Effects of Feed Types on Growth Performance of African Giant Land Snails *Archachatina Marginata* in Abak Local Government Area

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Abstract
This study examined the response of the African giant land snails to concentrates, ripe pawpaw and sweet potatoes with regards to weight gains and feed conversion efficiency. A total of 100 snails were randomly allotted to five treatments of 20 snails each (each treatment has two replicates of 10 snails). Experimental randomized control group design was adopted for the study. The treatments are top grower mash; ripe pawpaw; sweet potatoes; ripe pawpaw and sweet potatoes (control); and combined top grower mash, ripe pawpaw and sweet potatoes. The snails were fed with these diets for 24 weeks. Results showed that snails fed with combination of top grower mash, ripe pawpaw and sweet potatoes recorded the highest mean body weight (30.5280) followed by snails fed top grower mash, while those fed ripe pawpaw had the least mean body weight (30.1315). It can be concluded that combined top grower mash, ripe pawpaw and sweet potatoes contribute better to the growth performance of African giant land snails than other feed types and recommended that snail farmers should feed their snails with combination of feed stuffs for increase in productivity of snail farming.

Keywords: Feed, Growth, Performance, Archachatina marginata, and Snails

Introduction

The essence of feeding snails is to aids reproductive capacity and increases their size. Therefore, snails convert feed into body weight when balance diet is given to them. Snails are voracious feeders, feeding virtually on all plant and animal substrates. African giant land snails are the largest known breed of snails in Africa (Okon, Ibom, Nsa & Ubua 2012). The snails belong to the kingdom of animalia, phylum of mollusca, class of gastropoda, family of archatinide and genus of archachtina. Ejidike (2016) reported that different strains of black skinned and white skinned African giant land snails can mate freely and fertilise each other, laying fertile egg clutches that hatch into black skinned and white skinned snailets in different proportions.

These snails are characterized by yellowish background with stripes, oval in shape, fast growing, and high percentage hatchability and have high reproductive potentials which make them better species than other for profitable snail farming. Snails farming are a method of culturing snails for human use, either for direct consumption as food, provision of high quality

protein, medicinal value, source of income and means of poverty alleviation among rural dwellers. Obinaju & Asa (2016) reported that snail farming is a profitable rural livelihood.

Snail rearing is practiced in open field and under controlled environment like net covered pens. Offiong, Udoh & Iwatt (2021) reported that snail can be reared in a small space in village, town and cities, at backyard farm or even at commercial level. They can adapt to various environmental conditions of which farmers need to be educated on that aspect. Intensively, snails need to be domesticated in standard pens with lid and well ventilated. The lid in the snail's pen should be well constructed to avoid them escaping. Offiong & Udoh (2017) stated that snails are wanderers and do not keep within bounds especially where the environment is friendly. Therefore snail housing must be escape proof and spacious in line with the growing stage of the snails.

Snails feeding are very important and a major factor a potential snail farmer should consider greatly. Feeding takes the largest percentage of the total cost of livestock production (Baruwa, Abogan & Kassali 2021). This is one of the distinct features of Agriculture. It is imperative for a farmer to understand snails feeding habit and types of food snails eat. Snails are wonderful animals, the effects of the food they eat are more pronounced in them than other livestock. When snails are fed on rich feed, a laudable yield is obtained. The size of snails depends on the quality and quantity of feed served. Snails should be fed as at when due to enhance growth and reproductive performance. Nwogor (2015) reported that snails eat a wide variety of food which could fall into these categories: leaves and vegetables, fruits, tubers, agricultural by-products, cereals, supplements, concentrates and minerals. Combination of concentrates, pawpaw fruits and sweet potatoes in feeding snails support growth and regular laying, good shell formation and resulting in healthy active snails. Thus a combination of at least three feed types pick from the various feed groups or classes is desired. Oluwatosin & Temitayo (2020), reported that the best result in snail rearing is obtained through the mixture of concentrates with natural feed sources. Combination of feed in adequate Proportions can give satisfactory growth performance in snails. Ogunyemi (2021) maintained that crude protein level from different feed sources aid weight gains in African giant land snails. Emelue & Omorzogbe (2018) reported that nutrients from feed stuffs aid body weight gains and shell growth in snails.

Feeding snails with concentrates increase their body weight due to protein and optimum energy level in the feeds. Nyameasem & Borketeyla (2014) stated that growth parameters in snails are significantly higher when fed with concentrate diets due to high nutritive values of the food. Similarly, various feed items from different diets contain suitable nutrients in the right proportions thereby making the feed palatable for snails consumption and increase their feed intake. Raimi & Olomola (2020) reported that combination of feed stuffs into diets of snails have no negative impact on feed intake and growth of snails but boost consumption and Utilisation of feeds as snails get to maturity fast due to quick feed conversion efficiency. Amata (2014) asserted that when snails consume formulated diets, vegetable and fruits, their feed

intake increased thereby enhancing weight and shell parameter gains. Given that information on the exact feed that can boost snails farming business for commercial purpose has received little attention, this study attempted to bridge the gap in knowledge on suitable feed types that would enhance growth performance of African giant land snails in Abak Local Government Area.

Statement of the Problem

The rate of protein-based food supply in Akwa Ibom State is not in tandem with demand and this is of great concern to the researcher. The low supply of protein food has caused citizens to suffer from protein deficiency leading to various diseases such as Kwashiorkor, delayed growth, pot bellies in children, weakened immune system and poor wound healing. If the problem is not addressed, some of these conditions could lead to death. The researcher longs to know what causes this and ways to alleviate same. It is against this background that this study is conducted to investigate the effects of feeds types on growth performance of snails in Abak Local Government Area.

Purpose of the Study

The study aimed at assesses the effects of feed types on the growth performance of African giant land snails. Specifically, the study sought to:

1. determine the effects of feed types (top grower marsh concentrates, ripe pawpaw; sweet potatoes; mixed ripe pawpaw and sweet potatoes; and combined top grower mash, ripe pawpaw and sweet potatoes) among weight gains of African giant land snails.
2. determine the effects of feed types (top grower mash concentrates; ripe pawpaw; sweet potatoes; mixed ripe pawpaw and sweet potatoes; and combined top grower mash, ripe pawpaw and sweet potatoes) among feed intake of African giant land snails.
3. determine the effects of feed types (grower mash concentrates; ripe pawpaw; sweet potatoes; mixed ripe pawpaw and sweet potatoes; and combined top grower mash, ripe pawpaw and sweet potatoes) among feed conversion efficiency of African giant land snails.

Research Questions

The following research questions guided the study:

1. What are the effects of feed types among weight gains of African giant land snails?
2. What are the effects of feed types among feed intake of African giant land snails?
3. What are the effects of feed types among feed conversion efficiency of African giant land snails?

Methodology

Experimental randomized control group design was used for the study. The population of the study consisted of 100 grower African giant land snails. The sample size of 100 snails was chosen using total enumeration sampling technique, due to the small and manageable size of the population. Data were collected through the use of parco, PAT No.142259 spring balance. Since the measuring instrument was already calibrated, standardized and validated by the manufacturer, no other validation was done. To check if the measuring instrument was reliable, it was cross checked and tested to be sure it is functional.

Experimental Procedure

The feed treatments are:

Treatment1 (Experimental group, top grower mash)

Treatment2 (Experimental group, ripe pawpaw)

Treatment3 (Experimental group, sweet potatoes)

Treatment4 (Control group, mixed ripe pawpaw and sweet potatoes)

Treatment5 (Experimental group, combined top grower mash, ripe pawpaw and sweet potatoes)

Experimental Procedure for treatment 1 (Top grower mash concentrates)

Twenty grower African giant land snails were reared in a palm frond strip basket with lid and adequate perforations to allow for ventilation and drainage. The bottom of the basket was filled with loamy soil to a depth of 10cm.The basket was raised on a stand to a safe distance and place the stand in a container of mixtures of spent oil and water and kept under a shade. Snails were acclimatized for two weeks. Top grower mash feed were procured from Agro products dealer at Abak market. Eighty gram of top grower mash was placed in a shallow plastic dish in the pen in the evening for six months (180days). Feed dishes were removed and cleaned daily and the left over feed were collected and measured to determine daily feed intake, snails body weight were measured at the beginning of the experiment and thereafter bi-weekly using parco PAT No.14229 spring balance. **Treatment 2-5 are governed by the same condition as explained in treatment 1**.The daily feed intake and body weight gains were assessed using parco PAT No.142259 spring balance. Data collected were analyzed by descriptive statistics which include mean and standard deviation.

Results and Discussion

Research Question 1: What are the effects of feed types among weight gains of African giant land snails?

Table 1: Descriptive Statistics for Effect of Feed Types Among Weight Gains of Snails.

Treatments	N	Mean Initial Body Wt	Final Body Wt	Mean Body Wt	Std. Deviation	Std. Error	95% Confidence interval for mean Lower Bound	Upper Bound	Minimum	Maximum
Treatment 1	20	29.80	607.16	30.3580	.20107	.04496	30.2639	30.4521	29.95	30.70
Treatment 2	20	29.80	602.63	30.1315	.23444	.05242	30.0218	30.2412	29.81	30.52
Treatment 3	20	29.80	603.56	30.1780	.16650	.03723	30.1001	30.2559	29.84	30.45
Treatment 4	20	29.80	604.84	30.2425	.17335	.03876	30.1614	30.3236	29.90	30.50
Treatment 5	20	29.80	610.56	30.5280	.24804	.05546	30.4119	30.6441	30.10	30.90
Total	**100**	**29.80**	**605.752**	**30.2876**	**.24827**	**.02483**	**30.2383**	**30.3369**	**29.81**	**30.90**

Sources: SPSS Results, 2023

The growth performance among the weight gains of snails as presented in Table 1 shows that snails treatment 5 (combined concentrates, pawpaw and sweet potatoes) performs better than other food treatment with the highest mean body weight of 30.5280. This was followed by snails in treatment 1 (concentrates) with mean body weight of 30.580 While treatment 4 (mixed pawpaw and sweet potatoes), treatment 3 (sweet potatoes) and treatment 2 (pawpaw) showed mean body weight of 30.2425, 30.1780and 30.1315 respectively. However, the highest mean body weight of snail in treatment 5 implies that feed ingredients in this treatment 5 have good potential of enhancing snails growth ,while other feed treatments also have capability of sustaining snails farming as evidence in progressive increased in body weight of snails throughout the feeding trials.

Research Question 2: What are the effects of feed types among feed intake of African giant land snails?

Table 2: Descriptive Statistics for Effect of Feed Types Among Feed Intake of Snails

Treatments	N	Mean Feed intake	Std. Deviation	Std. error	95% Confidence Interval for mean Lower Bound	Upper Bound	Minimum	Maximum
Treatment 1	20	510.2000	54.02007	12.07926	484.9178	535.4822	400.00	600.00
Treatment 2	20	308.4000	60.19390	13.45976	280.2284	336.5716	222.00	400.00
Treatment 3	20	419.5500	48.74750	10.89893	396.7383	442.3617	350.00	500.00
Treatment 4	20	495.1500	79.07177	17.68099	458.1433	532.1567	370.00	640.00
Treatment 5	20	537.0000	58.00635	12.97061	509.8522	564.1478	410.00	620.00
Total	**100**	**454.0600**	**102.2321**	**10.22321**	**433.7749**	**474.3451**	**222.00**	**640.00**

Sources: SPSS Results, 2023.

Result in Table 2 indicated that mean feed intake of snails in treatment 5 shows the highest value of 537.0000, followed with decline in treatment 1 with mean value of 510.2000, while treatment 4, treatment 3 and treatment 2 showed decline mean values of 495.1500,419.5500 and 308.4000

Research Question 3: What are the effects of feed types among feed conversion efficiency of African giant land snails?

Table 3: Feed Conversion Efficiency of Snails

Treatments	Mean Feed Intake	Mean Body Weight	Feed Conversion Efficiency
Treatment 1	510.2000	30.3580	16.8061
Treatment 2	308.4000	30.1315	10.2351
Treatment 3	419.5500	30.1780	13.9025
Treatment 4	495.1500	30.2425	16.3727
Treatment 5	537.0000	30.5280	17.5904
Total	**454.0600**	**30.2876**	**14.9813**

Sources: SPSS Results, 2023.

Result in Table 3 indicated that feed conversion efficiency of snails fed treatment 5 was the highest with 17.5904, followed by treatment1 with 16.3727, with decline in Treatment 4, Treatment 3and Treatment 2 with 16.3727,13.9025, and 10.2351 respectively . The highest feed conversion efficiency in treatment 5 means that the feed was more nutritious than the others.

Discussion of Results

Feed Types Among Weight Gains of African Giant Land Snails

The highest mean body weight was recorded by snails fed T5 (combined concentrates, pawpaw and sweet potatoes followed by those fed TI (concentrates) while those fed T2 (ripe pawpaw) had the least. Feed treatment 5 contains crude protein from various feed stuff, hence taste sweet and well digested. This finding supports the study of Ogunyemi (2021) who found that crude protein level from different feed sources aids weight gains in African giant land snails. This result corroborates with the reports made by Emelue & Omonzogbe (2018) in their studies, that nutrients from various feed stuffs aid body weight gains and shell growth in snails.

Feed Types Among Feed Intake of African Giant Land Snails

The highest mean feed intake was recorded by snails fed T5 (combined concentrates, ripe pawpaw and sweet potatoes), followed with decline in T1 (concentrates), T4 (mixed ripe pawpaw and sweet potatoes), T3 (sweet potatoes) and T2 (ripe pawpaw) respectively. This result confirms the result of the study by Raimi & Olomola (2020) who reported that combination of feed stuffs into diets of snails have no negative impact on feed intake and

growth of snails but boost consumption and utilization of feeds as snails get to maturity fast due to quick feed conversion efficiency. This result is in consonance with the result of Amata (2014) who reported that when snails consumed formulated diets and vegetable as well as fruits their feed intake increased thereby enhancing weight and shell parameter gains.

Feed Types Among Feed Conversion Efficiency of African Giant Land Snails

The highest mean feed conversion was recorded by snails fed T5 (combined concentrates, ripe pawpaw and sweet potatoes), followed with decline in T1 (concentrates), T4 (mixed ripe pawpaw and sweet potatoes), T3 (sweet potatoes) and T2 (ripe pawpaw) respectively. This result confirms the result of the study by Raimi & Olomola (2020) who reported that combination of feed stuffs into diets of snails have no negative impact on feed intake and growth of snails but boost consumption and utilization of feeds as snails get to maturity fast due to quick feed conversion efficiency.

Conclusions

It could be concluded that result from the study revealed that, combination of snails feed with different feedstuffs played a significant role in growth performance of African giant land snails. The study also revealed that fast growth rate of snails could be achieved by mixture or combination of different feedstuffs. This study shows that, there is an indication that large scale production of snails can be achieved when snails are placed on the consumption and utilization of various feed materials as snails get to maturity fast due to fast growth rate.

Recommendations

This paper recommended that:

1. Snail farmers should feed their snails with concentrates, fruits and tuber as sole feeding regimes.
2. Snail farmers should feed their snails with mixture or combination of concentrates with fruits or tubers as this enhance growth performance in snails.

References

Amata, I. A. (2014). Comparative evaluation of the growth performance of African giant land snails fed formulated diets and three selected edible vegetables. *Advance Research in Agriculture and Veterinary Science. 1(1):1-5.*

Baruwa, O. I., Abogan, P. O. & Kassali, R. (2021).Economic of raising African giant land snails in Osun State Nigeria. *International Journal of Agricultural Economics and Rural Development, 5:1-7.*

Ejidike, B. N. (2016). Growth response of African giant land snails fed on single plant leaf or leave supplemented with diet of 25% crude protein. *International Journal of current Micro-biology and Applied Sciences, 5(5):934-939.*

Emelue, G. U. & Omonzogbe, E. A. (2018). Growth performance of Archachatina marginata fed formulated diets with different calcium sources. *Malaysian Journal of Sustainable Agriculture, 2(1):1-4.*

Nwogor, U. A. (2015).Comparative study on the effects of Citrillus lanatus and Cucumis sativus on growth performance of Archachatina marginata. *American Journal of Agriculture and Forestry, 3(4):135-139.*

Nyameasem, J. K. & Borketeyla, E. A. (2014).Effects of formulated diets on growth and reproductive performance of African giant land snails. *Journal of Agriculture and Biological Science, 9(1):1-6.*

Obinaju, L. U. & Asa, U. A. (2016). Economics of rural livelihoods: a case study of snail farming in Itu Local Government Area in AkwaI bom State. *American Journal of Research Communication, 4(2):75-85.*

Offiong, A. A. & Udoh, F. E. (2017). Agricultural education and vocational snail production: towards meeting protein consumption Benchmark in Nigeria. *African Journal of Educational Assessors, 3(1):1-8.*

Offiong, A. A., Udoh, F. E. and Iwatt, E. B. (2021). Entrepreneurial skills needed for educating in school youths in snail farming enterprises for self-reliance in Akwa Ibom State. International *Journal of Advancement in Education, Management Science and Technology. 4(3):31-39.*

Ogunyemi, O. O. (2021). Growth performance of African giant land snails fed varying dietary protein level of plant sources. *Journal of Wildlife Biodiversification, 3:3-6.*

Okon, B., Ibom, L. A., Nsa, E. & Ubua, J. (2012). Reproductive and growth trains of parents and F1 hatchlings of Achatina achatina snails under mixed feeding regime with graded level of swamp taro cocoyam and pawpaw. *Journal of Agriculture Science. 1(11)289-298.*

Oluwatosin, R. C. & Temitayo, O. R. (2020).Effects of different feeds on growth performance of Archachatina marginata. *Nigerian Journal of Animal Science, 22(2):22-27.*

Raimi, C. O. & Olomola, R. T. (2020).Effects of different feeds on growth performance of Archachatina marginata. *Nigerian Journal of Animal Science, 22(2):222-227.*