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Performance evaluation of grower snails fed varying levels of groundnut cake

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Abstract

This experiment was conducted to determine the effects of groundnut cake (GNC) fed to grower snails as the main protein source at varying levels, of inclusion 23%, 25%, and, 27%. This experiment was carried out at the Federal College of Education Teaching and Research Farm, Asaba, Delta state of Nigeria. The snails were four (4) months old each and the experiment lasted for 12 weeks, forty-eight (48) grower snails were randomly divided into three (3) groups of sixteen snails each per treatment, which were replicated four (4) times. The parameters considered were growth performance, feed intake, feed conversion ratio, carcass, and shell characteristics. Data collected were analyzed by use of one-way analysis of variance and significant means were separated using Duncan's multiple ranged test at a 5% level of probability (SAS, 2011). The study showed that snails fed 27% of GNC supported higher body weight, live weight, and dressing percentage. However, no significant ($P<0.05$) differences were recorded in the final shell circumference, shell circumference gain, final shell length, and shell length gain. A formulated ration containing as much as 27% GNC will go a long way in ensuring the all-year availability of feed for commercial snail production.

Keywords: Performance; Circumference; Grower; Length; Groundnut Cake

1. Introduction

Giant African Land Snails (GALS) (*Archachatina marginata)* are invertebrates that have soft-body with outer hard shell covering that is identified as an exoskeleton. Snail meat is extremely nutritive and contains about 19.53g of protein/100g of fresh meat, has a low-fat content of 2.44%, and is rich in calcium (126.4mg/ 100g) and iron (2.29mg/100g) (Babalola and Akinsoyinu,) [4]. *Archachatina marginata* commonly referred to as the Giant African Land Snail, is a pulmonate land snail branded by the ability to grow massively (Aladesida *et al.*) [1]. This species is mainly found in the southern parts of Nigeria (Bamidele *et al.* and Sodipe *et al.*) [5&12]. It is also the most consumed snail species as a result of its nutritional importance and medical abilities (Idowu *et al.* and Akinnusi *et al*) [10 &2]. Snail meat competes with poultry eggs and flesh in essential amino acids and digestible proteins (Imevbore) [11]. This necessitated this research to determine the best protein level for snail feed formulation for commercial snail production and it's availability at all seasons. Its meat is low in cholesterol and a good source of vital minerals that are essential for normal tissue development and repairs. Snail belongs to a class of animals called Gastropoda.

2. Material and methods

2.1. Experimental location

This experiment was carried out at the Federal College of Education Teaching and Research Farm, Asaba, Delta state of Nigeria.

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2.2. Experimental animals

A total of sixty – two (62) grower snails of the spice (*Achachatina marginata)* of four (4) months old with an average weight of 35.61g were purchased from Songhai farms Amukpe, Sapele Local government area of Delta State of Nigeria.

2.3. Experimental setup

The snails were housed in wooden hatches measuring 28cm × 60cm × 35cm, erected under a roofed shade to avoid direct sunlight on the snails. The hatches were packed with humus soil up to a depth of 15cm and moistened with water. A total of forty-eight (48) grower snails were selected from the sixty- two (62) snails gotten and were randomly divided into three (3) groups of sixteen (16) snails each per treatment, which comprises four (4) replicates of four (4) snails each. The snails were fed with three (3) experimental diets which were formulated to contain groundnut cake at 23%, 25%, and 27%, as the main protein source. Clean water was sprinkled on the snails every morning and evening and also a flat plate was used to offer water for the snails to allow them to have access to water at all times. The experiment was carried out for twelve (12) weeks. Droppings were removed every morning before giving fresh feed to sustain a clean environment inside the hutch.

Table 1 Composition of Experimental Diets for Grower Snails at varying levels of Groundnut Cake inclusion 23% 25% and 27% /kg

Ingredients	**Groundnut Cake (GNC)**		
	23%	**25%**	**27%**
Yellow maize (9%)	55.00	49.00	44.95
Blood meal (80%)	12.00	12.00	12.00
Wheat bran (15%)	16.00	16.00	16.00
Groundnut cake (45%)	13.00	19.00	23.05
Bone meal	3.00	3.00	3.00
Vitamin premix	1.00	1.00	1.00
Total	100	100	100

2.4. Data collection

Data were collected on growth performances, feed intake, feed conversion ratio, and carcass characteristics.

2.5. Body weight (BW)

Body weight was taken at the start of the experiment and every week, this was done on a replicate basis for twelve (12) weeks.

2.6. Shell length (SL)

This was done by measuring the long axis of the snail on an individual basis with the use of a plastic measuring tape. This was done fortnightly.

2.7. Shell circumstances (SC)

This was done using a venial caliper around the largest circumference of the shell on an individual basis. This was done fortnightly too.

2.8. Feed intake (FI)

This was achieved daily as the variance in weight between the feed given and the feed remaining. This was done all through the whole period of the experiment.

2.9. Carcass Evaluation

After the experiment two (2) snails, were collected from each replicate giving a total of eight (8) snails in each level, totaling twenty (24) snails out of forty-eight snails used in the experiment. The live weight of each snail was taken and the meat of the snails was carefully removed from the shell with a hooked pin and dried cautiously with the use of a paper towel and weighed. The contents were separated into edible and non-edible portions, and the weight of the edible and non-edible portions was taken. The empty shells were air-dried for 48 hours and weighed. Carcass and shell characteristics were also obtained.

2.10. Shell Thickness

The snail shells at the aperture were placed between the jars of a micrometer screw gauge and readings were taken. This was repeated for each of the eighteen (24) snails.

2.11. Statistical Analysis

Data collected were subjected to one-way analysis of variance and significantly different means were separated with Duncan's multiple-ranged test at a 5% level of probability using the statistical analysis system [13]

3. Results and discussion

Results in Table 2, disclosed that snails fed 27% of GNC had the highest final body weight and body weight gain. This is in line with the conclusions of Ugwuowo) [13] that animal growth is influenced significantly by the level of protein intake and utilization of the feed materials. Ani *et al.* [3] also detected that snails perform better when fed higher protein levels and energy levels. Significant ($P<0.05$) differences were not certified in the final shell circumference, shell circumference gain, final shell length, and shell length gain. This may be attributed to the slow growth rate of snails which is in line with the findings of FAO [9].

Table 2 Growth Performance of Grower Snails fed Experimental Diets containing Groundnut Cake at varying levels of inclusion 23%, 25%, and 27% (0-12 weeks)

Parameters	**Levels of Inclusion**		
	23%	**25%**	**27%**
Initial body weight (g)	35.61	35.61	35.61
Final body weight (g)	41.88^{c}	42.47^{b}	45.05^{a}
Body weight gain (g)	6.27^{c}	6.86^{b}	9,44^{a}
Initial shell circumference (cm)	11.05	11.06	11.05
Final shell circumference (cm)	12.01	12.01	12.01
Shell circumference gain (cm)	0.96	0.95	0.96
Initial shell length (cm)	6.02	6.01	6.02
Final shell length (cm)	6.06	6.06	6.07
Shell length gain (cm)	0.04	0.05	0.05
Total feed intake (g)	372.08^{b}	385.38^{a}	388.57^{a}
Feed conversion ratio (g)	59.34^{a}	56.18^{b}	41.16^{c}

a, b,c=Means within a row bearing the same superscript are not significantly ($P>0.05$) different.

Snails fed 25% and 27% inclusion level of GNC had greater feed intake values however they also had the lowest feed conversion ratio because of the high weight gain documented. This is for the reason that a low feed conversion ratio is the mark of a high-quality feed. It has also been proven that feed consumption rises with a surge in protein levels (Bright) [6].

Table 3 Carcass Characteristics of Grower Snails fed Groundnut Cake at the Different Levels of Inclusion 23%, 25%, and 27% from 0-12 weeks

Parameters	Levels of Inclusion		
	23%	25%	27%
Live weight (g)	41.87[c]	42.41[b]	44.05[a]
Dressing percentage	17.95[c]	19.11[b]	20.57[a]
Visceral percentage	6.99[b]	7.39[ab]	7.73[a]
Shell Thinness (cm)	1.28[b]	1.30[b]	1.38[a]
Shell weight (g)	8.40[b]	9.02[a]	9.36 [a]

a, b, c means within rows bearing the same superscript are not significantly (p>0.05) different

Significant (P<0.05) differences were recorded in all the parameters observed. Snails fed 27% groundnut cake had higher live weight, dressing percentage, visceral percentage, shell thickness, and shell weight. This aligns with the result of Ejidike [8] who discovered that animal performance is prominently reliant on the levels of protein intake and use. Ugwuowo [13] also revealed that high dietary protein boosts a high percentage of edible weight, which is also in harmony with the works of Ani *et al.* [3] that as a rule heavier animals are estimated to have higher carcass yield than lighter ones. Though, grower snails fed 23% of groundnut had the lowest live weight, dressing percentage, visceral percentage, and shell weight.

4. Conclusion

The outcome of this experiment recognized that groundnut cake at a 27% level of inclusion braced higher final body weight, body weight gain, live weight, dressing percentage, and shell thickness. Nevertheless, groundnut cake (GNC) at 25% also supported higher visceral percentage and shell weight. Snails fed 23% of GNC had the highest fed conversion ratio.

Recommendations

Hence I recommend that farmers and researchers should include a formulated ration containing as much as 27% GNC as this will go a long way in ensuring the all-year availability of feed for commercial snail production.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest in this study.

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