

# **GROWTH PERFORMANCE AND REPRODUCTIVE QUALITIES OF BREEDER SNAILS (*Archachatina marginata*) FED DIFFERENT SOURCES OF PROTEIN**

**EZE, J.N.**

Department of Agricultural Education, Federal College of Education (Technical) Asaba. Delta state.

[Joantreasure45@gmail.com](mailto:Joantreasure45@gmail.com)

## **ABSTRACT**

This research was conducted to compare the effects of different protein sources, soyabean meal (SBM), cottonseed meal (CSM), and groundnut cake (GNC) fed to breeder snails. The snails were eight (8) months old with an initial average weight of 98.93g, and the experiment lasted for 12 weeks. Sixty (60) *Archachatina marginata* breeder snails were randomly selected and divided into 4 groups of fifteen (15) snails per treatment which were replicated three (3) times in each of the groups. The parameter examined were growth performance, feed intake, feed conversion ratio, and reproductive characteristics. Data collected were analyzed by the use of a one-way analysis of variance and significant means were separated with the Duncan Multiple Ranged Test at a 5% level of probability using SAS, 2011. The study revealed that soya bean meal (SBM) supports higher final body weight, body weight gain, and percentage fertility, while soyabean meal and cottonseed meal had higher percentage hatchability. However, no significant ( $P>0.05$ ) differences were recorded in the final shell circumference, shell circumference gain, shell length, and shell length gain. It was concluded that compounded feed with soyabean meal as the main protein source aided fast growth and better product performance.

**Keywords:** Growth, Performance, Reproductive, Quality, Protein

## **INTRODUCTION**

The significance of snail cannot be overstressed, it is a good source of animal protein, containing about 18% crude protein of rich biological value (Kehinde, 2009; Omole *et al.*, 2011). The meat contains all the necessary amino-acids needed such as Lysine, and methionine, highly-priced and contains less fat and low cholesterol level which makes it an antidote for fat-related diseases e.g. hypertension. Animal growth and reproduction depend greatly on the type of protein intake and utilization of other food nutrients, as the main objective of this study is to determine the protein sources which promotes fast growth and reproductive qualities.

## **MATERIALS AND METHODS**

The experiment was carried out at the Federal College of Education (Technical) Teaching and Research farm in Asaba, Delta State of Nigeria. The breeder snails were of the spice (*Achachatina marginata*) with an average weight of 98.93g which were purchased from Songhai Amukpe, Sapele Local Government Area of Delta State. The snails were housed in wooden cages measuring 35cm x 60cm x 35cm, constructed under a roofed shade to prevent direct sunlight on the snails. The cages were filled with humus soil up to a depth of 15cm and moistured with water. A total of sixty (60) breeder snails were randomly selected and divided into four (4) groups of fifteen (15) snails pre-treatment and were replicated three (3) times in each of the groups. The snails were fed with three (3) experimental diets which were formulated to contain soyabean meal (SBM), cotton seed meal (CSM), and groundnut cake (GNC) as the major protein sources in each of the experimental diets and a control diet with jack bean meal (JBM). Clean water was sprinkled on the snails every morning and evening and a flat plate was also used to provide 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 the fresh feed is given, this is to provide a clean environment inside the cage. Data were collected on growth performances, feed intake, feed conversion ratio, and reproductive qualities of the breeder snails. Body weight (g) was taken at the beginning of the experiment, and on weekly basis, this was done on a replicate basis for twelve (12) weeks. Shell length (cm) was taken by measuring the long axis of the snail on an individual basis with the use of a flexible measuring tape. This was done forth nightly. Feed intake was obtained daily as the difference in weight between the feed-given, and the feed remaining. This was done throughout the entire period of the experiment. At the end of the experiment, two (2) snails each were collected from each replicate giving a total of twenty-four (24) snails out of the sixty (60) snails used in the experiment.

## Reproductive Characteristics

These were calculated using the following formulas:-

1. Fertility percentage =  $\frac{\text{No of fertile egg}}{\text{No of eggs incubated}}$
2. Embryo mortality =  $\frac{\text{No of dead in shell}}{\text{Total no of fertile egg}}$
3. Percentage hatchability =  $\frac{\text{No of eggs hatched}}{\text{Total number of fertile eggs}}$

Data collected were subjected to a one-way analysis of variance and significantly different means were separated with the Duncan Multiple Range Test at a 5% level of probability using a Statistical Analysis System (2011).

**Table I: Composition of the Experimental Diet.**

Ingredients	Control Diet		Experimental Diets			
	Jack Bean Meal (JBM)	Soyabean Meal (SBM)	Cotton Seed Meal (CSM)	Groundnut Cake (GNC)		
Yellow maize (9%)	50	50	50	50		
Blood meal (80%)	12	12	12	12		
Wheat bran (15%)	16	16	16	16		
Jack bean meal (35%)	18	-	-	-		
Soyabean meal (44%)		18	-	-		
Cotton Seed Meal (41%)		-	18	-		
Groundnut Cake (45%)		-	-	18		
Bone meal	3	3	3	3		
Vit Premix	1	1	1	1		
<b>TOTAL</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>		

## RESULT AND DISCUSSION

**Table 2: Growth performance of breeder snails fed different sources of proteins**

Parameters	Control Diet	Soya Bean Meal (SBM)	Cotton Seed Meal (CSM)	Groundnut Cake (GNC)
Initial body weight (g)	98.93	98.93	98.93	98.93
Final body weight (g)	106.85 <sup>b</sup>	111.30 <sup>a</sup>	107.64 <sup>b</sup>	107.67 <sup>b</sup>
Body weight gain (g)	7.93 <sup>b</sup>	12.37 <sup>a</sup>	8.71 <sup>b</sup>	8.74 <sup>b</sup>
Initial shell circumference (cm)	16.06	16.06	16.06	16.06
Final shell circumference (cm)	17.02	17.02	17.02	17.02
Shell circumference gain (cm)	0.96	0.96	0.96	0.96
Initial shell length (cm)	9.00	9.01	9.00	9.01
Final shell length (cm)	9.05	9.06	9.05	9.06
Shell length gain (cm)	0.05	0.05	0.05	0.05
Total feed intake (g)	515.65	505.92	498.57	508.45
Feed conversion ratio (g)	65.03 <sup>a</sup>	40.90 <sup>c</sup>	51.18 <sup>b</sup>	58.18 <sup>b</sup>

a, b, c, d: means within row bearing the same superscript are not significantly ( $p < 0.05$ ) different.

The results of the growth performance of the breeder snails fed different protein sources showed significant ( $P < 0.05$ ) performance in the final body weight and body weight gain of the breeder snails. Breeder snails-fed soyabean meal had the highest final body weight and body weight gain compared to other sources of protein jack bean meal (JBM), cottonseed meal (CSM), and groundnut cake (GNC). This could be a result of the high protein and essential amino acid content of soyabean meals that are required for growth. This is in line with Ugwuowo and Ani (2011) that achievement in snail production includes others as protein is required for growth. No significant ( $p > 0.05$ ) variances were noted in the final shell circumference, shell circumference gain, final shell length, and shell length gain. This may be a result of the slow growth rate of snails which is in harmony with the works of Etukudo *et al.* (2016). There are no significant ( $p > 0.05$ ) differences documented in the total feed intake among the treatment means. However, significant ( $p < 0.05$ ) differences were recorded in the feed conversion ratio. Snails fed the control diet Jake bean meal (JBM) had the highest feed

conversion ratio followed by snails fed cottonseed meal (CSM) and groundnut cake (GNC) while snails fed soyabean meal (SBM) had the least feed conversion ratio (FCR) as a result of the higher body weight recorded because weight gain is a function of feed conversion ratio. A low feed conversion ratio is an indication of a high-quality feed (Bright, 1996).

**Table 3 Reproductive characteristics of breeder snails fed diets containing different protein sources (0 – 12) Weeks.**

Parameter	Control Diets			
	Jack Bean Meal	Soya Bean Meal	Cotton Seed Meal	Groundnut Cake
Noof eggs laid	21.25	22.11	20.67	20.33
Percentage fertility	74.32 <sup>b</sup>	90.77 <sup>a</sup>	76.90 <sup>b</sup>	75.32 <sup>b</sup>
Parentage hatchability	78.40 <sup>c</sup>	87.96 <sup>a</sup>	89.82 <sup>a</sup>	83.02 <sup>b</sup>
Percentage embryo mortality	13.41 <sup>d</sup>	12.04 <sup>b</sup>	10.18 <sup>b</sup>	16.98 <sup>a</sup>

a, b, c, d means within rows bearing the same superscript are not significantly ( $P>0.05$ ) different.

The result in Table 3 showed the reproductive performance of *Archachatina marginata* snails served the different protein sources. The result showed significant ( $p<0.05$ ) differences in the reproductive performance except in the number of eggs laid. Breeder snails fed Soyabeans meal had higher percentage fertility while snails fed SBM and CSM had the highest percentage hatchability. However, snails-fed groundnut cake had the highest percentage of embryo mortality. The nutritional superiority of Soyabean may have affected the fertility and hatchability rates with lesser percentage mortality of the embryo. According to Oyeagu, *etal.* (2015), the most vital factor influencing the performance of animals in captivity, all other factors being constant, is the quality of diet offered to the animals.

## CONCLUSION AND RECOMMENDATION

The result of this study recorded that snail-fed Soyabean meal (SBM) supported higher final body weight and body weight gain, percentage fertility, and percentage hatchability with a low feed conversion ratio. So, it is advisable to use soyabean meal to feed snails because of essential amino acid contents of soya beans.

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