	0.00	11.1

a,b,c,d - Mean with different superscripts within a row indicate significant difference ($P<0.05$)

The average feed intake increased from day old to 6 months of age, at 6 months of age the highest mean feed intake of 87.94g/month was recorded in T_1 while 46.33, 22.97 and 11.73g/month were recorded in T_2, T_3 and T_4 respectively ($P<0.05$).

The highest feed intake of *Archachatina marginata* (T_1) could probably relate to the increased size and more adaptability to the environment compared to T_2, T_3 and T_4.

The mean weight gain of 12.13g/month was recorded in T_1 while 7.68, 4.07 and 1.96g/month were recorded in T_2, T_3 and T_4 at 6 months old, respectively ($P<0.05$). Akinnusi (7) recorded average liveweight increase of 13.42g/month for *A marginata* at 6 months old which is higher than 12.12g/month recorded for *A. achatina* at 6 months old in this experiment.

This could be due to different combination of feeds used, Imevbore (10) recorded live body weight of 3.85g/month at the end of 6 months when he fed, *A. marginata* solely on pawpaw leaf.

The feed conversion ratio of 7.23 was recorded in T_1 while highest feed conversion ratio of 14.90 was recorded in T_4. Feed conversion ratio is a function of feed intake to live weight gain. This include that *Archachatina marginata* is a good converter of feed to flesh compared to *Achatina achatina, Achatina fulica* and *Limicolaria spp.*

Mortality of 13.3% was recorded in T_2 at the end of 6 months while no mortality was recorded in T_3. The highest mortality recorded in T_2, and T_4 could be due to poor adaptability. From the survey carried out by Omole (2), it was observed that mortality of *A. achatina* is higher in South-western Nigeria and both *A. achatina* and *Limicolaria spp.* required more humid environment than others.

Table 4 showed the carcass analysis of the experimental snails. Dressing % of the snails showed statistical significant differences among the treatments ($P<0.05$).

Table 4: Carcass Analysis of Experimental Snails at 6 months of Age

Parameters	T_1	T_2	T_3	T_4
No. of Snails	12	12	12	12
Average live weight (g)	72.94^a	46.02^b	24.31^c	11.46^d
Dressing percentage (%)	39.50^b	34.58^b	48.20^a	37.10^c
Vesceral / Liveweight %	20.55^d	24.50	23.00^c	27.51^a
Shell / Live weight (%)	24.10^d	25.4^b	19.45^c	28.10^a

a,b,c, Means along the Same row with different superscripts are significantly different ($P<0.05$)

The dressing percent of 39.50 in T_1 agreed with the findings of Awesu (1) who reported 37.39% while Oredein *et al.* (12) observed 38.1% T_4 had the highest shell to live body weight of 28.10 compared to 24.10, 25.40 and 19.45 in T_1, T_2 and T_3, respectively. Snails with high shell to live body weight ratio indicate low dressing%.

CONCLUSION AND RECOMMENDATIONS

1. *Archachatina marginata* has higher potential to meet animal protein supply than other three breeds.
2. *Archachatina marginata* grows faster than other three breeds.
3. The growth rate of snails are generally slow compared to other conventional livestock.
4. Further research study should be carried out on nutritional aspect of snail production.
5. *Achatina achatina* requires more humid environment than *Archachatina marginata.*
6. The dressing percentage of snails are generally low compared to other conventional livestock.

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