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EFFECTS OF DIFFERENT HOUSING SYSTEM ON THE FEED INTAKE OF SNAIL (*Achatina achatina*)

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ABSTRACT

The study assessed the effect of different housing systems on the feed intake of snail production. Different housing system were used for rearing the snails include (wooden box, clay pot, plastic basket, and tyre housing system) using adult snails of one hundred and twelve (112) snails. The snails were randomly assigned to four housing systems i.e wooden box, earthen pot, plastic basket and tyre. Seven snails were place in each housing system and it was replicated in four treatments respectively. There were no significant (P>0.05) differences Between the Tyre and Earthen pot housing systems. The result show that the highest mean weight (295.27g) was recorded in wooden box while the lowest mean weight (75.39g) was recorded in plastic Basket. There were significant (P<0.05) differences between the average weight in each housing systems of snail the from week 1 to week 8. The result showed that wooden housing system has been the most appropriate housing system for snail production and a prospective farmer can therefore rear Achatina achatina in wooden box housing system for survival and faster growth

Keywords: Effects, Housing System, feed intake, Snail

INTRODUCTION

Baba and Adeleke (2006) and Okpeze *et al* (2007) reported that snails have good quality protein and are rich in potassium, phosphorus, essential amino acid and vitamins B and C. The alarming increase in population implies that many people require the supply of protein in their diets because of its important role in human wellbeing which includes growth, maintenance of hormonal and enzymatic activities and improvement of the defense mechanism of the body (Mogbo *et al*. 2013). Snails are considered as food, that is consumed by millions of people worldwide, Snail farming (Heliculture) takes place in open spaces (fields), under totally controlled conditions or net-covered green houses or construct housing system (Apostolou, 2016). Different materials can be use to build snail housing such as plastic basket, Second-hand materials, like car tyres, oil drums and old water tanks (Cobbinah,2008). Snails will easily feed on leaves, fruits, household and industrial remnants which will hardly be consumed by man. Snail rearing is a good source of income and less capital is used in setting it up compared to other livestock species such as poultry, fish farming, cattle and goat production, etc (Kingsley., *et al*..2017).

The snail farming are so important because of benefit derived from snails' as high quality protein and medicinal value. Protein from snail meat is said to be very rich in all essential amino acids such as Lysine, Leucine, arginine and tryptophan. meat has been found to be higher in protein content (37 - 51%) compared to that of guinea pig (20.3%), poultry (18.3%), fish (18%), cattle (17.5%), sheep (16.4%) and swine (14.5%). Iron content (45 - 59 mg/kg), low in fat (0.05 - 0.08%), sodium and cholesterol level (Ahaotu *et al.*, 2019). Ahaotu *et al.* (2015) noted that snails contain almost all the amino acids required by man. Durunna *et al.* (2015) reported that snail breeding can start at any time of the year under domestication, but the time to start

breeding snail is at the beginning of the rainy season when feeds of snail are available. Cobbinah *et al.* (2008) report that the decline in the population of snails in the wild is as a result of human and other anthropogenic factors such as use of agrochemicals, deforestation for urban development, burning and clearing for agricultural purposes and collection of immature snails by the farmers/dwellers of the rainforest belt.

The facts on how to get feed sources is limited to a few farmers, the nutrient compositions of these sources have not been evaluated, and the effects of different feed sources on growth and reproduction performances are still not well-known (Okpeze,2007). Past study on snail production have concentrated on aspects of nutrition and environmental factors, little researcher has tried to access the effect of different housing system conditions on snail production. Therefore, this study was carry out to determine different housing system on snail production and to examine feed consumed by Snails under Different Housing Systems on snail production.

MATERIALS AND METHODS

Study Area

The experiment was carried out at Forestry Technology Teaching and Research farm of the Federal College of Forestry, Ibadan. The site is on located on Longitude 3.510E and Latitude 7.280N. The annual temperature ranges from minimum of 18.070C to an average maximum of 34.40C. it located in the rain forest vegetation of the southern part of Nigeria. It received a mean annual rainfall of 1300 to 1500 mm and average relative humidity of about 80-85%.

Experimental animals and Management

Prior to the study, one hundred and twelve grower snails (*Archachatina marginata*) were purchase a reputable snailery farm in Ibadan, Oyo state. One hundred and twelve mature snails were kept in each housing system (wooden box, clay pot, plastic basket, and tyre).Seven mature snails were replicated four times in wooden box housing system, seven mature snails were replicated four times in clay pot housing system, seven mature snails were replicated four times in plastic basket housing system and seven mature snails were replicated four times in tyre housing system. Feed in the most important input in snail production, especially under captivity (intensive system of management). For optimal production, the snails have to be provided with efficient feed for growth and development.

Throughout, the eight weeks (8 weeks) period of experiment the snail were fed a mixed feed regime of forage like pawpaw leaves bananas, peach water leaves watermelon etc and a formulated diet. The diet was formulated with the following ingredient, maize soybean meal, fishmeal, bone meal. Wheat offal, Oyster and mineral premix containing 24% CP, 15% Ca and 2650 kcal\kgME were offered to the snails every two days in the morning between 8:am and 9:am and the entire housing and feeders were also cleaned regular.

Prior to the study, one hundred grower snails (*Archachatina marginata*) weighing between 25 – 60 g were purchased from the local market at Ugbolu in Oshimili North Local Government Area of Delta State, Nigeria. The snails were confined in plastic baskets suitable for small scale backyard snail production. The snails were reared intensively for two weeks to allow for acclimatization. They were fed herbages such as pawpaw leaves (*Carica papaya*), oil palm fruits (*Elaeis guinensis*) and water leaf (*Talinium triangulae*). They were also sprinkled with water every morning and evening. Left-over feed and droppings were removed on a daily basis

Calculation of Feed Intake

Quantity of feed (fed intake) consumed by the snails was determine by subtracting weight. The formula is given as:

$$FI = FO - LO \quad [1]$$

$$AFI\ g) = FO - LO\ /WD \quad [2]$$

$$AWG\ (g) = WD - WFD/WD \quad [3]$$

$$FE = WG/FI \quad [4]$$

Where:

FI = Feed Intake (g); FO = Feed Offered; LO = left over; AFI = Average feed intake; AWG = Average weight gain; WD = weight at 7 day; WFD = weight at the 1st day; FE = Feed efficiency

WG = weight gain (g)

Data analysis

Data on feed intake was subjected to one way analysis of variance (ANOVA) while the difference in mean were separated using Duncan multiple Range Test (1995) at 5% probability.

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RESULTS

Table 1 revealed the mean weight of snail rearing under different housing system for a period of 8 weeks. It was revealed that the mean weight by the snail in the treatment increased progressively from week 1 to week 8. However the mean weight for the snails in the tyre housing unit varies from week 1 to week 4 while it begins to diminish in mean weight from week 5 to 8. In like manner, the mean weight in earthen pot housing system was also unstable at the initial stage while it is later diminished from 109.16g to 100.82g from week 1 to week 8. The highest mean weight (295.27g) was recorded in wooden box while the lowest mean weight (75.39g) was recorded in plastic Basket. There are significant ($P<0.05$) differences between the average weight in each housing systems of snail the. Body weight were significant ($P<0.05$) at all considered for both housing systems from week 1 to week 8. it was observe in week 3 and week 7 there was decline in the average weight of the snail and increasing again at week 4 and 5 respectively.

Table 1: Mean weight (Grams) of Snails under Different Housing Systems for a Period of 8Weeks

Treatments	Week 1	Week 2	Week 3	Week 4	Week 5	Week6	Week 7	Week 8
Plastic Basket	68.71^{a}	73.66^{a}	74.19^{a}	74.36^{a}	74.57^{a}	74.93^{a}	81.14^{a}	75.39^{a}
Tyre	101.07^{b}	101.52^{b}	102.00^{ab}	101.30^{b}	102.08^{b}	99.07^{b}	97.87^{a}	97.24^{ab}
Earthen Pot	109.16^{b}	107.86^{b}	113.73^{b}	102.48^{b}	102.82^{b}	99.77^{b}	99.48^{a}	100.82^{b}
Wooden Box	286.82^{c}	290.49^{c}	291.18^{c}	292.04^{c}	293.13^{c}	293.96^{c}	294.60^{b}	295.27^{c}

**Mean weight with the same alphabet are not significantly different from others.*

Table 2 below shows the mean feed consumed by the snails in each treatment. It revealed that all the feed consumed in the treatment were significantly ($p<0.05$) different from each other from week 1 – 8. The highest (121.64g) feed consumed was observed in the wooden box while the lowest (12.56g) feed consumed was observed in the plastic basket. There was significant ($P < 0.05$) difference in feed consumed by the snails on different housing system for the period of 8 week based on treatments applied in this study.

Table 3: Mean feed consumed by Snails under Different Housing Systems for a Period of 8 Weeks

Treatments	Week 1	Week 2	Week 3	Week 4	Week 5	Week6	Week 7	Week 8
Plastic Basket	21.03^{a}	16.05^{a}	17.38^{a}	18.04^{a}	14.93^{a}	17.11^{a}	14.33^{a}	12.56^{a}
Tyre	23.37^{a}	24.13^{a}	22.80^{a}	23.19^{a}	22.80^{ab}	23.08^{a}	22.80^{a}	23.37^{b}
Earthen Pot	42.85^{b}	41.67^{b}	42.73^{b}	33.45^{a}	40.18^{b}	39.96^{b}	40.67^{b}	36.28^{c}
Wooden Box	84.42^{c}	92.97^{c}	83.06^{c}	121.64^{b}	104.47^{c}	86.00^{c}	77.64^{c}	80 .64^{d}

**Mean feed consumed with the same alphabet are not significantly different from each other.*

DISCUSSION

There was significant ($P<0.05$) differences among mean weight in the different housing systems of the snail rearing. This could be base on the fact that snail can be domesticated in different housing system depending on how the farmer on farmers choice. The decline in the snail weight that was observe in the tyre and earthen pot housing system in week 5 - 8 could be due to break in the rains experienced during the experiment of the study resulting in the snails going into partial hibernation. This implies that snail could hibernate in a certain period of time both in a natural habitat and in domestication. This finding is supported by Akinnusi (1989) and Omole *et al.* (2007) who observed that snail are more active in the rainy season and feed well at this period. The result is also in line with the result of Eze *et al*. (2010) who

also noted that period of hibernation in mandatory to the success of the good breeding of good quality large snails. The demonstration of the experiment on the snail farming using different housing types indicated that snail perform better in wooden box housing system. This could be as a result of enough space of movement snail observed in the wooden housing system compare to other housing system observed in the study. This in line with the findings of Muraina (2004) which reported that out of the different types of snail housing system, wooden box is the best housing system in his study.

The result reveled that there are significant ($P<0.05$) differences between the average weight in each housing systems of the snail. Body weight were significant ($P<0.05$) at all considered for both housing systems from week 1 to week 8. it was observe in week 3 and week 7 that there were no significant in the average weight of snail respectively. The unstable weight of snail observe from the study could be due to the change of environment of the snail. This result was corroborate with the result of Eze *et al*., (2010) who reported that the irregular growth weight pattern observed in the growth of snail could be attributed to internal factors (behavior specific of snails) and environmental changes.

The result shows that all the feed consumed in the treatment were significantly ($p<0.05$) different from each other from week 1 – 8. The highest (121.64g) feed consumed was observed in the wooden box while the lowest (12.56g) feed consumed was observed in the plastic basket. This could be due to enough space that present in the wood box than other housing system that used in the experiment which could allow snail to consume more feed in the wooden box. This implies that snail could consume more feed in the wood box housing system due to well spacious which have to due to the fact that the snail performance were to be great in the spacious housing system which was observed in wooden box housing system types and the more the snail consume feed the more they increase in weight. The result were disagree with the findings of Amoo, (2013) who reveal that overall performance and pattern of growth traits parameters in this study were greatly favored the tyre type of housing system which have to due to the fact that the snail performance were to be great in the dark environment which were observed in the tyre types.

CONCLUSION AND RECOMMENDATION

The study revealed the domestication of *Achatina achatina* snail in the different housing system (wooden box, tyre, earthen pot and plastic basket) however, this result showed that wooden housing system has been the most appropriate housing system for snail production in terms of feed intake and growth due to the spacious of wooden box that enhance the feed intake and increase in weight of snail compared to other housing system that have limited space.

Based on the study of these findings, the study recommends the need for farmers to be using wooding box housing system for snail production. This will enhance the good performance of snail production, enhance survival and faster growth of snail as well as to maximize profit in the business and provide employment opportunity to the youth and farmers livelihoods.

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