



**National Agricultural Extension and Research Liaison Services
Federal Ministry of Agriculture and Water Resources
Ahmadu Bello University, Zaria**

SNAIL PRODUCTION TECHNIQUES IN NIGERIA



**Extension Bulletin No 108
Forestry Series No 12**

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Produced and Distributed By
National Agricultural Extension and Research Liaison Services
Ahmadu Bello University, Zaria.

ACKNOWLEDGEMENT

The authors wish to gratefully acknowledge the immense help got from the following during the preparation of this bulletin:-

- *Federal University of Technology, Owerri
- *Federal University of Agriculture, Umudike
- *Rubber Research Institute of Nigeria, Benin; and
- *FAO Publication on Snail Farming (Rome).

Chris Chinaka and E. K. Wilson.
(1995).

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INTRODUCTION:

Snail meat commonly known as “Congo meat” is one of the most popular delicacies in Nigeria. Snails are one of the commonest sources of animal protein in Southern Nigeria where the ecosystem favours their continued existence. The meat is high in protein (12 – 16%) and Iron (45 – 50 mg/kg); low in fat (0.05 – 0.08%) and contains almost all the amino acids needed for human nutrition.

Ordinarily, in Nigeria, snails are collected from the wild. Wild snail population have considerably declined because of human activities such as: deforestation, pesticide use, slash and burn agriculture, bush fires and collection of snails before they have reached maturity. If the present intensity of these factors continues unchecked, the giants land snails will sooner or latter get extinct. One way of preventing this from happening is to start rearing snails in farms just as is done for poultry, sheep, goats, and rabbits.

SNAIL FARMING

Snail farming is the rearing of snails in captivity. The snails are confined in an enclosure and most of their requirements like feed; water and lime are supplied on a regular basis by the farmer. On maturity, the snails are harvested, processed and consumed by the farmer or sold. Since the seasonality of supply of snails from the wild limits their use for meat on a continuous basis, the need for organized small or large scale snail farming has become imperative.

SNAILS FARMING SYSTEMS:

There are two main systems of snail farming. These are: Indoor and Outdoor systems.

Indoor System: This system involves raising snails indoors in pens located in a building. The snails are fed a mixture of fresh vegetables, concentrates, and other food materials. The system utilizes little space as the snails could be raised even in trays placed on shelves on the walls. In advanced management, the system allows for temperature regulation, controlled lighting, regular cleaning, and health care.

Out-door System: In this system, snails are raised outdoors on pastures. The snails may or may not be fed. The farmer has little control over the performance of the snails. The snails move about feeding on natural food materials.

A modification of the out-door system is one in which the snails are confined out-doors in enclosures and fed both synthetic and natural diets. It is easier to control and manipulate snails in this setting. This system fits in very well into the Nigerian farming system.

REQUIREMENTS BEFORE STARTING:

The farmer will need the following to start a snail farm – (The modified out-door system).

- *Enough edible live snails.
- *A good site near his house with the right kind of soil and the right amount of water for the snails to live and grow.
- * Enough food and shelter plants
- *The materials to build a pen for the snails.

SELECTION OF SITE:

A prospective snail farmer must choose a suitable site for his farm. Important factors to consider are: Location, soil type, moisture content, wind direction, lime content of the soil and environmental temperature.

Location of Farm:

The snail farm should preferably be located close to the farmer's house. In this way he will be able to watch his snail regularly, detect any problem early, protect them from their enemies and take care of them easily. There should be adequate space for future expansion.

Soil Type:

The snail farm must be sited at a place where the soil is rich in humus and other decaying plant and animal materials. The soil should contain sufficient lime or calcium for eggs and shell and snails shell formation. Snails do not live in hard soils nor do they live in loose sandy soils. Snails cannot dig into hard clayey soils to rest and lay eggs while soils with a lot of sand do not hold enough water. The ideal snail soil should be medium (light) to allow air and water to penetrate easily.

Moisture content of Soil:

Snails prefer damp soils. The farmer should avoid very wet lands and lands prone to flooding in the rainy season. Dew and rain keep the ground moist so that the snail can move easily and dig into it to rest and lay their eggs.

For a round the year production of snails, a ready source of water supply for irrigation or spraying should be provided. Snails usually seal off their aperture and go into hibernation during the dry season unless a continuous supply of moisture is guaranteed. The soil could be kept continuously wet by the provision of shelter plants like banana/plantain or the farm could be watered to provide the necessary conditions for the survival and multiplication of snails.

Wind Direction:

Snail farms should be situated in sites well protected from the wind. Strong winds during the snail growing season are bad for snails because they lead to dehydration and subsequent drying up of snails.

Temperature and Humidity:

Snails are cold blooded animals and therefore sensitive to change in atmospheric humidity and temperatures. In West Africa, temperatures in the areas where most edible species of snails are found do not fluctuate greatly. However, significant fluctuation in humidity below 75% induces the snails to aestivate (i.e. to lose valuable growing time). Snails therefore prefer a habitat that is neither too hot nor cold. When the temperature is too hot or too cold, the snails withdraw into its shell. This is called hibernation. Snails thrive best on temperatures of about 10 – 23°C.

CHOICE OF BREEDING STOCK:

Like most livestock ventures, the success of a snail farm depends in part on the quality of the farmer's foundation stock. It is recommended that the farmer should choose snails based on the desirable characteristics below:

- i. **Good strong shell:** Strong shells, protect snails from their enemies. Snails with cracked shells or thin shells should not be selected for a snail farm.
- ii. **Snails that fill their shell:** The farmer should choose only snails that fill their shells. A snail that does not fill its shell may be sick or it may have lost its water because of dry weather. It may not grow well.
- iii. **Fully-Grown Snails:** For his new snail farm, the farmer should choose only fully-grown snails as startment stock. They are hardier and would produce eggs and baby snails earlier than immature ones.
- iv. **Large Snails:** The larger snails of any kind of snail will be neater, healthier and lay more eggs than a snail that is smaller. The eggs of larger healthy snails hatch better and the baby snails grow bigger and faster. The farmer should therefore choose the largest of the fully grown snails of the type of snails he intends keeping.
- v. **Same Kind of Snail:** The same kind of snail should be selected for the snail farm. The farmer may decide to use either the giant type of snails (e.g. *Archatina achatina*; *Archachatina marginata*) or the exotic small types (*Helix pomatia*, *Helix aspersa*).

Never rear a mixture of small and large types in the same enclosure. Their requirements and maturity periods are not the same.

TYPES OF SNAILS TO FARM:

Only snails that live on land and are edible should be selected for farming. Some kinds of land snails harbour parasites which can cause diseases in man. Many species of edible land snails are recognized in Nigeria. The popular species of economic interest is the West African giant snail's *Archachatina marginata* and *Achatina achatina*. These are therefore the recommended species.

Archachatina marginata: These snails are found in places where it is warm all year round. Their shells are characterized by brown to pale brown colour with vertical streaks, zig-zag lines or blotches. They weigh from 150 – 200 gm or more at maturity. They grow to full size in 24 months if well fed and watered. They lay about 5 – 10 eggs four to eight times each growing season. The breeding season is from May to October (rainy season). However, if provided with regular supply of water, food and lime, they could grow and reproduce throughout the year. Their shell length ranges from 90mm to 130mm. They have rounded tails with blackish foot.

Achatina achatina: Like the *Archachatina marginata*, they are native to West Africa. They have strong brown shells and grow to full size in two years under good management conditions. They lay more eggs per growing size.

Achatina achatina lays from 100 – 300 eggs, once to two times each growing season. They have pointed tails with whitish to grey foot.

Snail eggs:

Generally, the eggs of snails are lemon yellow in colour and resemble small bird's eggs. The eggs hatch usually within 30 days. Young adult snails lay more eggs than old ones.

Where to get snails for your farm:

The farmer can gather wild snails from nearby bushes for use in his farm. He could also buy from people who gather and sell wild snails. Snails could equally be bought from another snail farmer in his locality. Snails bought from the open market should never be farmed. These are of doubtful quality and may soon die shortly after introduction into the pens.

CONSTRUCTION OF A SNAIL PEN (SNAILERY):

The type of snail pen depends on a number of factors which include:

- *The scale of the snail farming enterprise;
- *The type of snails farming i.e. In-door or Out-door;
- *The stage of development and habits of the snails.

This bulletin will discuss the construction of out-door snail pen.

Size of Snail Pen:

A snail pen can be large or small depending on how many snails the farmer wants to raise. For a new farmer, it is advisable to start with a small pen.

He would need fewer materials and fewer snails for this. As he becomes more experienced in snail farming, he can build a bigger pen and get more snails to raise. A 5m x 5m out-door pen is a suitable size to start with.

Preparation of site for 5m x 5m out-door snail pen:

Choosing a suitable site close to the house. The snail farmer should clear the area of all plant materials like bushes, grasses, roots and weeds. The cleared materials should be evenly spread on the ground where the pen would be located. Burn the materials when dry. Burning of the area will clear it of insects, weed, seeds, rats and other pests. From the cleared area, a square of 5m x 5m is marked out for the snail farm. The ground in the square is dug to a few centimeters dept (20cm) and turned over with s shovel, hoe or other suitable implements. If any more insects and other enemies of snails are seen, more dried plant materials are spread on the ground and burnt again. The ground is then smoothen after digging. The ground should be smooth and well worked as it would be when planting a vegetable garden.

Fencing of Pen:

On the smooth and well worked ground, a snail pen (5m x 5m) is created by fencing the area with one or more of the following materials:-

- *Corrugated iron sheet
- *Woven plant materials
- *Plastic sheet

*Chicken wire mesh

*Wooden posts.

Some of these materials (wire mesh, corrugated iron sheets, plastic sheet) though durable, are expensive and unaffordable by most farmers living in villages. However, woven plant materials fence cover is cheap and available in most rural areas. Such fences could be made from gamba grass or other tall grass species. The fence is built just like any other fence. A number of wooden posts of reasonable length are driven into the ground along the perimeter of the (5m x 5m) farm, such that when in place, each post is at least one meter above ground. When all the posts are in place, dig a shallow trench (about 0.4m deep) all the way round the pen. Attach the woven plant material (fence cover) to the post and ensure that the plant material fence cover goes all the way to the bottom of the trench. Whatever material that is used for the fence of the snail pen should be buried to a reasonable depth below ground. When woven plant is used, the bottom of the material tends to rot after some time and needs regular replacement. As soon as the plant material fence cover is in place fill in the trench to complete the fence. If a combination of chicken wire mesh and woven plant material is to be used, followed by the woven plant material. The farmer should remember to change the bottom of the fence cover when it rots. To facilitate easy replacement of rotten material in future, the fence cover could be made in two parts – one for the top and another for the bottom of the fence. To prevent snails from crawling out of the pen, flips could be attached to the top of the pen. In some pen designs the fence covering is made of mosquitoes wire netting.

Whatever materials that is used for the pen should ensure that rats and other predators are kept out.

At one corner of the snail pen, put a hatching chamber for hatching snail's eggs and a rearing unit for young snails (Fig. 1). The hatching unit and rearing unit could be wooden boxes covered with wire mesh or out drums or even baskets. The floor of the hatchery or rearing unit is filled with rich organic/top soil to a depth of 4-7cms. Perforate the bottom of such chambers to drain out excess water. Do not introduce newly hatched young snails into snail's pens to avoid cannibalism.

Other types of out-door snailery include the following:

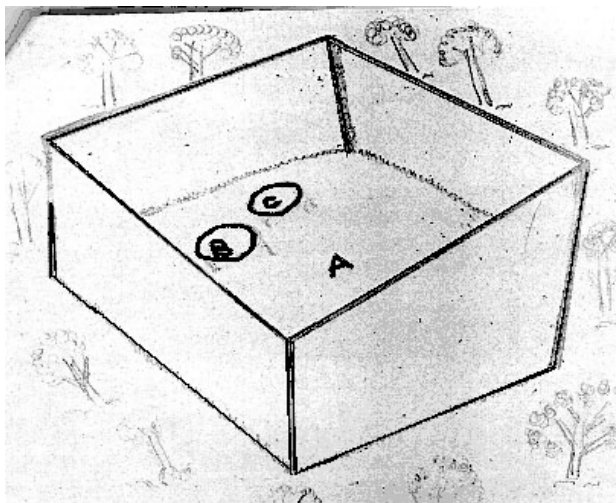


Figure 1: Modified outdoor snail pen (from the top)

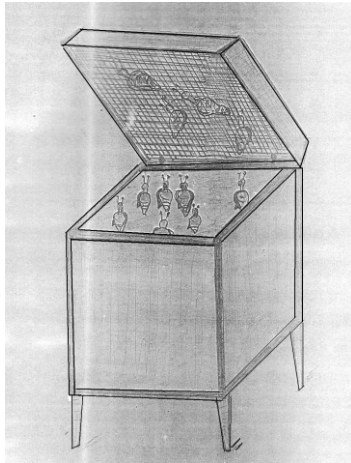


Fig. 2: Single unit hutch box (with lid open).

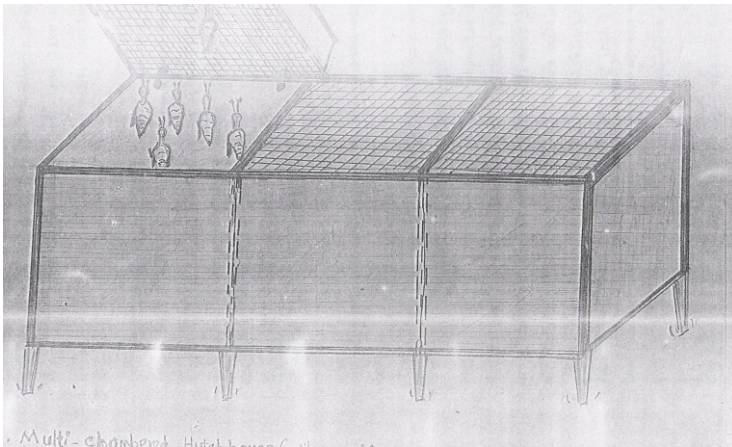


Figure 3: Multichambered hutch boxes (with one lid open)

(a) Hutch Box Method:

The hutch boxes which could be single (Fig. 2) or multi-chambered (Fig. 3) are wooden boxes with lids. The lids are openings covered with wire netting or nylon mesh. The floors of the boxes are filled with sieved organic soil to a depth of 5 – 8 cm, which must be slightly limed (CaCO_3). The bottom of the hutch boxes have holes to allow excess water to drain out. The hutch boxes are put under trees like rubber, cocoa, citrus and even plantain for shade. When hutch boxes are used, the soil is changed once every two to three months.

(b) Trench Pens:

In the trench type, pens, square or rectangular holes (depending on the desired shape of pen) are dug in the ground about 50cm deep. The dug up area is divided into pens and the sides are built up to 2 – 3 blocks high from the ground level while the bottom is covered with loose soil. The pens are covered with nylon mesh nailed to wooden frames for lids. The trench pens which more or less look like the hutch pens could be used for hatching snail eggs, rearing and for finishing.

(c) Make-shift Snailaries:

Snail keeping as a hobby or on a very small scale could be done using the following make-shift outfits:-

- i. Stack of old motor types
- ii. Baskets
- lii.Boxes

iv. Pots and calabashes

v. Cut drums, old basins etc.

In each case, the tops are covered with wire or nylon mesh.

INTRODUCTION OF SNAILS INTO PEN:

With the food and shelter plants in place, the snails can now be put into the pen. Snails selected for the farm should be very gently handled and carefully put into a container such as basket. In this way, they can be carried to the pen without hurting them. Before putting them in the pen, all grasses and weeds should be eliminated. The snails should be put in the pen in the evening when it is cool. They should never be put at the period of the day when the sun is hot. On days that no dew is available and the leaves of the plant and the ground are dry, wet them before putting the snails in. The newly introduced snails should be placed in different locations in the pen. Only the right number of snails should be put in the pen. Do not stock more than 15 – 25 mature snails/m². There should be no overstocking. After introduction of snails a check should be conducted the following morning to see that they have all moved. Any snails found to be dead should be taken out and replaced by equal number of snails. At first the newly introduced snails will try to crawl out of the pen. The farmer should go round each morning and put them back. After about two weeks he snails will become used to their new homes and most of them will not try to crawl out.

FEEDS AND FEEDING OF SNAILS:

Snails are voracious feeders and may consume about 10 time their body weight of leafy vegetable or plant material every day. To be successful in snail farming, the farmer must ensure a steady uninterrupted supply of foodstuffs to his snails throughout the snail growing season.

Food Plants:

Snails feed on a wide variety of cultivated and wild plants. Young tender green leaves as well as dead and decaying leaves are eaten. Green leaves of Amaranthus, cocoyam, cassava, lettuce, cabbage, fluted pumpkin, hibiscus, are all eaten by snails. Before beginning, the farmer should find out what plants his snails like to eat. He can thus get information from an experienced snail farmer in his locality. He can also with his lantern watch snails at night and see what they are eating. Different plant materials could be dropped in the pen and by trial and error, he could find out which ones the snail would prefer.

Fruit Trees as shelter and food Plants:

Some fruit trees provide shelter as well as food for snails. Banana, plantain, mango, pawpaw, sweet oranges, cocoa etc serve dual purpose of providing shelter as well as fruits. Snails prefer feeding on over ripe fruits of these trees. Ripe oil palm fruits, broken pods, seeds and seedlings of cocoa are also consumed by snails.

Generally, snails usually hide on shelter plants during the day when it is dry and move to food plants to eat at night or early in the morning when they are wet with dew.

Other Feeds:

Snails also feed on synthetic diets containing a good amount of protein, calcium and phosphorus. An example of such diet is poultry marsh. Wet poultry droppings, rotten vegetables and dead animals are all consumed by snails. Apart from the items mentioned here, there are many other foods in the farmer's locality which snails like to eat. As stated earlier, these could be found out by trial and error.

Feeding Habit of Snails:

Snails are nocturnal and feed on a wide variety of feed mainly in the night, early morning, evening or on cold rainy day. Their activity level (including their rate of feeding) fluctuates with the ambient temperature.

TAKING CARE OF THE SNAILS:

After the snails are put in the pen, the farmer should:

- *Watch them carefully to see that they are eating well.
- *Give them the right type of food in adequate quantity.
- *Wet the food and shelter plants and moisten the ground regularly.

On dry days during the snail growing season, water the ground daily. Always water in the evening at sunset. Ensure that the soil is moist and not wet. In areas with dry season, when plants do not grow, snails dig into the ground to rest. They should not be watered at this time, otherwise the snails come out of the ground when they should not. The snails breeding season in Nigeria corresponds to the period of the rainy seasons.

CAUSES OF MORTALITY IN SNAILS:

Snails have many enemies. These include termites, soldier ants, frogs, toads, rats, snail eating birds, lizards, and larvae of some beetles. Common salt is also poisonous to snails. Over crowding is a serious cause of mortality in snail pens. When too many snails are crowded in a pen, they produce undesirable secretion which is observed to reduce their productivity. To remedy these;

- *Examine the pen fence regularly and mend any openings.
- *Use materials that keep out pests from your fence.
- *Maintain the right stocking density in you pen.
- *Keep away poisonous chemicals like common salt.

HARVESTING SNAILS:

Generally, snails that are well fed and managed would be ready for harvesting within 12 to 24 months from the date of stocking. Also, when the farmer sees a lot of baby snails in the snail pen, he could harvest the fully grown snails that he first put into the pen. Average weight of a snail a well matured snail of the giant type is 200gm. It takes not less than two years of efficient feeding to attain this weight. Growth rate is slow and a lot patience has to be exercised in snail farming.

How to Harvest:

Harvesting is done with the hands. Sometimes the snails hide under the cover of vegetation. Easiest time to find them is when the plants are wet (after it has rained) or at night when there is dew and they are moving about eating.

The farmer can also put in some of the food that snails like (e.g. ripe pawpaw) and when they come to eat, the farmer can collect them. When harvesting, snails should be carefully handled and put in a container such as basket, box or net sack. Too many snails (more than 10kg) should not be put in one container otherwise those at the bottom would be injured.

What to do with harvested snails:

The harvested snails could either be sold or retained for family consumption. Snails meant for sale should have clean, intact shells. They should be carried to the market in suitable containers like baskets or box. Snails could be stored alive in containers filled with materials such as saw dust or chipped maize husks for as long as 6 – 8 weeks.

Economics of Snail Production:

Unlike other livestock enterprises, housing for snails is cheap to construct. Snails could easily be kept even in makeshift housing. The feeding of snails is cheap, snails do not compete with man for food, rather, they feed on the wastes from man's kitchen, poultry droppings, leaves and over ripe/rotten fruits. Snails have very high multiplication ratio.

The *A. marginata* for example lays up to 80 – 100 eggs/growing season while the *A. achatina* lays up to 300 eggs or more in a growing season. Snails hatch within 30 days and in 12 – 24 months are ready for table. One snail therefore can in a growing season give 100 – 300 new snails (depending on the breed).

Labour requirement for attending to snails is very low. 1 man hour/day can care for 100 snails.

If a farmer started with 10 snails which cost about N400 (Umuahia Market – June 2008), in a growing season the 10 snails will give about 10×300 eggs = 3,000 eggs. When hatched and reared, and allowing 10% mortality, in a growing season, the farmer will come up with about 2,700 new snails. Feeding on leaves, fruits and kitchen waste, the farmer spends nothing on feed.

At maturity; the 2,700 will sell at
 $2,700 \times N40 = N108,000$

Internationally, snail meat commands good market in Europe and North America. The French snail requirement is about 5 million kg/annum, out this, more than 60% is imported. Italy is said to consume about 306 million snails annually. Back home in West Africa, Cote d'Ivoire has an estimated annual snail consumption of 7.9 million kg. Although the annual snail consumption figure for Nigeria is not known, one thing is certain that the demand is far ahead of the supply. Snail farming in Nigeria therefore has very bright future.

Summary and conclusion

Snail meat (Congo meat) is a high protein food. Collection from the wild is not sustainable. Therefore conscious efforts should be made to rear snails in captivity.

To start a snail farm, the following are required: enough edible live snails, a good site, enough food and shelter plants and a pen for the snail. Snails require soil that is rich in humus with enough calcium for shell and egg formation. Snails prefer damp soils. Protect snails from wind. Snails are cold blooded. Therefore avoid sudden changes in atmospheric humidity and temperature. Choose snails for rearing that conform to: good strong shell; snails that fill their shell; fully grown and large snails. House only one type of snail together construct snail pens using materials available in your environment and according to your resources. Do not stock more than 15-25 snails/m².

Ensure steady and uninterrupted. Food supply to snails on dry days, water the ground daily. Keep solider ants, frogs, toads, rats, snail eating birds, lizards and some beetle larvae off snail farm. Avoid common salt in snail farm. Snails mature in 12 – 24 months.

Snail farming is very profitable and therefore highly recommended even as a hobby.

Bibliography

1. A. A. Awa (2003) MTRN Monograph (unpublished) Rubber Research Institute of Nigeria, Benin City
2. Chowdhuny, SMZH, Mondal, MMH, Hug, S and Rahman, M. H. (1994). Prevalence of *Fasciola cercariae* in lymnaeid snails in Bangladesh. Asian – Australian Journal of Animal Science, 1994. 7 (3) 401-403.
3. Food and Agriculture Organisation (FAO) 1989. Snail production series 11-29. Rome Italy.
4. Michael Okpara University of Agriculture (2002). Snail Production Monograph (Unpublished) Umudike, Abia State Nigeria.
5. Udoh A. P. Akanyung E. O. and Igiran, I. E. Nutrients and anti nutrients in small snails for chemistry. 1995. 53 (3) 239-241.

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