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Research Article

EFFECTS OF *Telfairia occidentalis* AND *Cnidoscolus acornitifolius* SUPPLEMENT ON THE GROWTH OF AFRICAN GIANT LAND SNAIL (*Archachatina marginata* - Swaison)

Akinola O.O, Okeke E.N, Aghimien E.V, Appah, O.R
Federal College of Forestry, Jericho Hill, Ibaban
Corresponding Author E-mail: funmalf@yahoo.ca

Abstract

The experiment was carried out to determine the effect of Telfairia occidentalis and Cnidoscolus acornitifolius on the growth of African giant land snails (Archachatina marginata). A total of thirty six (36) juvenile snails were used for the feeding trials which covered a period of eight weeks. There were four treatments which were replicated thrice with each replicate having three snails. The control experiment, treatments 2, 3, and 4 were designed with 0%, 15% of Telfairia occidentalis, 15% of Cnidoscolus acornitifolius and mixture of 7.5% Telfairia occidentalis and 7.5% of Cnidoscolus acornitifolius respectively. Weight gain, feed intake, feed efficiency, shell length and shell circumferences were part of the parameters assessed. There were significant differences in average weekly weight gain, feed intake, final weight gain as well as dressing weight. Snails in treatment 2 with 15% of Telfairia occidentalis had the highest average weekly weight gain of (6.20g), while treatment 3 had the lowest (3.80g). Treatment 2 also had the best result in shell length and dressed percentage.

Key words; Supplement, Growth, Snail, *Telfairia occidentalis, Cnidoscolus acornitifolius*

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Introduction

History had it that snail farming began with a Roman farmer called Lippious, who first established a small farm around 560AD, purposely to reduce fattening and for better prices (Elmslie, 1982). Kehinde *et al.*, (2009), reported that snail meat is nutritious, low in fat and cholesterol, when compared to other source of protein, a quality that makes it

suitable in diet of hypertensive patients. Snail meat competes favorably with poultry eggs and flesh in essential amino acid and digestible protein (Imevbore, 1990). Various researches have been undergone on food requirement and growth performance of snail species under captive rearing (Akinola *et al.,* 2017).

Telfairia occidentalis commonly known as fluted pumpkin is an herbaceous, climbing annual plant of the family Cucurbitaceae. It grows fast and the vines may grow up to 30.5m in length. It has very high nutrients content, the leaves and tender vines are a good source of minerals when consumed and the seeds contain protein and oil which can be consumed. It is also known to contain high percentage of iron, vitamins E and K making it a high blood builder. The leaf extract is usually taken as it enhances the body, mostly when tired or dizzy. It is also eaten raw for immediate energy gain.

Cnidoscolus acornitifolius locally known as Iyana-Ipaja among the Yoruba speaking people in Nigeria belongs to the family Euphorbiaceae. It thrives very well under normal temperature, if the temperature is too high it will lead to ineffectiveness of the plant.
Objective of this study is to determine the feed intake, growth rate, and carcass/dress weight of snails fed with *Telfairia occidentalis* and *Cnidoscolus acornitifolius* supplement and those fed with conventional feedstuff only.

Materials and methods

Experimental site

The experiment was carried out at the Agricultural Extension and Management Teaching and Research, Farm, Federal College of Forestry, Ibadan. It is located approximately on latitude $7^{0}9'$North of the equator and longitude $3^{0}5'$ East of the Greenwich Meridian. It falls within the rain forest vegetation, with mean annual rainfall of about 1300mm-1500mm and average relative humidity of about 80-85% (FRIN, 2006).

Feed diet composition

Four experimental diets were prepared. The control experiment, treatments 2, 3, and 4 were designed with 0%, 15% of *Telfairia occidentalis*, 15% of *Cnidoscolus acornitifolius* and mixture of 7.5% *Telfairia occidentalis* and 7.5% of *Cnidoscolus acornitifolius* respectively.

Experimental procedure

Forty-medium sized juvenile snails were purchased from Oje market, Ibadan. Thirty six snails were selected from the batch for the feeding trials. The selected ones were housed in an already prepared pen that had been filled with top soil at a depth of ten inches and

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watered three days before the introduction of the snail into the pen. Twelve snails were allotted to each treatment in three replicates, with three snails making a replicate. The snails were fed daily, between the 6.30am-7.00am.

Parameters assessed include feed intake, body weight gained, feed efficiency, shell length, shell circumference, groove diameter on weekly basis, while the visceral length and the dressed weight percentage were computed at the end of the experiment, The experimental design was Completely Randomized Design (CRD), while all data generated were analyzed using Analysis of Variance (ANOVA).

Data collection

Feed intake: This was determined weekly by subtracting the quantity of feed left in the trough from the total quantity of feed given. Similarly the same method was used to determine the weekly and total quantity of feed eaten

$$\frac{Quantity\ served\ (g) - \ Quantity\ left\ (g)}{7\ days}$$

Body weight gain: The body weight gained was determined weekly and was calculated by subtracting weight on each replicate on the 7th day from the previous weight as at the 1st day

$$\textbf{Body weight gain} = \frac{\boldsymbol{Final\ weight\ (g) - Initial\ weight\ (g)}}{\boldsymbol{7\ days}}$$

Feed efficiency: this was calculated by dividing the weekly weight gain per replicate by the total amount of feed consumed by the snail of the replicate.

$$\textbf{Feed efficiency} = \frac{\boldsymbol{weight\ gain\ (g)}}{\boldsymbol{feed\ intake\ (g)}}$$

Shell length: a graduated meter rule was used to measure posterior from the tip to the base of the groove of each snail in order to determine the shell length. The summation per replicate was divided by three in order to find the average length

Shell circumference: The circumference of each snail was measured with the use of veneer caliper. The total sum was divided by three to find the common average of the shell circumference.

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Groove diameter: This was measured using a graduated ruler to measure ventrally the length of the groove. The individual readings are summed together and divided by three of each replicate weekly.

Visceral weight: This was measured after the snail has be sacrificed. Sensitive balance was used to weigh the visceral (intestine) from three snails out of each treatment.

Dressing %: the visceral was detached from the foot in order to get the dress weight. The dressed carcass percentage is expressed mathematically as

$$\frac{Live\ weight - visceral\ weight \times 100}{live\ weight}$$

Sensory evaluation: A modified hedonic scale was used to score the sample from each treatment for its flavor, juiciness, tender and overall acceptability.

Statistical Analysis: data generated were subjected to one-way test (Analysis of Variance ANOVA), using Statistical Package for Social Statistics (SPSS) and test for the mean using Duncan Multiple Range Test.

Results and Discussion

Table 1 shows the Proximate Nutrient Composition of the test ingredients (*Telfairia occidentalis* and *Cnidoscolus acornitifolius* as compared to groundnut cake meal). The result presented in Table 2 shows that groundnut cake meal had more crude protein value than the two assessed test ingredients while *Telfairia occidentalis* has better crude pr*otein content* than *Cnidoscolus acornitifolius* leaf.

Table 1: Gross composition of the experimental diets

INGREDIENT	% (T1)	TOC 15% (T2)	CA 15% (T3)	TOC7.5/CA7.5 (T4)
Maize	22.00	22.00	22.00	22.00
Wheat bran	12.20	12.20	12.20	12.20
Brewery Dry Grain	10.00	10.00	10.00	10.00
Fish Meal	4.00	4.00	4.00	4.00
Soya Bean Meal	24.20	24.20	24.20	24.20
Groundnut Cake	10.00	8.50	8.50	8.50
Bone Meal	2.30	2.30	2.30	2.30
Lime stone	9.80	9.80	9.80	9.80
Palm kernel cake	5.10	5.10	5.10	5.10
Premix grower	0.40	0.40	0.40	0.40
TOC		1.50		
CA			1.50	
TOC/CA				1.50
Total	100	100	100	100
Calculated analysis				
Crude protein	20.10	19.88	19.44	19.04
Crude fibre	5.46	5.56	5.66	5.76
M>E(Kcal/kg	2.65	2.63	2.62	2.61

TOC= *Telfairia occidentalis*, CA= *Cnidoscolus acornitifolius*

Table 2: Proximate Composition of *Telfairia occidentalis* and *Cnidoscolus acornitifolius* as compared to Groundnut cake

Nutrient (%)	*T. occidentalis*	*C. acornitifolius*	Groundnut cake
Dry matter	91.00	91.23	89.17
Crude protein	35.10	20.82	48.00
Crude fibre	12.70	12.04	3.81
Ether extract	9.60	5.33	9.16
Ash	10.90	10.00	5.50
N-free extract	31.70	43.01	22.70
Gross energy (MJ/Kg)	3413.00	2846.32	2530.00

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The growth performance characteristics of *Archachatina marginata* fed with *Telfairia occidentalis* and *Cnidoscolus acornitifolius* is shown on Table 3. There were significant differences (P<0.05) in average final weight, average weekly weight gain, average feed intake, average dressing weight, visceral length and feed efficiency.

Table 3: Growth Performance Characteristics of *Archachatina marginata* fed with *Telfairia Occidentalis* and *Cnidoscolus acornitifolius* based diet

	T_1	T_2	T_3	T_4	SEM
Av. Initial weight/snail (g)	130.00	134.00	116.00	110.00	3.37
Av. Final weight/snail (g)	157.00^b	171.00^a	139.00^d	142.00^c	3.84
Av. Weekly weigh (g)	4.50^c	6.20^a	3.80^d	5.30^b	1.02
Av. Weekly feed intake (g)	24.50^c	28.53^a	23.50^d	26.84^b	1.51
Av. Shell length (cm)	11.41	11.66	10.63	10.72	0.71
Av. Shell circumference (cm)	3.65	3.77	3.53	3.65	0.30
Av. Groove length (cm)	6.06	6.07	5.87	6.03	0.30
Av. Visceral weight (g)	12.43	11.80	9.13	8.50	0.97
Av. Shell weight (g)	34.10	37.90	32.00	34.31	1.22
Dressing weight (g)	37.66^d	42.00^a	38.04^c	40.10^b	0.75
Feed efficiency	0.18	0.22	0.16	0.19	0.01
Number of egg laid	-	13.00	-	5.00	2.48
Weight of egg laid (g)	-	1.16	-	2.68	1.13

The improved final weight among the snails fed with test ingredients over those of the *Telfairia occidentalis* could be attributed to the presence of the test ingredient. *Telfairia occidentalis* leaf meal is known to be source of very highly soluble protein and could easily release nutrient in animals. Also, the increase in the final weight of snail fed with diets 2 and 4 could be attributed to the neutralization of the anti-nutritional factors usually associated with forages in the diets. Normally, there is a relationship between feed intake and body weight gain, snails fed with the test ingredients had better feed intake, this could be attributed to level of crude fiber, nitrogen free extract and energy values of the test ingredients which could be ideal for optimal performance.

Snails of treatment 4 could be well balanced in nutrient digestibility as a result of the combination of both *Telfairia occidentalis* and *Cnidoscolus acornitifolius* leaf meal which have good protein and energy sources. This result agrees with the works of Asimiyu

(2009) and Fasuyi (2005), which gave (P<0.05) improvement in feed intake when incorporated in the diets of snails and rabbits. The dressing weight gave a significant improvement, in that all the snails fed with the test ingredient separately or mixed gave better result. This could be as a result of the test ingredients in their diets. Snails fed diet 2 had the highest dressing weight (42.0g), followed by those of diet 4 (40.10g), diet3 (38.34g) and finally diet 1 (37.66g). The dressing weight obtained in this study agreed with the works of Cobbinal, (2006) and Asimiyu (2009) that reported similar weight gain when *Archachatina marginata* were fed with okra leaf meal and *Telfairia occidentalis* leaf meals respectively. There were significant difference (P<0.05) in shell length, and the groove length. This means that the test ingredient in the diets positively influenced the development of the shell length and the oral groove. In terms of number of eggs laid and average egg weight, snails of treatment 2 and 4 had 13(1.16g) and 5 (2.68g) respectively. Although, treatment 2 had more number of eggs, those of treatment 4 had better egg weight; this might have influence on egg hatchability.

Result of sensory evaluation of *Archachatina marginata* fed with *Telfairia occidentalis* sand *Cnidoscolus acornitifolius* based diet is shown in Table 4. There were no significant difference (P>0.05) among the treatment means, this means that the test ingredient did not influence the meat quality in terms of flavor, juiciness, tenderness and overall acceptability.

Table 4: sensory evaluation of *Archachatina marginata* fed with *Telfairia occidentalis* and *Cnidoscolus acornitifolius* based diet

Parameters	Treatments				
	T_1	T_2	T_3	T_4	SEM
Flavor	5.2	5.7	4.2	9.2	1.09
Juiciness	0.2	3.3	1.4	6.2	1.30
Tenderness	1.2	3.3	7.2	4.2	1.24
Overall acceptability	7.2	5.3	6.2	10.2	1.06

Conclusion

The inclusion of test ingredient has greatly affected the snails in terms of final weight, weekly weight gain and weekly feed intake. It could be concluded that *Telfairia occidentalis,* which had the highest crude protein, has affected both treatment 2 and treatment 4 in terms of their growth performance. During the course of the experiment

T_2 and T_4 laid eggs, this could be an index that the presence of protein in *Telfairia occidentalis* affected the reproductive performance of the snails. It is therefore recommended that *Telfairia occidentalis* should be used by snail farmers as a good source of feed, because it is high in crude protein which serves as body building blocks whether used separately or by mixing with other test ingredients as in the case of T_4 which is the mixture of *Telfairia occidentalis* and *Cnidoscolus acornitifolius*.

References

Akinola O.O, Okeke E.N and Aghimien E.V (2017); Effects of yam peel meal based diets on the growth of African giant land snails (*Archachatina marginata* – swaison). Book of proceeding 39th Annual Conference of Forestry Association of Nigeria, pp 666-671

Asimiyu, A.K (2009): Effect of Fluted Pumpkin *Telfairia occidentalis* Leaf Meal substitution for Soya Bean Meal on the production of African Giant Land Snails. Unpublished HND Project, Federal College of Forestry, Ibadan. Pp3

Cobbinal, J.R. (2006); Snail Farming in West Africa, Published by Technical Centre Agriculture and Rural Cooperation (CTA). Pp9

Elmslie, L.J (1982); Snail and snail farming. *World Anim. Rev.*, 41:20-26

Fasuyi, A.O. (2005); Nutritional potential of Some Tropical Vegetable Leaf Meal: Chemical Characterization and Functional properties. *Africa Journal of Biotechnology* pp 50-53.

FRIN (2006); Agro-metrological station report, Forestry Research Institute of Nigeria, Ibadan. Pp 96-120

Imevbore, E.A (1990) Observation on the response of the African Giant Land Snails (*Archachatina marginata*) to varying moisture content. *J. Ecol.*, 31:265-267

Kehinde, A.S., Tewe, O.O., Babatunde, T.O and Bobadoye, O (2009); Effect of age on The Chemical Composition and carcass Analysis of African Giant Land Snail (*Archachatina marginata*). *Journal of Forestry Research and Management.* Forestry Research Institute of Nigeria