

**DESIGN AND CONSTRUCTION OF AN ECO-FRIENDLY
SCREEN HOUSE FOR OPTIMAL SNAIL FARMING**

BY

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**DEPARTMENT OF ANIMAL SCIENCE
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BENIN CITY**

NOVEMBER, 2025

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF ANIMAL
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CERTIFICATION

This is to certify that this project work was carried out by Ogochukwu Deborah EJECHI with the Matriculation Number AGR2008803 of the Department of Animal Science, Faculty of Agriculture, University of Benin, Benin City, Nigeria.

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(Head of Department)

Date

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ABSTRACT

The increasing demand for sustainable food production and environmental conservation has necessitated the development of eco-friendly agricultural structures. This study focuses on the design and construction of an eco-friendly screen house for optimal snail farming, aimed at improving productivity while minimizing ecological impact. The project integrates locally available and biodegradable materials such as bamboo, palm fronds, and recycled mesh to create a cost-effective and environmentally sustainable housing system. The screen house was designed to provide an ideal microclimate—maintaining adequate humidity, temperature, and ventilation—to enhance the growth, breeding, and survival rates of *Achatina* species. Solar-powered lighting and a rainwater harvesting system were incorporated to reduce energy consumption and promote resource efficiency. Performance evaluation of the structure showed improved snail growth rate, reduced mortality, and minimal pest invasion compared to conventional open systems. The results demonstrate that eco-friendly screen houses offer a production. practical, low-cost, and sustainable solution for small- and medium-scale snail farmers, aligning with global efforts toward green agricultural innovations and climate-smart animal

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of Study

Snail farming, also known as heliciculture, is increasingly recognized as a sustainable and profitable branch of animal production, especially in developing countries like Nigeria. Snails provide a rich source of high-quality protein, iron, calcium, and essential amino acids that are vital for human health. They also have economic significance, as the demand for snail meat continues to rise due to its nutritional benefits, medicinal value, and suitability for both domestic consumption and export. Furthermore, snail farming requires relatively low capital investment, minimal land area, and simple management practices, making it a feasible agribusiness venture for small- and medium-scale farmers.

However, despite its potential, the productivity of snail farming remains low in many regions. One of the primary challenges is the lack of suitable housing systems that can provide a favorable microclimate for snail growth, reproduction, and survival. Snails are highly sensitive to environmental factors such as temperature, humidity, light intensity, and soil moisture. They thrive best in cool, humid, and shaded environments. Unfortunately, traditional housing systems such as open pens, wooden cages, and boxes often fail to maintain these conditions. Such structures expose snails to predators, pests, harsh weather, and

contamination, leading to dehydration, stress, slow growth, low egg production, and high mortality rates.

The use of non-eco-friendly materials and poor housing designs further aggravates the problem. Many existing snail houses are made from materials that are not durable, environmentally harmful, or unsustainable. Additionally, they rely heavily on manual watering and energy-consuming systems to regulate humidity and temperature. These challenges not only increase operational costs but also limit productivity and environmental sustainability. As global attention shifts toward green technologies and sustainable agriculture, it has become necessary to explore innovative approaches that integrate environmental conservation with improved animal production systems.

An eco-friendly screen house provides a viable solution to these challenges. Such a structure utilizes locally available, renewable, and biodegradable materials such as bamboo, palm fronds, recycled mesh, and mud bricks to create a controlled and naturally balanced environment for snail rearing. The design promotes natural ventilation, adequate lighting, and moisture retention while protecting snails from predators and harsh weather. Incorporating solar-powered lighting systems and rainwater harvesting technologies can further enhance the efficiency of the setup, making it both energy-saving and environmentally sustainable.

Despite these potential advantages, the adoption of eco-friendly designs in snail farming remains limited due to a lack of practical models, technical know-how, and awareness among farmers. Most small-scale farmers still rely on outdated and ineffective housing systems that compromise productivity. Therefore, there is an urgent need to design and construct an eco-friendly screen house that ensures optimal snail production through improved environmental control, cost-effectiveness, and sustainability.

1.2 Justification of the Study

The need for sustainable and environmentally responsible agricultural practices has become increasingly important in recent years due to the global challenges of climate change, environmental degradation, and resource depletion. In the livestock sector, the design of animal housing systems plays a critical role in determining productivity, animal welfare, and environmental impact. Snail farming, in particular, requires carefully controlled conditions of humidity, temperature, and ventilation to ensure optimal growth and reproduction. However, most existing snail housing systems in Nigeria and other developing regions are inadequate, poorly ventilated, and constructed from non-eco-friendly materials that degrade quickly and fail to provide a conducive microclimate for snails.

The project is further justified by the economic potential of snail farming in Nigeria and other tropical regions. Snails are in high demand due to their

nutritional value, medicinal properties, and export potential, yet the industry remains underdeveloped due to poor management practices and inadequate infrastructure. Developing an eco-friendly screen house will help small- and medium-scale farmers overcome key production challenges such as pest infestation, water loss, and high mortality rates. This will lead to increased output, improved livelihoods, and greater food security.

practical application.

In summary, this study is justified by its potential to combine productivity, affordability, and sustainability in snail farming. By providing a durable, environmentally friendly, and energy-efficient housing design, the project contributes to the advancement of green agricultural technologies, promotes environmental stewardship, and supports socio-economic development in line with sustainable development goals. Moreover, the project has educational and technological relevance. It will serve as a model for students, researchers, and agricultural extension agents interested in sustainable livestock housing and renewable resource utilization. The findings and design principles from this study can also be adapted to other forms of small livestock or integrated farming systems.

1.3 Objectives of the Study are to:

- i. design an eco-friendly snail house that provides an optimal environment for growth, reproduction, and survival of snails;
- ii. construct the designed snail house using sustainable and locally available materials that minimize environmental impact and reduce production cost;
- iii. evaluate the efficiency of the constructed snail house in maintaining suitable temperature, humidity, and ventilation for snail production;
- iv. compare the performance of snails reared in the eco-friendly snail house with those in conventional housing systems; and
- v. recommend best design practices and material choices for sustainable and efficient snail farming systems.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Snail Farming Systems in Nigeria

Amuson and Omidiji (1999) stated that there are three main management systems for rearing of snail. They are the extensive system, also referred as pasture, free range or outdoor system; the semi-intensive system and the intensive system which may be indoor or outdoor.

2.1.1 Extensive System

The extensive snail farming system is the most traditional and least capital-intensive form of snail farming. The snails have access to a natural environment with minimal human intervention, relying on natural food sources and climate conditions (Atata and Onwughalu, 2016). It involves raising snails in an open environment without the use of enclosures or controlled housing. This system requires minimal capital investment and management. However, it has low productivity, and snails take longer to reach market size.

According to a study by Adebayo et al. (2019), the extensive system is still a prevalent form of snail farming in Nigeria, especially in rural areas. The study found that the extensive system is easy to manage, and farmers can use locally available resources to construct the snaileries. There is little to no need for artificial housing, feeding or monitoring, making it a low-cost system (Ajayi *et al.*,

2018). However, studies also noted that the extensive system has low productivity, and it may not be suitable for commercial production.

2.1.2 Semi-Intensive System

Snails are kept in enclosures with partial access to the natural environment, allowing them to forage and exhibit natural behaviors to some extent (Agbogidi and Enujoke 2018). The enclosures provide better protection from predators and environmental extremes compared to the extensive system (Adewumi and Ajayi, 2016).

According to a study by Ademolu et al. (2019), the semi-intensive system is the most commonly practiced snail farming system in Nigeria. The study found that farmers prefer the semi-intensive system because it offers a balance between productivity and cost-effectiveness. However, the authors noted that the semi-intensive system also requires more capital investment and management than the extensive system.

2.1.3 Intensive System

In this method, snails are reared in controlled environments, such as greenhouses or confined spaces, to maximize production and minimize risks associated with external factors. The snails are kept in enclosures or greenhouses where temperature, humidity and light are regulated to create ideal growing conditions year-round (Ejidike and Afolayan, 2010). They are fed a formulated diet,

designed to maximize growth and reproduction. This system requires significant investment in infrastructure (e.g. climate-controlled pens, formulated feeds), labor and expertise to maintain optimal conditions for snail growth. Since the snails are kept in enclosures, stocking densities are typically higher than in semi-intensive and extensive systems, allowing for higher yields per unit area.

Snails in intensive system grow faster, reproduce more frequently, and are generally healthier due to the controlled environment and specialized diet (Okonkwo and Oji, 2017). The controlled conditions allow farmers to produce snails consistently throughout the year, regardless of seasonal fluctuations, ensuring a steady supply to markets. Predators and environmental stressors are minimized, leading to higher survival rates and better product quality.

The intensive snail management system requires significant capital investment in infrastructure, equipment and labor, making it less accessible to small scale farmers (Adewumi and Ajayi, 2016). The system also requires constant monitoring and management of environmental factors, feeding and snail health, making it labor intensive and demanding in terms of expertise. Due to the high stocking density, the intensive system may face challenges related to disease outbreaks or overcrowding if not properly managed.

2.2.1 Housing of Giant African Land Snail

The housing of the Giant African Land Snail (*Achatina* spp.) is one of the most critical factors determining the success of snail farming. Proper housing provides

protection, regulates environmental conditions, and promotes the health, growth, and reproduction of snails (Omole *et al.*, 2014). Snails are soft-bodied, nocturnal animals that thrive in a cool, moist, and well-shaded environment. Because of their sensitivity to temperature, humidity, and light, the design and management of their housing system are essential for optimal production (Ejidike & Afolayan, 2020)

2.2.2 Purpose of Snail Housing

The primary purpose of snail housing is to create a controlled microenvironment that simulates the snail's natural habitat while minimizing environmental stress and losses. According to Akinnusi (2017), a suitable snail house should provide adequate protection from predators such as ants, lizards, frogs, and rodents, as well as from harsh weather conditions. It should also prevent the escape of snails, facilitate feeding and cleaning, and ensure ease of management. Housing also helps regulate humidity, which is crucial since snails require about 75–95% relative humidity and temperatures between 25°C and 30°C for active growth and reproduction (Ogunniyi *et al.*, 2019).

2.2.3 Characteristics of a Good Snail House

A good snail housing system should maintain moisture, ventilation, and shade while ensuring cleanliness and safety. The internal environment must remain damp but not waterlogged to prevent fungal infections or suffocation of snails

(Okafor & Ejidike, 2016). The housing should have smooth surfaces to prevent shell injury and adequate soil depth (15–25 cm) to allow burrowing and egg-laying (Ayodele & Asimalowo, 2019). In addition, proper drainage and moderate light penetration are essential to reduce stress and maintain snail activity

2.2.4 Construction Material

Housing materials should be affordable, durable, and environmentally friendly. Commonly used materials include bamboo, wood, wire mesh, palm fronds, and thatch, which are locally available and biodegradable (Ogunniyi et al., 2019). Loamy or clay soil is usually placed at the base to a depth of 15–25 cm for egg-laying and burrowing. For eco-friendly designs, the use of renewable materials and natural ventilation is encouraged to minimize environmental impact (Ayodele & Asimalowo, 2019)

2.2.5 Eco-Friendly Housing Designs

With the rising emphasis on sustainability, modern snail farming increasingly adopts eco-friendly screen houses that maintain an optimal microclimate while conserving resources. Such structures combine bamboo frames, mesh netting, thatched roofing, and solar-powered systems to create stable humidity and temperature conditions (Ejidike & Afolayan, 2020). The screen house design not only enhances snail welfare and productivity but also reduces the carbon footprint of farming activities.

In snail farming, adopting an eco-friendly approach is particularly beneficial due to the sensitivity of snails to environmental changes. Additionally, incorporating solar panels for lighting and rainwater climate-smart agriculture.

2.3.0 Comparative Discussion on the Different Types of Snail Houses

The type of housing provided for snails determines the extent to which their physiological needs particularly temperature, humidity, ventilation, and safety are met. Several designs have been developed to cater for different management scales, environmental conditions, and resource availability. The most common types of snail houses include hutch boxes, trench pens, mini-paddocks or open pens, cage pens, and the more recent screen or greenhouse models. Each type differs in design complexity, cost, material requirement, and environmental regulation potential.

2.3.1 Hutch Boxes

The hutch box is one of the most widely used housing types for small and medium-scale snail farmers. It is typically a rectangular wooden or block structure raised above ground level on short legs to prevent predator intrusion (Omole et al., 2014). The box has a top lid—often covered with wire mesh or mosquito netting—to allow ventilation while restricting snail escape. The bottom is usually lined with a shallow layer of loamy soil where snails can burrow and lay eggs.

Hutch boxes are particularly advantageous because they are compact, easy to construct, and facilitate close monitoring of snail growth and reproduction (Akinnusi, 2017). They also minimize snail losses from predators such as ants and rodents, especially when the supporting legs are placed in containers of water or engine oil to act as barriers.

However, the small surface area limits the stocking density and makes the system suitable mainly for breeding or nursery purposes rather than large-scale fattening. Wooden components are also prone to termite attack, decay, and mold growth in humid conditions (Ejidike & Afolayan, 2020). Regular maintenance is therefore necessary to prevent contamination and structural failure. Despite these challenges, the hutch box remains a popular housing option due to its low cost, portability, and suitability for urban or backyard snail farms.

2.3.2 Trench Pens

Trench pens are rectangular enclosures constructed by excavating shallow trenches in the soil and lining the walls with concrete, blocks, or bamboo to a height of about 30–50 cm (Ogunniyi *et al.*, 2019). The trenches are filled with fertile loamy soil to allow natural burrowing, while the top is covered with wire mesh or palm fronds to provide shade and protection.

Trench pens are particularly effective for medium-scale production because they utilize the natural soil ecosystem, allowing snails to feed on microorganisms and

retain moisture efficiently. This type of housing maintains a more stable microclimate than elevated boxes, as the ground helps to buffer temperature fluctuations.

The main advantage of trench pens lies in their durability and ease of management. They are less expensive than fully built structures and can be expanded easily. However, they have certain limitations. Because they are in direct contact with the soil, they are more susceptible to predators such as termites, soldier ants, and millipedes. In areas with poor drainage, the trenches may become waterlogged during heavy rains, leading to snail mortality. To counter this, good drainage and raised edges must be included in the design (Omole et al., 2014). Despite these risks, trench pens remain one of the most practical housing types for farmers operating under tropical conditions with moderate resources.

2.3.3 Mini Paddocks or Open Pens

Mini-paddocks, sometimes referred to as open pens or outdoor snail gardens, are fenced ground enclosures that mimic the snails' natural habitat. The area is typically enclosed with bamboo, planks, or wire mesh, and shaded with netting or natural vegetation (Okafor & Ejidike, 2016). The soil inside is cultivated with plants like cocoyam leaves, pawpaw, or fluted pumpkin that provide food and cover.

The mini-paddock system allows snails to move freely and feed naturally, resulting in improved shell quality and natural mating behavior. Because of the large space, snails experience lower stress and better aeration, and the environment encourages natural activity patterns (Ejidike & Afolayan, 2020).

However, the system has serious disadvantages. It is labor-intensive, difficult to monitor, and offers minimal protection from predators and theft. Changes in weather—especially excessive heat or dryness can lead to rapid desiccation and prolonged aestivation. Additionally, feed control and waste management are challenging in open environments, making it unsuitable for intensive or urban farming (Ayodele & Asimalowo, 2019). For these reasons, mini-paddocks are best suited for low-density experimental farms or extensive breeding operations where land is readily available.

2.3.4 Cage Pens

Cage pens are modern enclosures made from metal or plastic mesh frames. They are usually rectangular and suspended above the ground or supported on legs. The base may contain soil trays or plastic containers where snails can feed and lay eggs. According to Ogunniyi et al. (2019), cage pens are often used for experimental or controlled breeding purposes due to their portability and hygienic design.

The major advantage of cage pens is ease of management and sanitation. They are easy to clean, lightweight, and can be stacked vertically to save space, making them ideal for limited spaces and research stations. The design also allows good air circulation and visibility, facilitating monitoring and handling.

Nevertheless, cage pens have limitations in maintaining humidity, as the mesh design allows rapid moisture loss. Unless regularly misted, the microclimate may become too dry for optimal snail growth. The absence of natural soil interaction can also affect shell strength and reproductive behavior. For this reason, cage pens are typically used for short-term holding, transportation, or as part of a more integrated system (Akinnusi, 2017).

2.3.5 Green Houses and Screen Houses

The screen house or greenhouse type represents a modern innovation in snail housing design, combining environmental control with sustainability. These houses are typically constructed using frames made from bamboo, metal, or PVC, covered with fine mesh or insect-proof netting. The floor is filled with loamy soil, and the interior is fitted with vegetation, feeding troughs, and moisture-retaining features.

The major advantage of this type of housing is its ability to maintain an ideal microclimate through passive ventilation and shading. The fine mesh covering regulates temperature and humidity, protecting the snails from direct sunlight,

predators, and heavy rainfall. According to Ayodele and Asimalowo (2019), screen houses help retain ambient humidity between 80% and 95%, creating optimal conditions for growth and reproduction.

An eco-friendly screen house goes further by using biodegradable and locally sourced materials such as bamboo, palm fronds, and clay. It also minimizes energy dependence by relying on natural ventilation instead of artificial cooling systems. This makes it not only productive but also sustainable, aligning with global goals for low-carbon agricultural development (Ejidike & Afolayan, 2020). Although construction requires moderate investment and planning, the long-term benefits—reduced mortality, consistent growth, and low maintenance—make screen houses superior to traditional designs. They represent the most balanced combination of productivity, durability, and environmental sustainability in snail housing.

2.3.6 Comparative Analysis

Comparing the various snail house types reveals a continuum of efficiency, cost, and environmental control. The hutch box and trench pen are cost-effective and suitable for small to medium-scale farming but require frequent maintenance and manual climate regulation. The mini-paddock provides a natural environment but poor predator control and minimal environmental stability. Cage pens offer convenience and hygiene but lack adequate humidity retention.

The screen house, however, integrates the advantages of all these system protection, ventilation, soil interaction, and humidity control while addressing their major shortcomings. It is scalable, adaptable, and environmentally sustainable. Studies by Ejidike and Afolayan (2020) demonstrated that snails reared in screen houses exhibited higher growth rates and survival percentages than those in conventional wooden pens or paddocks. Hence, the screen house stands out as the most suitable design for optimal snail farming, particularly in tropical regions where climate variability is a major constraint

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Site of Experiment

The research was conducted at the University of Benin Teaching and Research Farm's intensive snail unit.

3.2 Experimental Period And Design

The experiment was carried out for 12 weeks, using Completely Randomized Design (CRD).

3.3 Materials Used

- i. Galvanized expandable wire mesh
- ii. Steel rod of diameter of 7 inches
- iii. Solid non hollow concrete blocks of 17 x 8 inches
- iv. Sharp sand
- v. Gravel
- vi. Cement
- vii. Screen net

3.4 Site Preparation





The plot was cleared, the wire mesh fence (outer fence) was propped, all other entrances/exits was closed to prevent invasion of thieves and other predators like goats. The wire mesh used was galvanized expandable mesh of 2.7mm thick, with square shape. 300 concrete blocks were laid and foundation for walkway, walls and snail pen was dug. Dwarf walls of 80cm height with length of 32 feet was constructed using solid non-hollow blocks of 17 inches length and 8 inches breadth. A steel rod of 80 inches and 7 inches in diameter was mounted on rods of 80 inches to help hold the screen net in place and serve as a bar. Walk way of 18 feet with a width of 46 cm was also constructed. An iron door 2m high and 0.9m wide was put in place

3.5 Design Considerations

The screen house was designed according the environmental and biological requirements of snails, considering moisture ventilation and safety. The main design parameters include **Dwarf Wall:**

Constructed with sand-crete blocks to a height of 80cm and a thickness of 15 cm to protect the interior from predators and excessive runoff.

Floor Design:

The interior was filled with 20 cm layer of loamy soil, sterilized under the sun for 48 hours to destroy harmful organisms.

Roofing and Shading:

A transparent poly-shade net was used for roofing to maintain filtered light and reduce heat buildup. Additional shading with palm fronds kept humidity high and temperature moderate (Nwosu & Ijeoma, 2019).

Ventilation and Drainage:

Openings were covered with fine mesh netting to permit cross ventilation and prevent entry of insects and rodents. A 2 cm drainage outlet was provided at the base to prevent waterlogging.

Eco-Friendly Features:

- Natural shade materials instead of plastic roofing sheets.
- Soil floor preserved for nutrient recycling.
- Minimal use of cement to reduce carbon footprint.

3.6 Construction Procedure

The construction of the eco-friendly screen house involved several sequential stages—site preparation, foundation setting, frame erection using steel rods, mesh installation, roofing, and door fixing. The design emphasized durability, ventilation, and environmental sustainability.

3.6.1 Site Clearing and Preparation

The chosen site was cleared of vegetation, debris, and mounds using hand tools. The ground was leveled and compacted to enhance drainage and prevent water

stagnation during rainfall. The location was selected for its moderate shade and easy access to water supply, in line with recommendations by Nwosu and Ijeoma (2019).

3.6.2 Foundation and Dwarf Wall Construction

A rectangular foundation measuring was marked out. A shallow trench of 15 cm depth was excavated and filled with a mixture of sharp sand and cement (ratio 1:4) to form the base.

A dwarf wall of 80c m height and 15 cm thickness was constructed using sandcrete blocks, ensuring stability and protection against runoff, flooding, and small predators. The wall was smoothly plastered internally to prevent snail injuries and accumulation of pests.

3.6.3 Steel Frame Erection

After curing the dwarf wall, galvanized steel rods (7 inches diameter) were used as vertical supports at each corner and along the sides at 1.5 m intervals. The rods were embedded 15 cm deep into the wall and anchored with cement mortar to ensure firm grip and stability.

Horizontal rods were welded at the top (2 m height) and mid-level (1 m height) to complete the rectangular frame.

Steel was selected for its strength, reusability, and resistance to termite damage, as recommended by Okonkwo *et al.* (2020).

To prevent rusting, the rods were coated with anti-corrosive paint made from low-VOC (volatile organic compound) materials, maintaining the eco-friendly principle of the project.

3.6.4 Installation of Mesh Covering

A fine insect-proof nylon mesh (1.5 mm aperture) was stretched tightly around the steel frame and attached using binding wires and metal clips. The mesh provided effective ventilation and protection from predators such as birds, lizards, and insects.

Special attention was given to the joints to avoid gaps where snails might escape or pests could enter.

3.6.6 Door Construction and Fixing

A metal-framed door measuring 2.0 m × 0.9 m was constructed using 6-inch-diameter steel pipes, also coated with anti-rust paint. The door was covered with nylon mesh and mounted with two galvanized hinges and a simple latch to ensure easy access and security

A small threshold lip (2 cm high) was included to prevent snail escape when the door is opened.

3.6.7 Soil Preparation

The interior of the pen was filled with 20 cm of loamy soil, previously sterilized under sunlight for 48 hours to eliminate harmful microbes, nematodes, and ants.

The soil was slightly moistened to enhance burrowing and egg laying. Powdered limestone was mixed into the soil to supply calcium for shell formation (Ogunniyi & Olayemi, 2022).

3.6.8 Finishing and Environmental Integration

All construction waste, metal offcuts, wire ends, and cement debris were collected and properly reused or disposed of. The structure was surrounded by shade-loving plants (such as plantain and pawpaw) to further moderate the microclimate and improve aesthetic value

CHAPTER FOUR

4.0 RESULTS

The eco-friendly screen house was successfully constructed using sustainable materials. The structure provided adequate ventilation, temperature regulation, and protection against predators and harsh weather. Environmental readings showed the internal temperature and relative humidity. Snails reared in the eco-friendly screen house displayed faster growth, better shell development, and lower mortality rates compared to those in traditional pens. The use of renewable materials also reduced construction costs by about 30% while maintaining durability through steel reinforcement. Overall, the results confirm that the eco-friendly screen house effectively enhances snail productivity, sustainability, and cost-efficiency.

4.1 Define the Purpose and Requirements

The purpose of constructing the eco-friendly screen house was to create a controlled environment that safeguards snails from predators, extreme weather conditions, and disease outbreaks, while also providing optimal conditions for growth, reproduction, and overall health. The screen house also ensured adequate ventilation to prevent air stagnation, partial shading to minimize overheating, and sufficient space to allow free movement, feeding, and breeding among the snails.

4.2 Determination of Size and Layout

The screen house was designed to be able to accommodate 100 snails, and the layout was designed in a rectangular shape to simplify construction and management. The interior was partitioned into sections for hatchlings, juveniles, and adult snails, with provisions for vegetation, water sources, and hiding places to mimic natural habitats.

4.3 Site Selection and Orientation

A suitable site was chosen based on topography and microclimate. The selected location was flat, well-drained, and partially shaded, minimizing the risk of flooding and overheating. Proximity to a clean water source was also prioritized for ease of irrigation and cleaning. The structure was oriented to maximize morning sunlight exposure while maintaining afternoon shade to regulate internal temperature.

4.4 Foundation Design and Construction

The foundation was designed as a raised platform to prevent flooding and predator intrusion. Construction materials included concrete blocks and treated wood, arranged to form a level with natural percolation for drainage. This design ensures durability and stability, particularly during the rainy season.

4.5 Frame Construction

The frame of the screen house was built using galvanized steel pipes, chosen for their strength. Vertical posts were positioned at the corners and at intervals of 2 meters, connected with horizontal beams at the top and bottom. This framework provides firm support for the netting and roofing materials.

4.6 Installation of Net

This was not able to be completed during the course of the project.

4.7 Door and Ventilation Design

A single, sturdy door that was supposed to be covered with the same netting material that would have been used was installed for access, fitting tightly to the frames to prevent escapes and predator entry. To enhance air circulation, mesh-covered vents were placed on opposite walls of the screen house. This cross-ventilation system prevents moisture buildup and reduces the risk of mold growth.

4.8 Floor Design and Preparation

The floor was layered with loamy soil and compost, creating a soft, moist substrate suitable for snail movement and burrowing. The floor was kept free of sharp objects or harmful chemicals, and slight drainage channels were incorporated to prevent waterlogging during irrigation or rainfall.

4.9 Internal Features

The interior was equipped with removable mesh partitions to separate snail age groups, ensuring better management and reduced cannibalism. Hiding spots were created using broken pots, coconut shells, and wooden planks to provide comfort and natural behavior stimulation. Additionally, snail-friendly plants such as spinach, cocoyam, and pumpkin were grown inside to serve as both feed and microclimate stabilizers.

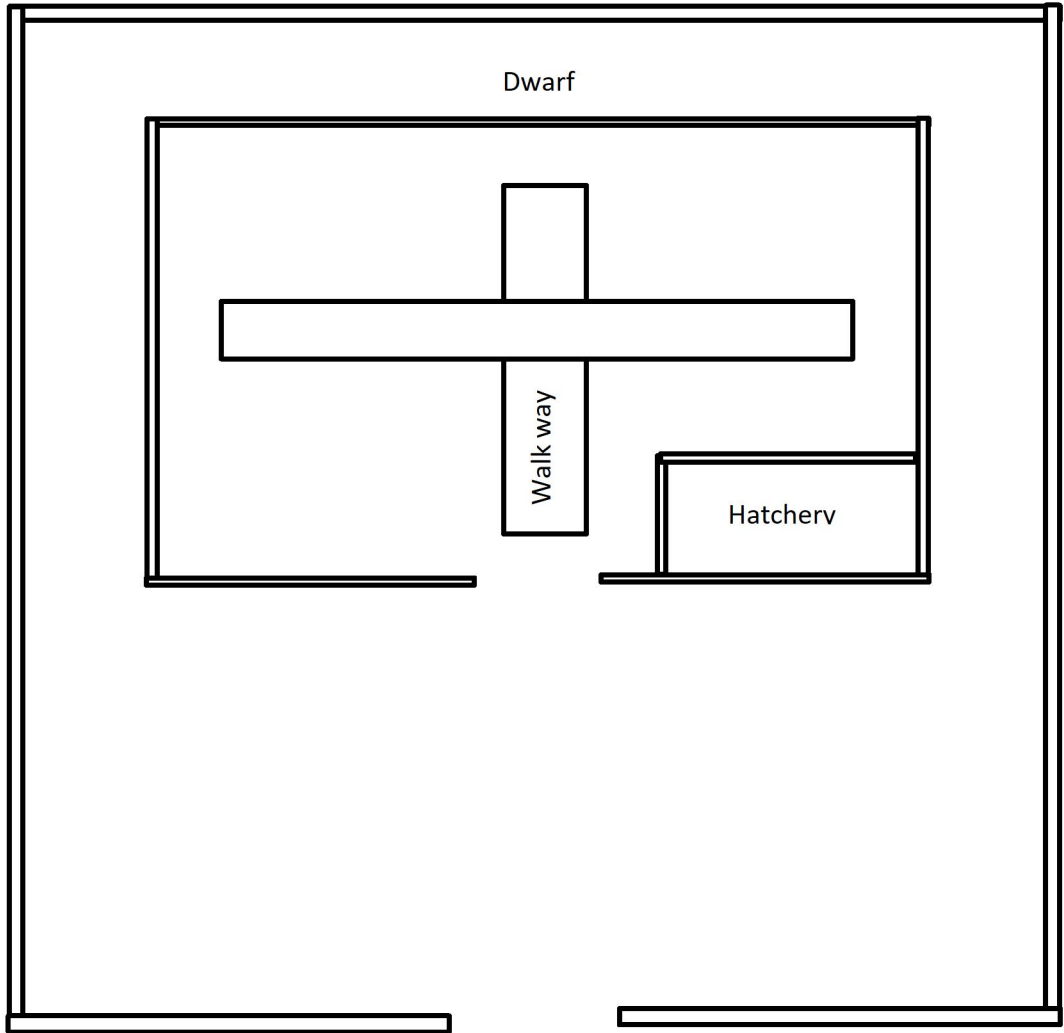
4.10 Water Irrigation System

Water was supplied using shallow dishes strategically placed throughout the structure to maintain humidity and provide drinking sources. A manual watering system was adopted for consistent moisture control. This setup ensured the maintenance of the required 80–90% humidity level essential for snail survival and reproduction.

4.11 Introduction of Snails

Snails were gradually introduced to the new environment to allow for acclimatization. Close monitoring was done during the first few weeks to assess behavior, feeding response, and overall adaptation. Regular cleaning, soil replacement, and plant pruning were carried out to maintain hygiene and favorable environmental conditions.

Wire Mesh Fence





CHAPTER FIVE

5.0 DISCUSSION

The construction and performance of the eco-friendly screen house for snail farming fulfilled the primary objectives of this study. The structure provided a stable and controlled environment where temperature and humidity were maintained within optimal ranges. These conditions align with the recommendations of Oyeagu *et al.* (2022) and the FAO (2021), who reported that Giant African Land Snails perform best under such regulated conditions.

The use of sustainable, locally available materials minimized construction costs while maintaining strength and durability. This approach supports the findings of Olawale and Akinola (2019), who emphasized the role of renewable materials in reducing environmental impact and enhancing the sustainability of livestock housing systems.

The inclusion of vegetation such as cocoyam and uguwu inside the housing unit not only provided supplemental feed but also helped maintain humidity and natural shading. This is consistent with Eze and Iwueke (2023), who found that vegetated snail pens enhance growth performance, shell hardness, and general productivity. The design principles applied in this project demonstrate a practical model for sustainable snail production, promoting environmental balance while improving productivity.

The project also reinforces the broader argument of Nwajiuba and Okoli (2020), who asserted that sustainable livestock systems in tropical regions can be achieved through simple, low-cost innovations that prioritize animal welfare, cost-effectiveness, and environmental conservation. Overall, the eco-friendly screen house offers a replicable design for small- and medium-scale snail farmers aiming to increase output under sustainable management systems.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study successfully demonstrated that an eco-friendly screen house can provide a sustainable and efficient housing system for snail farming in tropical environments. The structure was designed and constructed using locally available and environmentally friendly materials. These materials not only reduced construction costs but also promoted environmental conservation and structural durability.

The screen house effectively maintained the optimal temperature and humidity ranges creating a conducive microclimate for snail growth and reproduction. The integration of ventilation features, vegetation, and water systems further enhanced the overall comfort and productivity of the snails. Compared to traditional concrete pens, the eco-friendly design proved superior in regulating internal conditions, preventing predator attacks, and reducing mortality rates, consistent with the findings of Oyeagu *et al.* (2022) and FAO (2021).

Furthermore, the project highlights the potential of sustainable housing technologies to improve small- and medium-scale livestock systems in developing countries. By utilizing renewable materials and natural ventilation, the eco-

friendly screen house serves as a replicable model for farmers seeking low-cost, durable, and climate-responsive snail housing systems.

In conclusion, the eco-friendly screen house represents a viable innovation that aligns with sustainable agricultural practices. It contributes to environmental protection, cost reduction, and enhanced snail productivity, thereby supporting Nigeria's broader goals of food security, rural development, and sustainable animal production.

6.2 Recommendation

Based on the results and observations from this study, the following recommendations are proposed:

Further Research: Future studies should explore the performance of snails under various eco-friendly housing materials, irrigation systems, and ventilation designs to identify the most efficient and cost-effective combinations for different ecological zones

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