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Performance, Carcass Yield and Meat Quality of Land Snail (*Archachatina marginata*) Raised on Three Different Feed Types

P. Patami, A.L. Nwaji and N.O. Aladi

Department of Animal Science and Technology, Federal University of Technology, Owerri

Corresponding author: P. Patami. Email: princesspatani@gmail.com

Abstract

This research was conducted to investigate the performance, carcass yield and meat quality of Land snails (*Archachatina marginata*) raised on three different feeding regimes. 120 snails were randomly distributed to 3 treatments, replicated 4 times with 10 snails per replicate in a complete randomized design (CRD). Snails on Treatment 1 were fed a solid state fermented mixture of okara and palm kernel cake (PKC), those in Treatment 2 were fed a formulated compound feed while those in Treatment 3 received fruits leftover/reject. The research lasted for a period of 58 days. Data was collected on live weight gain, final feed intake, feed conversion ratio, carcass characteristics and sensory evaluation of meat. No significant differences were found for live weight gains and the sensory qualities of the snail meats but snails fed fermented mixture of okara and PKC recorded significantly ($p < 0.05$) higher carcass weight (31.88g) while those fed concentrate diet had lower value (26.93g) relative to the control. It is therefore recommended that solid state fermentation of mixture of okara and PKC would be a feasible technology for producing Land snails raised in captivity.

Keywords: Okara, snail, palm kernel cake, solid state fermentation

Introduction

Snail is a micro livestock recently cherished for its nutritional, economic and health benefits (Babalola, 2015). Snails are invertebrates that have a soft body and a covering of hard shell which belongs to the family phylum *mollusk*. In nature, they live in damp places, under leaves, trees stumps and stone and are abundant during the rainy season. Attempts have been made recently at domesticating them to ensure all year round availability. Relative to the conventional animal proteins sources like chevon, beef, pork and mutton, snails can readily be farmed with minimal feed cost (Omole *et al.*, 2007).

Snail meat is a very good source of animal protein, it is highly nutritious and contains 19.3g of protein per 100g of fresh meat, has low fat content of 2.44% and rich in calcium 126.4mg/100g and iron 2.29mg/100g (Babalola and Akinsoyinu, 2009; Ademosun and Imevore, 1988). It is reported to be low in cholesterol and is also a good source of vital mineral required for normal tissue development and maintenance. In the wild, it feeds on decomposing leaves and vegetables, humus and the likes. Finding adequate feeding material for snails raised in confinement has been a major challenge to commercial production (Ifediba, 2016). According to Aladi (2016); blending okara (a residue from soymilk extraction from pureed soybeans) with palm kernel cake (PKC) makes it convenient to be incorporate the byproducts into livestock feed. However, most livestock have limited ability of to utilize PKC due its high content non starch polysaccharide known as mannan (Aladi, 2016). To breakdown mannan, animals need elaborate mannanase. Several species of snail including *Archachntina marginata* were reported to produce mannan in their gastro intestinal track (GIT). Hence, the mixture (Okara-PKC) is likely to make a good diet for snail.

This work was therefore designed to compare the performance of African giant land snail fed fermented okara-PKC diets to those fed vegetable/fruit rejects and a formulated corn-soybean based diet

Materials and Methods

Okara was sourced from household in the FUTU community, and blended with equivalent weight of PKC and then allowed to ferment for 6 days before use. 120 grower African giant land snail (*Archachatina marginata*) were used in the experiment which lasted for 8 days. The snails were randomly distributed to 3 treatments, replicated 4 times with 10 snails per replicate in a completely randomized design (CRD). Snails in Treatment 1 were fed a solid state fermented mixture of Okara and palm kernel cake. Those in Treatment 2 were fed a maize-soybean meal diets formulated to provide 22% CP and 11.4 Mcal/kg feed (Ugwuowo, 2009), while those in Treatment 3 received fruits leftover/reject collected from fresh fruit and vegetable vendors..

The live weights, daily weight gain, and feed intake were determined. Feed Intake was measured on daily basis on replicate basis and then meaned to determine the Average Daily Feed Intake (ADFI), Length and width of the snails were measured with Venier caliper following the method described by (Ugwuowo, 2009). At

the end of the feeding trial, two snails per replicate were selected and killed and edible portions (i.e. the meat), the viscera, shell and fluid were separated. The values were then expressed as percentage of live weight.

The meats were washed separately 2% lime solution. After this, the snail meats were seasoned with 5% salt solution and ground chilli pepper and then cooked under steam for 20 minutes. After this, the snail meats were distributed to an untrained sensory panel (who are familiar with snail meat and flavor) drawn from the 500 level students of the Department of Animal Science and Technology, FUTO. The panelist were asked to masticate the sample and score it for tenderness, flavor, off-flavor, and degree of likeness using a 9 point category rating as described by AMSA (2016).

Data was collated and analysed using ANOVA in a completely randomized design (CRD). The feed intake and Feed Conversion Ratio between T₁ and T₂ were compared with T-test. SPSS V2020 (2007) was used.

Results and Discussion

The growth performance of land snails fed the 3 different diets are shown in Table 1. No significant differences ($p>0.05$) was found among the treatment groups for all the parameters evaluated. This shows that all three diet forms supported growth and development of the land snail. The feed intake did not vary between those fed T₁ and T₂ indicating that the fermented okara-PKC mixture was well consumed by the snails. Records of daily feed intake and hence FCR for snails in T₃ was not available because they were fed on fruits and vegetable scraps/rejects which degenerate with time. No significant difference ($P>0.05$) was found between the feed conversion ratio on okara/pkc regimen and compound feed.

Table 1: Growth performance of land snails fed 3 different feed regimes/diets

Parameter (g)	T ₁	T ₂	T ₃	SEM
Initial weight	70.69	70.59	68.63	0.95
Final weight	82.68	82.81	82.12	1.05
Weight gain	11.99	12.22	13.49	0.83
ADFI	2.66	2.61	-	0.07
FCR (g/g)	10.87	10.45	-	1.27

T₁= Okara + PKC, T₂= Maize-soybean compound feed, T₃= Fruits/Vegetable leftover, FCR = Feed conversion ratio and FI = Feed intake, SEM = Standard Error of Mean

The carcass parameters of the snails fed different diets; Okara/PKC, compound feed and fruit leftover are shown in Table 2. No significant difference ($p>0.05$) were found for all parameters studied except carcass weight. The carcass weight of snails fed Okara-PKC diet (31.88) was similar ($p>0.05$) to those fed fruit/vegetable scrapings/rejects (29.29) but superior to those fed maize-soybean based diet (26.93). This indicates that snails fed okara/PKC performed better than those fed compound feed.

Table 2: Carcass indices of snails fed 3 different feed regimens

Parameter (g)	T ₁	T ₂	T ₃	SEM
Live weigh	82.16	82.63	79.12	1.97
Carcass weight	31.88 ^a	26.93 ^b	29.29 ^{ab}	0.95
Waste	22.27	20.43	23.26	0.98
Shell weight	27.64	26.43	26.63	0.97
Width	8.41	7.68	8.46	0.17
Length	11.96	11.25	11.46	0.18

^{ab} within the same rows show that means are significantly different ($p<0.05$), T₁= Okara + PKC, T₂= compound feed, T₃= Fruits leftover, SEM = Standard Error of Mean

The result of the sensory evaluation of the snail meats is shown in Table 3. No significant differences ($p>0.05$) was found for all the parameters evaluated. This indicates that the feeding of fermented mixture of okara-PKC mixture did not affect flavor and other consumer perception of meat quality of the snails. Snails' natural taste/flavor remained the same irrespective of the differences in the nature and composition of the diets. This is in line with the findings of Adeola *et al.* (2010) who found no differences in sensory characteristics in meats of Land snails fed formulated concentrate diets or sweet potato leaf.

Table 3: Sensory evaluation

Parameter (g)	T ₁	T ₂	T ₃	SEM
Flavour	8.17	8.00	7.50	0.28
Tenderness	5.83	5.83	8.17	0.43
Off-flavour	8.50	8.00	8.33	0.29
Degree of likeness	8.83	8.33	8.33	0.37

T₁= Okara + PKC, T₂= compound feed, T₃= Fruits leftover, SEM = Standard Error of Mean

Conclusion and Recommendation

Fermented mixture of okara and palm kernel cake will make a good feed material for snails and does not negatively affect meat quality of snails. It is therefore recommended that Okara/PKC mixture and fruit leftover should be fed to snails since they are more economical and yield heavier carcasses.

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