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HELICULTURE IN NIGERIA: THE POTENTIALITIES, OPPORTUNITIES AND CHALLENGES (A REVIEW)

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ABSTRACT

Heliculture, the science and occupation of growing snails for food, can be regarded as a new bride of animal husbandry in Nigeria, with its potentialities, opportunities and challenges. The potentialities of snail rearing are that the meat is highly nutritious - containing 37-51% protein, has high iron content (45-59mg/kg) and low sodium (2.32g/100g) and fat content (0.05-0.08%) - making it the ideal meat for hypertensive patients. Also, heliculture requires a comparatively low level of capital to set up; it requires a little space and is well-adapted to domestic rearing. Snail meat is a valuable export commodity, with a flourishing international trade in Europe and North America. Despite the challenges of availability of quality feed at reduced cost; problem of numerous enemies and predators; problem of obtaining species of fast growth rate and the problem of maintaining optimum humidity and eliminating excess heat in the snail pen; snail has the potential of serving as food, livestock feedstuff or as a source of revenue in Nigeria. Snail meat should no longer be regarded as bush meat or game meat to be eaten occasionally, but rather as a nutritious meat to be relished on a daily basis, just like the meat of conventional livestock.

Keywords: Heliculture, potentialities, opportunities, challenges, nutritious, domestic rearing, export.

INTRODUCTION

Snails are soft-bodied animals that can be scientifically classified thus: Kingdom: *Animalia* Phylum: *Mollusca* Class: *Gastropoda* Order: *Stylommatophora* Family: *Achatinidae*

They are molluscs, which are second in size in the whole of the animal kingdom to the arthropods, and have the following distinguishing characteristics: a coiled, hard, outer protective shell; a broad, flat, muscular foot; and a distinct head which bears two pairs of tentacles or stalks, with the eyes positioned at the tips of the long or upper tentacles (Adekan & Taiwo, 2004). Snail rearing or heliculture can be regarded as the new bride of animal husbandry in Nigeria. It is gradually becoming a popular pastime and a great way to provide a different regular meat and extra income. Today, there is a growing interest in the rearing of snail for meat and sale in Africa and Nigeria in particular (NRC, 1991; Omole, 2001).

Culturable Snail Species

There are about 40,000 species of snails found throughout the world in the wild, out of which a few species have been found to be culturable. Table 1 below gives the species of *Achatina* and *Archachatina* found in tropical and sub-tropical Africa; and the different species of snail that are found in Italy and other European countries.

Of all these species, the popular species of economic interest in Africa are *Achatina achatina*, *Archachatina maginata* and *Archachatina degneri* (King, 2008).

Achatina achatina (Linné, 1758), the Giant Tiger Snail or Giant Ghana Snail, is one of the largest snails in the world, and sought after because of its size, distinct markings and nutritive value. It is the most prized snail for eating followed by *Archachatina maginata* (West African Land Snail), *Achatina fulica* (Giant African Snail) and then *Archachatina degneri* (Giant Gold Coast Snail). It has an average shell length of 18cm and diameter 9cm, and may weigh up to 500g at maturity. It has a lifespan of 5-7 years. The shells are conical in shape and fairly pointed than other snail species. In captivity under intensive management, it attains sexual maturity between 10 to 12 months and can lay between 30-300 eggs/clutch, with diameter 4-10mm per egg (King, 2008).

Archachatina maginata (Swainson, 1821), West African Land Snail or Banana Rasp Snail, is the largest snail of the *Archachatina* genus found in West Africa. The outer shells are dark-skinned or white-skinned (albino-bodied). It has an average longevity of 4.5 years and shows signs of sexual maturity at 9-10 months. It produces larger-sized eggs (12-20mm in diameter), laying 2-4 clutches of 8-9 eggs per clutch in a year.

Archachatina degneri (Bequaert and Clench, 1936), Giant Gold Coast Snail, has a light brownish-yellow ground colour, with reddish-brown axial streaks. It is different from *A. maginata* in that the inside of the shell is extensively purplish (King, 2008).

In Italy and other European countries, the commonest species of snails farmed are the garden snails, *Helix aspersa* (Muller 1774) and *Helix pomatia* (Linnaeus 1758). Unlike the *Achatina* and *Archachatina* species, they are just about 4-5cm long and 3.5cm broad (depending on their age and species) and weigh about 10g at maturity (Begg, 2003).

Table 1: Species of snails found in tropical and sub-tropical Africa and Europe

Achatinidae	Other Species
<i>Achatina</i>	<i>Helix</i>
<i>Achachatina</i>	<i>aspersa</i> var.
<i>achatina</i>	<i>aspersa</i>
<i>maginata</i>	<i>aspersa</i> var.
<i>fulica</i>	<i>maxima</i>
<i>degneri</i>	<i>pomatia</i>
<i>craveni</i>	<i>aspersa</i>
<i>puylaepi</i>	<i>vermiculata</i>
<i>stuhmanni</i>	<i>lucorum</i>
<i>bicarinata</i>	
<i>albopicta</i>	<i>Capaea</i>
<i>crawfordi</i>	<i>hortensis</i>
<i>nyikaensis</i>	<i>nemoralis</i>
<i>granulata</i>	
<i>iredalei</i>	
<i>dimidiata</i>	
<i>zebra</i>	
<i>ventricosa</i>	
<i>smithii</i>	
<i>ustulata</i>	
<i>varicosa</i>	
<i>limitanea</i>	
<i>immaculata</i>	
<i>cinnamomea</i>	
<i>reticulata</i>	
<i>camerunensis</i>	
<i>panthera</i>	
<i>knorrii</i>	
<i>glutinosa</i>	

The Demand for Snail and Snail products

The meat of snail is nutritious, with high protein content (37-51%) compared to that of guinea pig (20.3%), poultry (18.3%), fish (18%), cattle (17.5%), sheep (16.4%) and swine (14.5%). It has high iron content (45 to 59mg/kg), low sodium and low fat content (0.05-0.08%), making it the ideal meat for hypertensive patients (Owolabi, 2008). According to Sogbesan and Ugwumba (2008), the garden snail is made up of 66.8% crude protein, 7.9% crude fat, 4.1% crude fibre, 2.32g/100g sodium, 1.13g/100g calcium, 2.23g/100g potassium, 0.15g/100g phosphorus and 0.28g/100g magnesium, with a metabolizable energy (ME) of 1504.95kJ/100g. It possesses low myristic and palmitic acid content, and contains almost all the amino acids needed for human nutrition. Also, snail meat has numerous medicinal values, containing orthocalcium phosphate used in the cure of diabetes, kidney and circulatory disorders. The shells of snails also constitute a good source of calcium and phosphorus for livestock feed (Adelekan and Taiwo, 2004).

Snail meat is a valuable export commodity. In France alone, the annual requirement is more than 5 million kg, out of which over 60% are imported. And in Italy, the estimated annual consumption is more than 306 million snails, with over 40 tonnes exported to France every year (Okorhuele, 2008).

Table 2 below gives the Italian snail production data by species in 2002 (Begg, 2003).

Table 2: Italian snail production data by species (2002)

Species	Kilograms produced	% of total production
<i>Helix aspersa</i>	14,900	45.15
<i>Helix pomatia</i>	9,800	29.70
<i>Helix vermiculata</i> (Rigatella)	4,420	13.39
Others	3,800	11.76
Total	33,000	100

The above table shows that *Helix aspersa* is the most suitable and easily-grown snail for farming in Italy. It also shows that snail farming has moved from a small cottage

industry to a large-scale, recognized agricultural farming enterprise in Italy. According to Okorhuele (2008), there is a flourishing international trade in snails in Europe and North America. Escargot is a common French cuisine made from snail and widely relished in Europe. Another product highly valued is snail caviar prepared from snail eggs of good quality immersed in a brine of *fleur de sel Gu rande* (best quality unrefined salt), with a dash of rosemary essence. They are then packed in small metallic boxes, vacuum-sealed and sold, protected from light (semi-canned).

Other products of repute are snail extract, baba descargot, caviar de caracol, caviar descargot, snail secretions, helicina, baba de caracol and snail serum; all of which are highly valued in the international market.

The Potentialities for Heliculture in Nigeria
Heliculture has the following advantages that make it suitable in Nigeria:

It requires a comparatively low level of capital to set up in terms of buildings, procurement of juveniles, feeding and general maintenance. A sum of N100,000- N150,000 would start a small profitable snail farm.

A snail farm occupies a little space and is well-adapted to domestic rearing. Snails can be raised in old tractor or car tyres, earthen or clay pots, baskets, hutch boxes and concrete trenches.

Snails do not make noise, unlike poultry, cattle, sheep, goats and pigs. They are nocturnal animals that hide in the day and feed quietly at night. They are non-violent, gentle creatures that are easy to breed and maintain.

With suitable housing and good feeding, snail rearing can be carried out throughout the year in the savanna, tropical and sub-tropical climates of Nigeria.

Heliculture has the potential for high return on investment (ROI) with low level of inputs. Snails have a high reproductive rate, being able to continue to lay eggs several times over a period after a single mating. Hence, a snail can produce at least five times its own body weight of meat in a year, after attaining sexual maturity in 8-12 months. Research in Italy has shown that the number of marketable snails raised successfully from each breeder is an average of 20 snails. And it takes from 10-12 months to reach market size (Begg, 2003).

The Challenges ahead

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One of the major limitations to the efficient rearing of snail in Nigeria is the availability of quality feed, and at affordable price. Snail feed are normally formulated to contain 25-30% crude protein and ME of 2400-2500 kCal/kg (Omole *et. al.*, 2008). Hence, commercial feed millers are encouraged to produce quality snail feed at affordable prices and make them readily available. A snail farmer should have access to buying snail feed as easily as buying broiler or layer's feed.

Snails are easily attacked by numerous predators and enemies including soldier ants, termites, maggots, lizards, snakes, rodents (rats, rabbits, hares and moles), millipedes, centipedes, frogs, beetles, wild spiders, ducks, crows, magpies, blackbirds, flies and man, etc. However, this problem can be minimized by properly fencing the snailery with mosquito net and wire mesh (1/2 inch or 3/4 inch). Also, a channel of about 30cm wide and 25cm deep should be dug around the snail pen and filled with water. Disinfectant should be poured into the water to prevent mosquitoes from breeding in the pool and to scare away potential predators (Okorhuele, 2008). Also, remove vegetation and faeces daily to prevent maggots from the snail pens.

One of the greatest factors to be eliminated in snail rearing pens is excess heat; hence the maintenance of optimum humidity in the pen is paramount. Excess heat from the sun or nearby fire disturbs the snail since they are slow animals, and have little resistance to heat. To hatch their eggs, they need a temperature of about 31°C to 32°C for 28-40 days, which should be provided for them at the hatchery tanks or hatching boxes/incubators. But for purposes of rearing, direct heat from the sun beating the snails should be avoided.

Snails though need moisture and humidity of about 80% in the pen; flood and excess rainfall affects the eggs and the juveniles. Too much water disturbs them and makes them drown (Okorhuele, 2008).

Obtaining the correct species of snail juveniles that grow fast and attain a maximum size of between 500g-800g in less than a year could be a problem. It is therefore encouraged that the snail farmer should obtain species of *Achatina achatina*, *Archachatina maginata* or *Archachatina degneri* from recognized snail breeders, to get optimum results. They should avoid sourcing their bloodstocks or foundation

stock from the wild, from the open market or from doubtful sources.

Problem of snail diseases could also be a big challenge because of limited available knowledge. However, much of snail diseases are due to poor or inadequate nutrition. Hence, the snail farmer is advised to feed his animals properly with formulated balanced feeds supplemented with available fruits and vegetables such as ripe and unripe plantain, ripe and unripe pawpaw, spinach, water leaf, pineapple peels, tomatoes, lettuce, cabbage, garden egg, carrots and cucumber. Rotten foods should be removed daily to avoid mouldiness and maggots.

There could be problem of overcrowding. This can be avoided by stocking the snails using the correct recommended density. Also, snails should be well-handled and well-managed to avoid dehydration, physical injury and chemical poisoning, especially from common chemicals such as salts, petroleum products (petrol and kerosene), fertilizers, disinfectants (e.g. IZAL, DETTOL and MORIGAD) and medicated soaps.

CONCLUSION

Future Prospect for Heliculture in Nigeria

With a land mass of 923,768km², a population of over 120 million (with an annual growth rate of 2.3%, *Microsoft Encarta Encyclopaedia 2009 Edition*), and a tropical climate suitable for snail rearing, heliculture has good future prospect in Nigeria. In fact, when properly harnessed and explored, it can soon become another gold mine! Already, interested individuals are now approaching snail farming as a hobby, while commercial large scale farms are expected to spring up when many people eventually come to appreciate the numerous potential benefits of snail farming.

The National Biotechnology Development Agency (NABDA), a recently established parastatal of the Federal Government of Nigeria, is taking the lead by promoting heliculture, grass cutter domestication,

apiculture (bee keeping), mushroom farming, fish farming and tissue culture - to produce elite varieties of bananas, plantains and pineapples, etc. Recently, NABDA assisted Obasanjo Farms at Otta in Ogun State to set up a facility for rearing 500,000 snails. This is a good beginning, with other commercial farms all over the country soon to follow suit. Hence, NABDA is encouraged to carry on its laudable activities to the grassroots to cover all the six geo-political zones in the country so that snail meat would become a regular item in the menu of the Nigerian populace.

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