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MORPHOMETRIC ANALYSIS OF EGGS LAID BY TWO ECTOTYPES OF SNAIL *Archachatina Marginata* (*Swainson*) RAISED IN CAPTIVITY

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ABSTRACT

The snails used for this study were categorized on the basis of skin (foot) colour into black skinned and white skinned (albino) ectotypes. Forty snails, twenty each of the black skinned ectotype and white skinned ectotype were managed in captivity and the morphological characteristics of their eggs evaluated. The snails were grouped in a mating arrangement of two similar ectotype to a cell and monitored for 90 days. Morphometric parameters evaluated include number of clutches and eggs laid, egg weight, length and width. Data collected were subjected to t-test. Results showed that the black skinned ectotype laid 234 eggs from 30 clutches, while the albino ectotype laid 68 eggs from 13 clutches. The mean egg weights were 1.80 g and 1.05 g for black skinned ectotype and white skinned ectotype respectively. The mean egg lengths and widths for the black skinned ectotype were 1.61 mm and 1.39 mm respectively. The corresponding values for the albino ectotype were 1.43 mm and 1.05 mm The black skinned ectotype morphometric parameters differed ($P<0.05$) significantly from those of the white skinned ectotype

KEY WORDS: Morphometric, Eggs, Ectotypes, Snails, Captivity

INTRODUCTION

The per capita animal protein consumption of Nigerians is low, 6.5 g and this is below the 35 g recommended by the Food and Agriculture Organization (FAO, 1995). The conventional and regular sources of animal protein supply like beef, pork, goat, meat, mutton, milk, fish, poultry meat and egg have failed to solve the problem of animal protein inadequacy One of the virgin areas capable of solving the problem of low animal protein intake in Nigeria is wild life domestication (Ayeni and Ajayi, 1983).

The domestication of wild life species such as snails and cane rats may offer solution to the much felt need to improve animal protein production level in Nigeria. This is because at present the collection and supply of meat from wild is largely attended to by the destruction of the environment through the setting of bush fires by hunters. Hodasi (1984) and Omole (1997) recognized African giant snail (*Archachatina marginata)* as the most common edible land snail species found and reared in Nigeria Amusa and Omidiji (1998). Akinnusi (2004) and Omole et al. (2007) noted that the foot (skin) of *A marginata* can be black or white in colour Snail production holds lots of potential in the Nigerian livestock industry and can serve as a means to alleviate the acute protein shortage This owes to the fact that snails have high rate of productivity or fecundity Snails are hermaphrodites, but practice sexual reproduction (Cobbinah, 1993, Payne and Wilson, 1999, Akinnusi, 1997,2004) Unlike chickens that lay one egg per day, sanils lay 4-18 eggs within 1-2 minutes (Omole and Kehinde, 2005). Akinnusi (1997) opined that *A marginata* lays 5-11 eggs within the same period (1-2minutes) Plummer (1975), Reid (1989) and Ogogo (1989, 2004) reported that *A marginata* lays 3-16 eggs per clutch per snail within twenty-four hours There is need to assess the morphological characteristics of these eggs as the two ectotypes (black skinned and white skinned) of *A. marginata* may differ in many production characteristics.

Compared with conventional farm animals, snails have small body size, do not make noise, are easy to manage and are excellent sources of animal protein with good amino acid profile (Payne and Wilson, 1999, Nodu and Adesope, 2002). However, the white skinned (albino) ectoype of *A. marginata* is discriminated against by many Nigerians. In spite of its high biological value and nutritional qualities, this snail type grows and dies without being exploited in several Nigerian towns and villages Information is lacking on the reproductive performance of albino *A. marginata* as the genotype has not been subjected to much scientific investigation, perhaps because of the foregoing reason or because it is a smaller ectotype. This study therefore focused on the morphological characteristics (number of eggs laid, eggs weight, length and width) of eggs laid by albino *A. marginata* for comparison with those laid by the popular, meatier and readily acceptable black skinned ectotype. This way a desirable and acceptable foundation stock suitable for commercial production can be established, and biodiversity preserved.

MATERIAL AND METHODS

The study was conducted at the Snailery Unit, Department of Animal Science Teaching and Research Farm, Cross River University of Technology, Obubra Campus. Obubra lies between latitudes 5° 59 7'N and longitudes 8° 16.5' E of the Equator, with a mean annual rainfall of 2250 to 2500 mm (CRADP, 1992)

Forty mature snails, twenty each of the black skinned white skinned (albino) ectotypes with weight ranging from 56.22-67.38 g and 57.54-67.02 g for black skinned (BS) and white skinned (WS) ectotypes respectively were obtained from a local market They were grouped into two treatments on the basis of skin (foot) colour Each treatment was replicated ten times in the Completely Randomized Design (CRD), with two snails to a cell measuring 40 sq cm by 30 cm depth. Allowing two snails per cell was to be sure that egg(s) obtained from there was as a result of the mating between these two The mating arrangement is shown in Table 1. The cell compartments in which the snails were managed were kept under trees shed throughout the duration (90 days) of the experiment

The snails were fed on a mixed feeding regime of forage (Pawpaw leaves) supplemented with formulated diet The diet was formulated to contain 24% CP, 2650kcal/kg ME and 10% Ca with the following ingredients; maize, soybean meal, fish meal, bone meal oyster shell and vit /min premix Feed and water were given unrestricted throughput the study

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period.

Eggs morphological characteristics assessed included number laid as counted, number of clutch(es), weight (g), length (mm) and width (mm) The weight was measured using a Scout™ Pro scale electronic scale with 0.01 g sensitivity while measurements of the length and width were done using Vernier caliper Data collected were analyzed using the "Student" t-test statisticals tool as modified by Madukwe (2004).

Table 1: Mating arrangement of snails.

Mating group	Number of snails	Number of cells
BS X BS	2	10
WS X WS	2	10

BS= Black Skinned ectotype, WS = White Skinned ectotype.

RESULTS AND DISCUSSION

The values of analyzed eggs morphological characteristics of black skinned and white skinned (albino) *Archachatina marginata* ectotypes are presented in Table 2. The results showed that the black skinned ectotype is more prolific than the albino ectotype The prolificacy might be due to inherent genetic potentials of the black skinned ectotype. As shown in table 2, the black skinned ectotype laid a total of 234 eggs from 30 clutches while the albino ectotype laid fewer clutches and number of eggs, 13 and 68 respectively. The black skinned ectotype clutch size ranged from a1 to 5 with 3 to 11 eggs per snail. This gives an average clutch size of 1.5 with 7.8 eggs per clutch and 3 9 eggs per snail. On the other hand, the albino ectotype clutch size ranged from 0 to 3 with 4 to 6 eggs per snail This gives an average clutch size of 0.65 with 5 23 eggs per clutch and 2.62 eggs per snail. These variations differed (P<0 05) significantly. The clutch size obtained in this study is in agreement with the reported of Ubua (2004). The number of eggs per clutch per snail obtained in this study fall with the range reported by Plummer (1975), Reid (1989) and Ogogo (1989, 2004). The zero (0) clutch size obtained among albino ectoype imply that mating did not take place in such cell(s) This corroborates Akinnusi (2004) and Omole and Kehinde (2005) respectively, that snails are choosy in their mating partners and that snails are sometimes uninterested in mating with other snails of the same species.

The average egg weight of the black skinned ectotype was 1.80 g, while that of the white skinned ectotype was 1.05 g These differences were statistically (P<0 05) significant. The lengths and widths of eggs laid by black skinned ectotype were also significantly different (P<0,05) from those by white skinned ectotype. They were 1.61 mm and 1 29mm length and width respectively for black skinned ectotype and 1 43 mm and 1.05 mm, length and width respectively for white skinned ectotype.

Table 2 Morphological characteristics of eggs laid by Black skinned and white skinned ectotypes of *A marginata*

Parameter	BS X BS	WS X WS	SEM
Total number of clutches	30	13	
Av. number of clutches/cell	3^a	1.3^b	0.26
Av. number of clutches/snail	1 5	0.65^b	0 13
Total number of eggs	234	68	
Av. number of eggs/clutch	7.8^a	5.23^b	0 40
Av. number of eggs/snail	3.9^a	$2 65^b$	0 23
Av Egg weight ( )	$1 80^a$	$1 05^b$	0 10
Av. Egg length (mm)	1.61	$1 43^b$	0 04
Av Egg width (mm)	$1 29^a$	$1 05^b$	0 03

ab= Means within the same row with different superscripts are significantly (P<0 05) different
SEM =Standard Error of Mean.

CONCLUSION

There were significant differences between the black skinned and white skinned (albino) ectotypes in all measured parameters However there are indications that the albino ectotypes has potentials to lay more eggs if compatible partners are kept together This can be achieved by increasing the number of snails per cell.

We recommend that inter mating between the black skinned and white skinned ectotypes by tried Besides, awareness should be created among potential snail consumers to allay their fears about any negative opinion they have against meat from the albino ectotype

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