EVALUATION OF SOME SELECTED LEAVES FOR FEEDING AFRICAN GIANT LAND SNAIL (*Achatina achatina* L.)

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ABSTRACT
Feeding trial was conducted on One hundred and twenty (120) to evaluate the utilization of four different leaves used for feeding of African Giant Land Snail (*Achatina achatina*). Grower snails were used in a Completely Randomised Design with 4 treatments replicated 3 times with 10 snails per replicate. The treatments were *Spinach olaracea* Leaves, *Ipomoea asarifolia* leaves, *Cucurbita pepo* leaves and *Commiphora africana* leaves. Weight gain, Shell length, Shell breadth, Aperture breadth, and Feed intake were measured weekly. The result obtained showed significant difference ($p<0.005$) among the treatment means in final weight, weight gain, shell length, shell breadth, aperture breadth and feed intake. Feed conversion ratio was highest ($p<0.005$) for snails fed with *Spinach olaracea,* followed by *Ipomoea Asarifolia,* then *Cucurbita pepo* and *Commiphora africana* leaves. Therefore, the final Weight gain, Shell length, Shell width, Aperture width and Feed intake of the experimental Snail fed the selected edible leaves was represented in this descending order: *Ipomoea asarifolia* > *Spinach olaracea* > *Cucurbita pepo* > *Commiphora africana* leaves. The result of this study indicated that *Ipomoea asarifolia, spinach olaracea Cucurbita pepo* and *Commiphora africana* leaves can serve as feed for African Giant Land Snail (*Achatina achatina*).
Key words: *Ipomoea asarifolia, Curcubita pepo, Commiphora africana, Spinach olaracea, Achatina achatina*

INTRODUCTION
Snails dwell mostly in humid forest areas in West Africa from where they are gathered by villagers for consumption and other uses (Ademosu, Omidigi, 1999). In recent times, the wild snail population has declined considerably due mainly to the impact of man and other anthropogenic factors including deforestation, slash and burn agricultural practices and overexploitation of this animal resource stemming from the world teaming population hence the few remaining species are captured before they reach maturity. Usually, snails become scarce during the dry season hence expensive at this period (Amusan, 2002). The need to enhance the mass production of snails cannot be overestimated because snails can be reared both on small scale and large-scale production systems. Snail rearing can be seen as a veritable means of generating income and to achieve self sufficiency in hard times as presently experienced in Nigeria today. It is therefore necessary to domesticate snails in order to save the species from going in to extinction. To effectively do this, various plant materials need to be evaluated as feedstuff for snails. The present research is focused on evaluation of some selected leaves: (*Spinach oleracea, Ipomoea asarifolia, Commiphora africana, Curcubita pepo*) as feed resource for snails.

MATERIALS AND METHOD
A total of 120 (one hundred and twenty) average weight (0.538 g) grower snails were used for this research. This experiment was carried out in a local snail farm (Bayan Area Council) in Dutsinma Local Government, Katsina State, for the period of 6 weeks. The snails were weighed on arrival and randomly allotted to four treatments in a completely randomized design. Each treatment was in triplicate, having ten sails each. The snails were housed in a discarded car tire's and covered with mosquito net. The treatments were *Spinach olaracea* Leaf, *Ipomoea asarifolia* leaf, *Cucurbita pepo* leaf and *Commiphora Africana* leaf. Weight gain, shell length, shell breadth, aperture breadth, and feed intake were measured weekly. The thirty marked snails from each treatment were weighed and measured at the end of the experiment. Proximate analysis was carried out on the experimental diets and the fecal sample per replication using standard AOAC methods. Analysis of variance was carried out to determine the Growth performance of African Giant Land Snail (Achatina Achatina) on experimental diets using SAS (SAS 2001).

RESULTS AND DISCUSSION

The snails in all the treatments gained appreciable weight across all the treatments as can be seen in table (2). The highest weight gain was observed in treatment B (*Ipomoea asarifolia*) leaves, with a mean total weight gain of 2.510 grams/snail followed by treatment A (*Spinach olaracea*) leaves, with 1.587 grams/snail, treatment C (*Cucurbita pepo*) leaves, 1.507 grams/snail, while treatment D (*Commiphora Africana*) leaves recorded the lowest weight gain with 0.863 grams/snail. The result indicated that there were significant differences ($p<0.05$) in the treatments diets but no significant differences ($p>0.05$) were observed between treatment A (*Spinach olaracea*) and treatment C (*Cucurbita pepo*) leaves.

Significant differences ($p<0.05$) were observed in diet B (*Ipomoea asarifolia* leaves) with average mean shell increment of 0.078 mm/snail, this conformed with reports of Aribisala (1999) that there is direct correlation between shell length increment and growth of the snails, every factor that affects the growth rate would also affect the shell length increment. It also conformed with the reports of Eze *et al., (*2013) who indicated that when snails were fed herbages and poultry waste based diet, the gain in length was significantly higher ($P<0.05$) than gain in length as a result of feeding standard poultry diet and this indicate positive impacts of herbages/leaves in shell length increment of snails despite the availability of calcium in the standard poultry diets even though the shell of snail is made of calcium which is present in the Ash (Hamzat 2004; Omole *et al* 2008).Thus, no significant differences ($p>0.05$) were observed between treatment A (*Spinach* olaracea) 0.042 mm/snail and treatment C (*Cucurbita pepo*) 0.031 mm/snail while treatment D (*Commiphora africana*) recorded the lowest 0.019 mm/snail.

The analysis of variance shows that there were significant differences ($p<0.05$) between the treatments in terms of shell breadth increment. Treatment A (*Spinach olaracea*) had the highest breadth increment with 0.206 mm/snail followed by treatment B (*Ipomoea asarifolia*) 0.145 mm/snail while treatment C (*Cucurbita pepo*) had 0.090, treatment D (*Commiphora africana*) recorded the lowest 0.060 mm/snail, but no significant difference ($p>0.05$) were observed between treatment C and D 0.090, 0.060 mm/snail respectively.

The values across all the treatments showed that the snails did well on the four treatments in terms of shell aperture increment and there was significant difference ($p<0.05$) between the treatments diets. Highest increment was observed in treatment C (*Cucurbita pepo*) 0.097 mm/snail, there was also significant difference ($p<0.05$) between treatment B (*Ipomoea asarifolia*) 0.031 mm/snail and treatment A (*spinach olaracea*) 0.020 mm/snail, while treatment D (*Commiphora africana*) was the least having 0.019 mm/snail.

Highest feed intake was observed in treatment A (*Spinach olaracea*) 47.63 grams/snail followed by treatment B (*Ipomoea asarifolia*) 45.47 grams/snail While Treatments C and D (*Cucurbita pepo and Commiphora africana*) recorded 29.96 and 20.06 grams/snail respectively. The analysis of variance shows that significant difference exists between the treatments ($p<0.05$).

The highest feed conversion ratio as can be seen in (table 2) was observed in treatment A (*Spinach olaracea*) 26.980 followed by treatment B (*Ipomoea asarifolia*) 24.343 and treatment C (*Cucurbita pepo*) 23.905 while the lowest feed conversion ratio was recorded in treatment D (*Commiphora africana*) 20.790. The analysis of variance shows that there is significant difference ($p<0.05$). The zero mortality rate recorded could be due to proper management practices adhered to during the course of the feeding trial. Again it could be due to "hardy" nature of snail. This observation is in line with of (FAO 1986, Amusan and Omidiji 1998) that the snail is "hardy" in nature and can tolerate adverse environmental conditions better than other livestock.

CONCLUSION AND RECOMMENDATION

CONCLUSION

The results obtained in this study indicated that *Achatina achatina* respond positively to all treatment diets used in this study. Best performance in terms of growth response, feed intake and feed conversion ratio was obtained in *Achatina achatina* Snails fed with (*Ipomoea asarifolia*) leaves, followed by (*Spinach olaracea*) leaves and (*Cucurbita pepo*) leaves. Apart from the good performances of snails fed with these treatment diets, (*Ipomoea asarifolia*) leaves was available all the year round all over the country to the farmers since it can be obtained at little or no cost.

RECOMMENDATIONS

1. *Ipomoea asarifolia* plant and *Cucurbita pepo* leaves which has been hitherto been thought of as an undesirable plant material (weed) could be used in feeding of *Achatina achatina.*

2. Being able to use *Ipomoea asarifolia* plant and *Cucurbita pepo* leaf as feed stuff offers the opportunity of making the environment pollution free and farmers can be encouraged to raise snails to generate additional income.

3. *Ipomoea asarifolia* was considered easily accessible and available all the year round all over the country to the farmers and it can be obtained at little or no cost.

4. Utilization *Spinach olaracea* leaf, *Ipomoea asarifolia* plant and *Cucurbita pepo* leaf will effectively reduce the cost of snail production.

5. Future research should be conducted to determine the cost implication of utilizing the selected leaves.

TABLE 1: Proximate Composition of the Experimental Diets

Parameters	**Treatment (A) (*Spinach*)**	**Treatment (B) (*Ipomoea*)**	**Treatment (C) (*C. pepo*)**	**Treatment(D) (*C. africana*)**
Moisture	36.8	15.61	9.65	6.03
Ash	6.96	7.10	9.68	11.59
NFE	20.25	20.79	40.50	33.77
Crude Protein	11.10	32.00	21.70	8.57
Ether Extract	3.51	7.60	7.11	3.84
Crude Fibre	21.3	16.90	11.36	36.2

TABLE 2: Growth performance of African Giant Land Snail (*Achatina Achatina*) on the selected leaves.

Parameters	Trt. (A) (*Spinach*)	Trt. (B) (*Ipomoea*)	Trt. (C) (*C. pepo*)	Trt. (D) (*C. africana*)	SEM
Initial weight (g)	17.230	17.557	15.280	14.440	1.721
Final weight (g)	18.817 [b]	20.067 [a]	16.787 [c]	15.303 [d]	1,787
Total weight gain (g)	1.587 [b]	2.510 [a]	1.507 [b]	0.863 [c]	0.606
Shell length increment (mm)	0.031[b]	0.078[a]	0.042[b]	0.019[c]	0.055
Shell breadth increment (mm)	0.206[a]	0.145[b]	0.090[c]	0.060[d]	0.070
Shell aperture increment (mm)	0.020[c]	0.031[b]	0.097[a]	0.019[c]	0.089
Total feed intake (g)	47.63[a]	45.47[b]	29.96[c]	20.06[d]	0.000
Feed conversion ratio	26.980[a]	24.343[b]	23.905[c]	20.790[d]	4.233
Mortality (%)	0.00	0.00	0.00	0.00	

a, b, c, d, means within rows bearing same superscript are not significantly (P>0.05) different, Trt. = Treatment, SEM = Standard Error of the Means

TABLE 3: Proximate Composition of the Feacal Samples

Parameters	Treatment (A) (*Spinach*)	Treatment (B) (*Ipomoea*)	Treatment (C) (*C. pepo*)	Treatment (D) (*C. africana*)
Moisture	5.80	7.80	5.20	4.20
Ash	4.96	2.20	3.50	5.30
NFE	76.712	76.095	76.150	79.840
Crude Protein	2.888	3.325	3.150	3.062
Crude Fibre	9.60	10.58	12.00	7.60

REFERENCES

Ademosun, A.A., Omidiji, M.O. (1999). The nutrient value of African giant land snail (*Archachatina marginata*). *Journal of Animal Protection Resear*ch 8(2): 876 – 877.

Agbogidi, O.M. Okonta, B.C. and Ezeani, E.L. (2008). Effects of two edible fruits on the growth performance of African giant land snail. (*Archachitina marginata* Swainson). *Journal of Agricultural and Biological Sciences* 3(3): 26- 29.

Amusan, J A Amusan, O.M. (2002). The techniques of snail farming as a viable and profitable venture. Oak Ventures Publishers, and Omodiji M O (1998). Edible Land Snail: A Technical Guide to Snail Farming in the Tropics. Verity Printer Limited, Ibadan.:96pp.

Aribisala, A.O (1999) Utilization of fruits in snail nutrition and their effects on growth and reproductive performance of the African giant land snail (*Archachatina marginata*). Masters thesis at the Department of Animal Science, University of Ibadan.

Awesu, M.D (1980) Observation on the Biology and management of the West African Giant Snail (*Archachatina marginata*). M. Phil Dissertation, University of Ibadan.

Cobbinah, J.R (1993) Snail Farming in West Africa CTA Publication pp11

Eze, J. N., Akpodiete, O. J., Okonkwo, J. C. and D. Eruvbetine (2013). Cost Benefit Analysis and Effects of Feed Preference on Performance of Giant African Land Snail (*Archachatina marginata*) Reared Intensively. *Journal of Applied Agricultural Research* 2013, 5(1): p83-90

FAO (1986). Farming Snails by FAO Better Farming Series, 3/33 Rome, Italy.

Hamzat, R. A. (2004) Utilization of Kola testa (*Cola nitida*, Ventenat Schott et Endheher). in the feeding of African Giant Land Snail (*A. Marginata*), PhD Thesis, Dept. of Animal Science, University of Ibadan, Nigeria

McDonald P., Edwards, R A and J FD Greenhalgh 1987 (4th ed) Anima Nutrition. Longman limited. 4th edition.

Omolara O.A (2005) Utilization of Cocoa Pod Husk by African Giant Land Snail (*Archachatina marginata*). Undergraduate Project submitted to the Department of Animal Science, University of Ibadan, Oyo State, Nigeria.