

Comparative Effect of Compounded Feed and Water Leaf on the Growth of Snails

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Abstract

The growth performance of snails *Archachatina marginata* fed with two different feed materials was monitored in this study. Twenty Juvenile snails were used for this study and were subjected to two diet treatments, Treatment 1 (compounded feed) and Treatment 2 (*Talinum triangulare* leaf) which were housed in two (2) rectangular wooden cage. The Animals were obtained from Center of Entrepreneurship snailery unit at Federal Polytechnic Ado-Ekiti, Ekiti- State, and acclimatized for two weeks and fed for ten weeks with compounded feed and *Talinum triangulare* leaf. This paper therefore studied the growth performance of feeding *Achatina marginata* snails with these feeds. Data was collected on weekly basis by measuring growth parameters (shell length increase, shell circumference, and weight gain). The result of the data collected showed that snails on Treatment 2 (*T. triangulare* leaf) had the best mean shell length increase of 6.48 ± 0.01 cm), weight gain of (16.73 ± 0.20) g and shell circumference increase of (0.25 ± 0.02) cm). Specific Growth Rate (SGR) and Protein Efficiency Ratio (PER) were higher in T_2 (water leaf) than T_1 which were fed with compounded feed. There is significant difference ($P < 0.05$) in the growth data for *marginata* fed with these diets.

Keywords

Achatina marginata Snails, *Talinum triangulare*, Growth, Leaf

1. Introduction

Heliculture is the process of farming or raising snails in the world. Presently in Nigeria it has become an important practice in recent time because of increased animal protein shortage in the country, their population and acceptability nationwide the potential for export, including the emerging technologies for their production which have largely contributed toward the present renewed interest in snail farming.

The knowledge and skills in snail rearing is an innovation in agricultural education. Snail is a common name which is applied to most of the members of the Mollusca class of gastropoda. There are different types of snail, the water snail and the land snail [16]. The species of snail that are common

in temperate regions are *Helix aspera*, *Helix pomatia*, *Helix lucrum*, *Helix abeta*, *Iberusalonensis* and *Otalapuntala* [20].

African giant land snails (*Archachatina marginata*) have voracious appetite that is the ability to eat large amount of food [22]. The snails' ability to utilize a variety of readily available feed materials to achieve appreciable weight gains under intensive management and high dietary value of the meat, makes it suitable and cheaper alternative to other animal protein sources. [2]

Consumption of snails helps the consumers to get enough animal protein which helps to prevent lack of protein in the body. It was recommended that 6.5 gram of snail must be taken daily to ensure good health as snails contain 60-61% dry weight good quality protein with low cholesterol. The business of snail rearing provides income and source of protein to many families who are involved in the business

and has tremendously reduce poverty and created wealth. [12]

It is high time we integrated in to our farming system; some non-conventional meat source like snail will solve the problem of protein malnutrition. Snails are very popular as food delicacies, apart from texture and favourable nutritional value, snails have been reported to have high values of protein and low fat content. [26]

The protein consumption in Nigeria is below 67g recommended by the world health organization [13], snail production has gone to an advanced stage in America Europe and Asia but in Africa, much research work has not been carried out [23]. These countries are mostly located in the warm humid tropics where the level of animal protein intake represents about one tenth of the level of intake in the advanced countries [11].

He also pointed out that snail meat is useful in the treatment of some human diseases like anaemia, hypertension and asthma while it shell can be used in the production of bottom spring and other jewelleryes. It is unequivocally clear that many people require snail meat in their diet because of its importance in improving the activities of the hormone and enzymes and its improvement in the defence mechanism of the body. [11].

Snail is a high quality food that is rich in protein, low in fat and source of iron, calcium, magnesium and zinc [1]. Snail meat is high in protein (88.37%) and in iron (45-50/kg), low in fat and contains almost all the amino acid needed by human. Growth and nutritional performances of snail has been reported by many authors to be influenced by a lot of factors. [7]. The growth performance of snail is influenced by different housing types in West Africa, snail meat has traditionally been a major ingredient in the diet of people living in the high forest belt in cote d' Ivory for instance, it is estimated that 7.5 million kg of snail are eaten annually.[15]

In Ghana the demands currently out strips its supply. Growth and nutritional performance are also influenced by balanced diets feeding [24, 4]. The growth of snail like other animals differs with respect to what they are fed. There is also a strong and positive relationship between nutrient content of the feed and growth of snails [20].

As a result of continuous increase in growth of Nigerian population, the demand for animal protein became very acute. The increase in demand of proteineous food lead to price increase since the supply cannot meet the ever increasing demand. It is therefore necessary for man to look for a cheaper source of animal protein that can meet the nutrition requirements. [14]

Snails appear to be one of the cheapest sources of animal protein as they can be picked within surrounding. However, picking snails can lead to extinction of the animal, if process of multiply them through rearing is not practice. Snail meat has become popular culinary in various household. The cost of convectional proteineous food is on high side, so there is need to explore the non-convectional one like snail meat, in order to increase protein supply. [14]. It has been noted that snail meat contains low level of sodium, cholesterol and high

level of potassium hence it may be needed in the treatment of arteriosclerosis, anaemia, high blood pressure and other fat related ailments [8].

Nutritionally, snails are commonly fed with leaves from pawpaw, cocoyam and waterleaf, kitchen wastes grains, waste products, such as maize shaft, plantain peels, succulent vegetables including cabbage, pawpaw, pineapples, nuts, cherry, cassava, cocoyam, soft shoot and lettuce [19]. Other foods eaten by snails are flowers, potatoes, yams, and carcasses like dead birds, offal and dead ants, termites and cockroaches. Formulated diets promote rapid growth and conversion efficiency in animals but they are very expensive [25].

Naturally, snails are slow in growth. It was observed that well-fed and adequately managed giant snail are expected to reach their maximum growth between one and half to two years; while those on low feed quality are expected to fully mature between two and half to three and half years.[6].

However, the growth obtained through feeding young *Archachatina marginata* on plant food materials supplemented with compounded feed was significantly better than that obtained through feeding it only plant food materials [9].

The growth of snails like other animals differs with respect to what they are fed. There is also a strong and positive relationship between nutrient content of the feed and growth of snails. The need for research studies on the use of compounded ration for snail in order to solve the problem of scarcity of fruits, tuber and leaves during the dry season [3]. The provision of adequate feed, supplementary vitamins, calcium, minerals and water during the dry season is capable of thwarting the aestivation cycle and enhances greater productivity besides preventing drug wastage and bacteria growth over time. [20]

Growth performance is the measure of increase in body weight overtime and largely dependent on the amount of nutrient supplied and absorbed by the specific tissues of the body [18]. Growth performance of snails has been reported by many authors to be influenced by a lot of factors. It was reported that growth performance of snail is influenced by different housing types. [15]

It is unequivocally clear that many people require snail meat in their diet because of its importance in improving the activities of the hormone and enzymes and its improvement in the defence mechanism of the body, even the average citizen cannot afford most of the conventional animal protein source like chevon, mutton, Beef and other animal source. [20]

Although previous information on similar studies have been reported, current knowledge on the growth performance of snails fed with local feeds is necessary. Making use of available local feeds instead of conventional feeds will go a long way in increasing the population of snail in Nigeria. Therefore, the study evaluated the feed conversion ratio, the nutritional composition of the feeds and their influence on the growth performance of the snail.

2. Materials and Methods

A 10-weeks completely randomized design (CRD) feeding trial was conducted at the site of Agricultural Technology Department, Federal Polytechnic, Ado-Ekiti, Ekiti State, Nigeria. The state is located in south western part of the country, Ekiti State covers a land area of 6,353km square (2453sqmi) with a population estimated in 2005 to be 2,737,186. It enjoy tropical climate with two distinct seasons, these are rainy season (April to October) and dry season (November to March).

2.1. Experimental Design

Twenty (20) healthy-looking growing *Archachatina marginata* snails were divided into two groups of ten (10) each. The snails T₁ were fed Compounded feeds and T₂ *Talinum triangulare* leaves (water leaf). Fourteen days (2 weeks) trial feeding was done before the commencement of the experiment to allow for physiological adjustments. A wooden cage was used for the experiment and partitioned into two treatments groups.

The stand of the cage from ground were measure 5 fit and the length each side 30cm by 15cm in width. Wire mesh net were used to cover front side of the cage and the wood were properly perforated under for easy drainage of water and the cage were also filled to 5cm depth with loamy soil exposed to sunlight to get rid of harmful soil micro-organism. The soil was moistened regularly to keep favourable humidity for snail growth.

2.2. Experimental Procedure

Each group of the snails was fed with 50 grams of feed (Compounded feed and *Talinum triangulare* leaves (water leaf) daily. Digital measuring scale was used to measure their weight for 10 weeks for feeding trial. The floor of the pens was covered with loamy soil to about 5cm high from the bottom. The drinkers and feeders were emptied and washed on daily basis before fresh feeds and water were served.

In the morning of the next day, the leftover in the feeder as well as feed wasted on the floor were removed. Water was also sprinkled on the floor (soil) on daily basis to maintain adequate humidity and temperature in the pen. At the end of every three weeks, the soil was removed and replaced to

prevent any pathogenic manifestation in the pen.

The snails were weighed at the onset of the experiment and subsequently on a weekly basis. The parameters measured were growth (weight gain response), length and width. The weight was determined by using digital sensitive weighing balance while the length and width was measured on weekly basis using tape rule and vernier calliper respectively.

This study adopted a true experimental research, which investigated possible causes and effects relationship by exposing two experimental groups to two treatments conditions and comparing the results. It also required rigorous management of experimental variables and conditions by direct control and manipulation.

2.3. Statistical Analysis

The data obtained were recorded as mean \pm standard deviation. All data in each parameter were subjected to Descriptive Analysis. To determine if there was any significant difference due to the type of feed used. All statistical analysis were done using SPSS version 15.

3. Results

Table 1: showed the growth performance of *Archachatina marginata* fed with compounded feed and water leaf (*Talinum triangulare*). The highest weight gain was recorded by snails fed water leaf (*Talinum triangulare*) followed by those fed with compounded feed. The shell length gain was similarly influenced by the experimental diets. Snails on water leaf leaves had higher shell length gain than snails with compounded feed.

At the start of feeding trial, the mean initial shell circumference, length and body weight of the snail were given were T₁ (compounded feed) 3.38 \pm 0.17cm and 9.25 \pm 0.22cm and 47.53 \pm 0.53g respectively. The mean initial shell circumference, length and body weight of snail fed with T₂ (*Talinum triangulare*) were 4.31 \pm 0.12cm and 3.75 \pm 0.19cm and 57.16 \pm 0.79g.

Specific Growth Rate (SGR) and Protein Efficiency Ratio (PER) were higher in T₂ (water leaf) than T₁ which were fed with compounded feed. There is significant difference (P<0.05) in the growth data for marginata fed with these diets.

Table 1. Growth Parameters of *Archachatina marginata* fed with Compounded feeds and *Talinum triangulare*.

PARAMETERS	Compounded feed	Water leaf
Mean Initial shell circumference (cm)	3.38 \pm 0.17	4.31 \pm 0.12
Mean Final shell circumference (cm)	3.83 \pm 0.20	4.56 \pm 0.10
Shell Difference gain (SCF-SCI) (cm)	0.45 \pm 0.03	0.25 \pm 0.02
Mean Initial length (cm)	9.25 \pm 0.22	3.75 \pm 0.19
Mean final length (cm)	9.36 \pm 0.10	10.23 \pm 0.20
Length Difference gain (FL-IL) (cm)	0.11 \pm 0.12	6.48 \pm 0.01
Mean Initial weight (g)	47.53 \pm 0.53	57.16 \pm 0.79
Mean Final weight (g)	48.83 \pm 1.00	73.89 \pm 0.99
Weight difference (WF-W1) (g)	1.30 \pm 0.47	16.73 \pm 0.20
Specific growth rate (%/day)	0.01 \pm 0.06	0.05 \pm 0.05
Protein efficiency ratio	0.06	1.92

Table 2: showed the proximate composition of the experimental diets. T₂ (Water leaf) had low crude protein (8.74%) and ash (1.36%), when compared with the compounded feeds which had crude protein of 20% and ash 2.00%. The crude fiber (9.62%) were higher in the T₂ (Water leaf) than in compounded feeds which had crude fiber of 9.0% respectively.

Table 2. Proximate Composition of Snail (*Archachatina marginata*) fed Water leaf and Compounded Feeds.

Diet (%)	Compounded feed	Water leaf
Ash	2.00	1.36
Moisture content	8.70	8.74
Protein content	20.00	8.67
Crude fibre	9.00	9.62
CHO	52.33	68.12
Crude fat	7.07	3.49
Steroid mg/100g	1.27	1.09
Phosphorus	2.17	1.76

4. Discussion

This could be attributed to the enhanced growth performance of snails on this diet and the positive correlation between growth performance, shell length and shell width. A positive correlation between live weight gain, shell length gain, and shell width gain had been established especially in growing snails [17].

The range of shell length and width (9.25 to 9.36cm and 3.38 to 3.83 cm) of compounded feeds for growing snails fed 20% CP of compounded feeds and (3.75 to 10.23cm and 4.31 to 4.56cm) fed 8.67% CP of water leaf obtained in the present study were higher than the values (2.92 and 2.48cm for shell length and shell width) [3]. For growing snails fed 24.91% CP (3.75 to 4.31cm) and 8.67% CP of water leaf were lesser than the values (5.85 and 4.38cm for shell length and shell width, respectively). [21].

The disparity with these reports could arise from such factors as differences in age of snail, species as well as management and environment.

5. Conclusion

The result obtained showed that feeding snails with water leaf will aid growth. The significant difference ($P < 0.05$) observed in growth performance between those snails raised on water leaf and compounded feed might be due to the relatively low amount of fibre and higher protein content in compounded feed than the water leaf which may affect digestibility and feed utilization.

Recommendations

1. From the findings of this study, it was recommended that Agricultural extension workers should regularly

organize snail workshops, conferences and seminars for snail farmers.

2. Snail rearing in Schools, Colleges and other institutions of higher learning should be encouraged to establish Snailery as school demonstration farms to arouse students' interest as well as enable them acquire heliculture competencies for entrepreneurship, on graduation.
3. The government should sponsor seminars and workshops for snail farmers and the public who are interested in snail farming because of the nutritional and medicinal value of snail and train them on how to process it
4. Successful snail farmers should organize exhibitions of these African land giant snails, attend agricultural shows, and trade fair to display and disseminate the skills required in snail husbandry for the public and for patronage.
5. Researchers on snail farming should be motivated and assisted financially to publish their works for wider publicity on snail rearing which is still very new in the country.

Appendix

Appendix 1

The Snails in the Treatment cage



Appendix 2

Snail Feeds (COMPOUNDED FEEDS)



Appendix 3

Water Leaf (*Talinum triangulare*)



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