

GROWTH PARAMETERS OF GIANT AFRICAN LAND SNAILS AS INFLUENCED BY DIFFERENT SOURCES OF DIETARY CALCIUM IN ILORIN, NIGERIA

A.H.A. Badmos, J.K. Joseph, M.A. Belewu and K.M. Okukpe.

Dept. of Animal Production, University of Ilorin
Corresponding Author: badmos111@yahoo.com

Abstract

The effect of different sources of dietary calcium on the performance of growing snails (*Archachatina marginata*) was investigated for 12 weeks. A total of 48 (forty eight) growing snails were randomly allocated to four (4) treatments and each treatment was replicated three (3) times with four (4) snails per replicate in a completely randomized design. Diets were formulated to contain 6% calcium from various sources (Bone meal-T1, Oyster shell-T2, Limestone-T3, Egg shell-T4). The results showed that snails fed with the diet containing only oyster shell (T2) was higher in T2 than in T1, T3, and T4. It was concluded that snails fed with the diet containing only oyster shell (T2) as the source of calcium performed better than T1, T3, and T4 in terms of feed intake, weight gain and feed conversion ratio.

Keywords: Snails, Calcium, weight gain, shell growth.

Introduction

The rapid growth of human population has not only led to higher demand for animal protein but has called for increased efficiency in feedstuff utilization by livestock. Osho *et al.* (2007) emphasized the need for improved feeding management and productive performance of livestock as essential to overcome Nigerian animal protein insufficiency. Nigerians are presently interested in the production of highly nutritive, medicinally by-product utilizes like snail (Hamzat *et al.*, 2002). The relatively small capital in setting up the business, as well as the low fat and cholesterol content has made snail farming highly promising (Olufokunbi 1989). Calcium is a major mineral constituent of the shell of the snail, and its supply is a major issue in snail farming. This study was conducted to evaluate the performance of growing snails fed diets containing calcium from different sources.

Materials and methods

The experiment was carried out at the Snailery Unit of the Department Of Animal Production Pavilion, University of Ilorin, Nigeria. A total of forty-eight (48) growing snails (all aged 3 months) were used for the study.

Four diets were formulated to contain calcium from four (4) sources; (bone meal, oyster shell, lime stone and eggshell) being of the same percentage (6% calcium). The snails were randomly distributed to four (4) treatments in a completely randomized design. Each treatment was replicated three times with four (4) snails per replicate, making 12 snails per treatment.

The diet was formulated to contain 22% crude protein and energy level of 2300kcalME/kg (Table 1). Feeding was done twice a day.

The snails were reared under 16 liters plastic buckets of different colours (for identification) which were perforated and up-turned and placed under the shade. Sandy loamy soil was used and raised up to depth of 5cm. Heavy stones were used to render the buckets immovable. The snail mash was served in containers. The snails were fed *ad libitum* throughout the period of the experiment. Clean water was offered *ad libitum* on a daily basis to prevent snails from aestivation.

Feed intake was recorded on every 3 days by subtracting the left over from the feed offered. Data were collected weekly on the following parameters: the body weight gain (measured with the use of electric weighing

balance), the shell length and width (measured with the use of veneer caliper), and the shell thickness (measured with a micrometer screw gauge). Feed conversion ratio was calculated as the ratio of feed intake to weight gain.

Sample of each diet was analyzed for proximate composition according to the method of AOAC (1990). All data were subjected to analysis of variance (ANOVA) and significant means were separated by Duncan's New Multiple Range Test (DNMRT) according to Steel and Torrie (1980).

Results and discussion

The proximate composition of the experimental diets is shown in Table 1. The diets contained the same percent of calcium (6%) from different sources (oyster shell, bone meal, limestone and egg shell) while the crude protein of the dietary treatments was the same (22%CP) and the ether extract, fiber content and ash of the diets were relatively similar. Table 2 shows the response of snails to diets containing calcium from different sources.

The monthly feed intake of snails in T1, T2, and T3 was not significantly ($P>0.05$) different from each other. The mean monthly weight gain also followed the same trend like that of feed intake. The lowest weight gain of 48.36g ($P<0.05$) in T4 (eggshell) and the highest weight gain of 61.48g in T2 (oyster shell) was recorded. This agrees with the report by Daouda (1993) studying *Achatina achatina* fed powdered oyster shell *ad libitum*. The study also agrees with Hodasi (1995) in respect of oyster shell and bone meal fed to *Helix aspersa*, though egg shell and limestone support the inferior gains. Ebenso (2003) had earlier indicated the greater efficiency of oyster shell. This was as a result of giving the snails the formulated feed which hastened their growth compared to when they were fed forages. Ebenso (2003). Moreover, shell constitutes about 10% of the total live weight and calcium is the major constituent of snail shell. Omole *et al.* (2004) used 4.5% calcium in the formulated feed.

The monthly shell length, width and thickness (Table 2) were not affected by the different sources of calcium, they were relatively similar. The mineral content (ash) in all the treatments which is responsible for shell growth and development (Dauda, 1995; Bright, 1996) was relatively the same. The results on shell growth and development also buttress the earlier report that calcium intake has positive effect on shell length, width

and thickness.

The efficiency of feed utilization of treatments 2 (diets containing oyster shell) and treatment 4 (diets - containing egg shell) was better than the T₁ and T₃ (diets containing bone meal and limestone respectively). The zero mortality recorded in all the treatments (Table 2) indicates the safety of inclusion of calcium up to 6% in their diet, the proper management practices observed coupled with hardy nature of snail in being well adapted to the environment (Cobbinah, 1993) There was a gradual increase in feed intake as age increased during the experimental period. This is in line with Amusa and Omidiji (1998) and Akinusi (2002). Feeding of snails with formulated mash diet enhanced snail growth. Omole (1990) and Awesu (1980) observed that formulated period of food for snail (*Helix aspersa*) reduced the growth period from hatching to the harvest by 10 months (from 27 to 17 months).

Conclusion and Recommendation

The experiment was design to evaluate the effect of various calcium sources on the performance characteristics of growing snail *Archachatina marginata*. The results of this study showed that higher growth performance was recorded in diet T₂ (diet containing oyster shell) followed by T₁ (Bone meal), T₃ (Limestone) and T₄ (egg shell). The result also showed that the entire calcium source used as experimental diet (oyster shell, bone meal, lime stone and egg shell) could be used successfully for snail production without adverse effect.

Table 1: Gross Composition of the Experimental Diets (%).

Ingredients	T ₁ (Bone meal)	T ₂ (Oyster)	T ₃ (Limestone)	T ₄ (Egg shell)
Maize	10	15	16	15
GNC	26	26	25	24
SBM	7.5	6	6	7
F/meal	3	3	3	3
Corn bran	22	23	21	21
PKC	10	10.5	12.5	13
Calcium source	21 (bone meal)	16 (oyster shell)	16 (limestone)	16.5 (egg shell)
Vitamin premix	0.5	0.5	0.5	0.5
Calculated analysis				
Protein (%)	22.28	22.26	22.06	22.05
Ca (%)	6.01	6.08	6.07	6.19

Proximate Composition

Parameter	T ₁	T ₂	T ₃	T ₄
Dry matter	93.50	94.31	93.50	93.50
Crude protein	22.09	22.31	22.31	21.88
Ash	23.20	22.04	22.46	20.54
Ether extracts (fat)	1.86	1.95	1.84	1.76
Crude fibre	13.74	14.33	13.52	13.80
Nitrogen free extracts	32.61	33.68	33.37	35.35
Calcium %	6.02	6.05	6.10	6.15

Table 2: Effect of different dietary calcium sources of growing snails on feed intake, weight gain, shell increment and feed conversion ratio.

Parameters (mean values)	T ₁	T ₂	T ₃	T ₄
Initial weight (g)	66.20	66.27	65.87	65.83 ^{ns}
Monthly feed intake (g)	83.49 ^b	85.97 ^b	80.03 ^b	72.85 ^a
Monthly weight gain (g)	52.00 ^b	61.48 ^a	49.12 ^a	48.36 ^a
Total feed intake (g)	250.47 ^a	257.91 ^c	240.09 ^b	218.56 ^a
Final weight (g)	222.20 ^a	250.70 ^b	213.23 ^a	210.90 ^a
Total weight gain (g)	156.00 ^a	184.43 ^b	147.36 ^a	145.07 ^a
Monthly shell length increase (cm)	8.03 ^c	8.34 ^c	7.66 ^b	7.04 ^a
Monthly shell width increase (cm)	4.53 ^b	4.84 ^c	4.44 ^b	4.13 ^a
Monthly shell thickness (mm)	1.10	1.12	1.05	0.09 ^{ns}
Feed conversion ratio	1.61 ^b	1.40 ^a	1.63 ^b	1.51 ^a
Mortality	0.00	0.00	0.00	0.00

Where 'ns' means no significant difference.

Means with different superscripts along the same rows are significantly different (p<0.05).

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