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## Snail farming (Heliciculture): Benefits, economic viability, challenges and prospects

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### Abstract

The article upholds snail farming as activities that aim to grow industrial species of snails with the aim of deriving products for direct human consumption or for further processing. While the global agricultural systems are prompted to produce more food to feed the growing population, scientists and policy makers have often focused on plant and higher animals such as livestock. However, discussions involving livestock have been solely tied to cattle, poultry, pigs and shoats while stamping out small animals like snails, shrimps and insects, and their contribution to food security. Although the introduction and acceptance of snails in some world traditional cultures have been remarkably good, its introduction and prevalence in most global dish varieties is relatively low. Snails are a reliable and nutritious food source whose rearing is less strenuous, easy to start on reliance on available food sources. The mucus secretion from snails has medicinal purposes. Key challenges to snail farming are safety concerns and socio-cultural barriers towards adoption and acceptance. Snail farming is an economically viable venture with global demand for the commodity increasing as well as intensified research from pharmaceutical and cosmetic industry. While the future for snail farming seems bright, there is need for more research and development, global regulation and information sharing on the venture.

**Keywords:** Snail farming, shoats, shoats, shrimps, socio-cultural barriers

### Introduction

There is no known date when man started consuming snails, but consumption of snail meat transcends back in prehistoric times (Lubell, 2004) <sup>[9]</sup>. Snails are invertebrate animals that belong to a group called molluscs. Other members are squids, mussels, cuttlefish and slugs. Snails are reared as source of food, for their medicinal properties as well as for their aesthetic value. Meat, caviar and snail secretion are the main products of snail farming. Climate, feeding, hygiene and other edaphic (soil) factors are key to successful snail farming. Snails can be reared in indoor farms, open air farms or garden farms in intensive or semi-intensive system. Snails are vegetarians, but will not consume hairy vegetable/leaves or those that produce toxins such as physic nut (*Jathropa curcas*). Young snails feed on tender plant material and consume twice as much as their mature counterparts due to differences in surface area to volume ratios. As snails age, they feed on humus, dead leaves and rotten fruits. The size and age at which snails are harvested depends on the breeding objectives. However, it is recommended that snails be harvested before attaining 24 months because after this milestone, growth gradually retards. Snails are commonly reared (for domestic or commercial) in Europe, North America and parts of West Africa.

**Table 1:** Taxonomic structure of some commonly reared snails

Taxonomic rank	Name
Domain	Eukarya
Kingdom	Animalia
Phylum	Mollusca
Class	Gastropoda
Order	Stylommatophora
Family	Achatinidae,
Genera	Lissachatina, Archachatina, Achatina etc
Species	Achatina, marginate, fulica, aspersum, etc

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## Benefits

In snail farming, edible land snails are raised for consumption as caviars or escargot. Snail meat is rich in iron (50 mg/Kg), proteins (12-16%), has low fat and cholesterol content and has almost all essential amino acids (Cobbinah, Vink & Onwuka, 2008)<sup>[3]</sup>. A snail is 80% water, 2.4% fat and 15% protein. They are also good sources for vitamins A, K, E and B12. Freshwater snails have been used as a food source for countries such as Thailand, Taiwan, Mexico, and the Philippines. African land snails are key protein sources in West African countries such as Ghana, Ivory Coast and Nigeria. Snails are also used for medicinal value in production of lectin, slime, allantoin, collagen and elastin (Cilia & Fratini, 2018)<sup>[16]</sup>. In West Africa, the bluish secretion that is collected from the shell is used in folk medicine in infant development. It is also believed that the meat is ideal in curation of asthma and ulcers. It was also believed to contain aphrodisiac properties and would be recommended for dignitaries in the evening in imperial Rome. Agbogidi *et al.*, (2008)<sup>[2]</sup> noted that snail meat forms important part of meal in West Africa, especially in the forest belts. Key bioactive compounds for pharmaceutical and cosmetic industries is harvested from snails. Such compounds can be used in the manufacture of less toxic formulations with less post effects. Key ethnomedicinal uses of snails (and or its extracts) is used in wound healing, smooth soothing, reliever of stomach cramps, inflammation, small pox and chronic bronchitis (Dhiman & Pant, 2021)<sup>[5]</sup>. Snail mucus secretion is used in the cosmetic industry to remove pigmentation, wrinkles and black spots (Liu, Sood & Steinweg, 2017)<sup>[8]</sup>.

## Economic viability

In West African countries snail meat has a huge demand. In Ivory Coast, 7.9 million kg are eaten per year, while in the neighboring Ghana the demand outweighs supply. Snail rearing is an environment-friendly venture that can be carried out in the backyard because the shelled gastropods' exudates or droppings does not produce offensive smell. Snail farming is relatively inexpensive venture in terms of technical, capital and financial inputs as compared to those of livestock types. Snails are vegetarians and therefore have a wide range of food sources from the environment such as maize shaft residues, grains, banana peels, and succulent domestic vegetable wastes such as pawpaw, cabbage, pineapples, cherry, lettuce, and cassava (Okafor, 2001)<sup>[11]</sup>. Agbogidi, Okonta & Ezeana, (2008)<sup>[2]</sup> noted that snails are known to adapt in a wide range of environments, and can be reared in urban areas without interfering with people's peace because they need relatively small-scale. Snail farming is also very feed efficient venture, meaning that they are cheap to rear at domestic and commercial level with high returns on low input. Ghosh, Jung & Meyer-Rochow, (2016)<sup>[7]</sup> noted that food conversion efficiency of *Achatina fulica* was relatively higher than that of conventional livestock.

## Challenges

Social and cultural restrictions are a key impediment to extensive adoption of snail farming. For instance, while religious beliefs may bind people against this delicacy, most people may turn to be generally molluscophobic. In Nigeria, for most Hausa speaking people, eating snails is considered a taboo because they believe snails come from a ghostly existence (*dodo*) (Agbogidi, Okonta & Ezeana, 2008)<sup>[2]</sup>. The venture may not warrant a quick return on capital invested especially for small-scale farmers due to the relative slow growth rate of the animals. In addition, the consumable meat makes up a maximum

of 40% of the snail's total live weight. Safety concerns on the consumption of snails is also a key challenge. For instance, cases of angiostrongylus infection have been proved to occur due to ingestion of raw or undercooked snail (Lv *et al.*, 2009)<sup>[10]</sup>. Wan & Weng, (2004)<sup>[14]</sup> noted that eosinophilic meningitis is characteristic to not only to people who eat raw snail meat but also playing with snails as pet. Zubar & Yu, (2021)<sup>[15]</sup> added that lack of extensive research and development, legislative regulation, and low industrial production capacity are key challenges to snail farming.

## Prospects

Snail farming is attracting a lot of attention and in coming years, the industry is poised to have evolved massively. With the dynamics of pharmaceutical and cosmetic industries more research to unearth more bioactive compounds will be directed into the industry. The business has good returns, owing to the fact that the commercialization of the venture is on the rise. For instance, there is a thriving international trade of snails in Europe and North America. Consumption of snails rose by 42% to 300 tonnes in 2018, which is attracting investors. The global market of snail sales is estimated to be \$ 117 M annually (Escargot World, N.D).

In France, there is 5 million kg annual requirement and more than 60% of it is imported. In Italy, annual consumption stands at 306 million snails. In West Africa, snails have always been a key ingredient to the people's diet. In Ivory Coast, for instance, an estimated 7.9 million kg is consumed yearly (Onuigbo, 2015)<sup>[12]</sup>. According to Tridge (2020)<sup>[13]</sup>, top three exporters of snails globally in 2020 were Morocco with an export value of \$ 10.48 M, Lithuania, (\$ 5.78 M) and Ukraine (\$ 1.90 M). In 2020, France was the top snail importer with an import value of \$ 15.2 M, while Morocco was the main producer with a 16.3K MT worth of production volume.

## Conclusions and policy implications

Snail farming is attracting entrepreneurs globally. Snails are reared for their nutritious, aesthetic and medicinal values. To optimize production and development of the industry, intensive research and development is necessary to set the blue print for this venture. There is need for: Capacity building to the small-scale and large-scale farmer to optimize production, including provision of subsidies and necessary extension expertise; sustainable commercialization of the industry; building processing infrastructure; infrastructural and organizational planning at national and international level and introduction of heliculture to the mainstream school education system.

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