ENHANCING SNAIL FARMING EFFICIENCY THROUGH ARTIFICIAL INTELLIGENCE

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Abstract
The study examined the efficiency of snail farming in Ekiti State through the integration of Artificial Intelligence (AI) technologies. Specifically, the study assessed the current challenges faced by snail farmers in Ekiti State, examined the potential applications of AI technologies in monitoring environmental conditions for snail farming and investigated how AI can optimize feeding schedules and reproductive cycles in snail farming. A descriptive survey design was employed, as it allows for the collection of data from a large number of participants and provides insights into their experiences and perceptions regarding the use of AI in farming practices. The population of the study consisted of snail farmers across Ekiti State. A sample of 150 snail farmers was selected for the study. Data were collected using a well-structured close-ended questionnaire and 4-Likert scale questions. The data analysis involved descriptive statistics using statistical software to generate mean scores and standard deviation. It was established that the major challenges currently affecting the efficiency of snail farming in Ekiti State are unfavourable weather conditions, difficulty in managing the appropriate humidity levels for snails, high cost of feeding, lack of the proper tools and resources to detect and prevent diseases in snails early and inadequate veterinary support or expert advice available for snail farmers. It was also discovered that AI technologies accurately monitor temperature levels in snail farms to ensure optimal conditions, effectively measure and regulate humidity levels in snail habitats, forecast seasonal variations and recommend adjustments to maintain optimal conditions and help in forecasting potential issues with environmental control systems. It was recommended that artificial intelligence significantly enhance snail farming efficiency. It was also recommended that the government should provide training for snail farmers on the use of AI-driven tools and technologies. Snail farmers should implement AI-powered systems for monitoring and regulating environmental factors like humidity and temperature.

Keywords: *Snail Farming, Artificial Intelligence, AI-powered system*

Introduction

Snail farming, also known as heliciculture, has emerged as a vital aspect of agriculture due to its potential to provide a sustainable source of protein and income. In various regions, particularly in Africa and Asia, snails are considered a delicacy, offering high nutritional value with significant levels of protein, vitamins, and minerals (Omole et al., 2021). As the demand for organic and environmentally friendly protein sources grows, snail farming has been recognized for its ability to contribute to food security and economic development, especially among small-scale farmers. However, despite the promise that snail farming holds, numerous inefficiencies persist within the traditional farming methods. These inefficiencies are largely due to limited knowledge on optimal snail breeding practices, unpredictable environmental factors, disease outbreaks, and challenges related to market access (Oluyemi & Ajibola, 2020). These issues create barriers for farmers, limiting the scalability and profitability of snail farming.

In recent years, the incorporation of advanced technologies in agriculture, particularly Artificial Intelligence (AI), has demonstrated transformative potential in enhancing the efficiency of various farming practices (Sarker et al., 2022). AI technologies, which include machine learning, data analytics, and automation, have been effectively applied in areas such as crop management, livestock monitoring, and predictive analytics. These technologies enable farmers to optimize resource use, improve productivity, and reduce losses (Bendre & Thool, 2023). The integration of AI into snail farming holds similar potential, particularly in overcoming the challenges faced by snail farmers. Through the use of AI, farmers can monitor environmental conditions such as humidity, temperature, and soil moisture, which are critical for the health and growth of snails (Adewuyi & Ogunleye, 2019). AI-driven systems can also analyze data related to feeding habits, reproduction cycles, and disease patterns, allowing for timely interventions and efficient resource allocation.

Furthermore, AI can assist in the automation of certain farming processes, reducing the labor-intensive nature of snail farming. For instance, automated feeding systems can be programmed to deliver precise amounts of food based on the growth stage of the snails, while AI-powered sensors can monitor health indicators to detect early signs of disease or stress (Kelechi et al., 2021). This level of precision not only enhances productivity but also minimizes waste and the likelihood of loss due to disease or poor management practices. AI can also provide predictive insights into market trends, helping farmers make informed decisions on when to harvest and sell their produce for optimal profitability (Ibe & Ozoemena, 2020). Such integration of AI could revolutionize snail farming by making it more efficient, sustainable, and economically viable.

The global trend toward precision agriculture, which emphasizes the use of technology to improve agricultural outputs, further underscores the relevance of AI in snail farming. Precision agriculture seeks to optimize the use of resources such as land, water, and labor, while reducing environmental impacts (Pérez-Ruiz et al., 2022). In the context of snail farming, precision techniques enabled by AI can ensure that farmers maintain the right environmental conditions that promote snail growth, thereby improving yields and reducing the time to market. Moreover, the ability of AI systems to learn and adapt over time means that they can continually improve farming practices based on historical data, leading to long-term benefits for farmers.

The economic implications of enhancing snail farming efficiency through AI are also noteworthy. Snail farming has the potential to generate significant income, particularly for smallholder farmers who often rely on traditional methods with low output (Afolayan et al., 2021). By incorporating AI technologies, farmers can increase their productivity, reduce losses, and access new markets more effectively. This not only improves the profitability of individual farmers but also contributes to the broader agricultural economy, especially in regions where snail farming is a growing industry. Moreover, as consumer demand for organic and sustainable food products rises globally, AI-enhanced snail farming could help meet this demand by providing a reliable supply of high-quality snail products.

Despite the promising benefits of AI in snail farming, there are challenges that must be addressed. Traditional snail farming faces several challenges, including unpredictable environmental conditions, high disease prevalence, and inefficiencies in farm management (Okoroafor et al., 2020). These challenges highlight the need for innovative solutions to improve farming efficiency. Artificial intelligence (AI) has emerged as a transformative tool, offering modern technologies that automate farming processes, enhance decision-making, and optimize resource utilization (Olaleye et al., 2022). Incorporating AI into snail farming practices can potentially revolutionize the industry by addressing its long-standing limitations.

AI technologies are particularly effective in addressing critical aspects of snail farming. For instance, environmental conditions such as temperature and humidity significantly affect snail growth and reproduction (Adegoke et al., 2021). AI-powered systems equipped with sensors and automation tools enable farmers to monitor and regulate these conditions with precision. Furthermore, AI-driven tools allow for personalized feeding schedules based on data analytics, which optimize growth rates and reduce feed waste (Ibrahim et al., 2023). Predictive analytics, another aspect of AI, helps forecast environmental challenges and seasonal fluctuations, enabling farmers to proactively mitigate risks and ensure stable productivity (Eze & Nwankwo, 2022). These advancements make AI an indispensable tool for modernizing snail farming, particularly in regions where efficiency and resilience are paramount.

Despite its potential, the adoption of AI in snail farming is hindered by factors such as limited access to technology, lack of technical know-how, and inadequate policy support (Ojo et al., 2021). Addressing these barriers requires a multi-stakeholder approach involving government agencies, private investors, and training institutions. Training programs can empower farmers with the skills needed to implement AI tools, while government incentives can lower the cost of adoption (Okonkwo et al., 2020). Additionally, integrating AI-based disease detection systems can reduce snail mortality and improve farm profitability by identifying health issues at an early stage (Agboola & Taiwo, 2022). By leveraging these strategies, AI can significantly enhance the efficiency and sustainability of snail farming in Nigeria, positioning it as a critical contributor to agricultural innovation.

The cost of implementing AI technologies, particularly for small-scale farmers in developing regions, may be prohibitive (Musa et al., 2022). In addition, there is a need for adequate training and support to ensure that farmers can effectively utilize these technologies. Governments and agricultural organizations must play a critical role in facilitating access to AI tools and providing the necessary infrastructure to support their widespread adoption in the snail farming sector. By addressing these challenges, the full potential of AI to enhance snail farming efficiency can be realized.

Statement of the Problems

In Ekiti State, agriculture plays a crucial role in sustaining the livelihoods of many households, with snail farming gaining recognition as a viable and profitable venture. Despite its potential, snail farming remains underdeveloped in the region due to several persistent challenges. Farmers in Ekiti State, like those in many rural areas, rely on traditional farming methods that are inefficient and labour-intensive. These outdated practices result in low productivity, inconsistent yields, and a higher susceptibility to environmental and disease-related losses.

One of the primary problems facing snail farmers in Ekiti State is the lack of access to modern technologies and knowledge on best farming practices. Many farmers struggle with maintaining optimal environmental conditions for snail growth, such as regulating humidity, temperature, and soil moisture, which are critical for healthy snail development. Inefficient feeding practices and improper management of snail reproduction cycles exacerbate these issues, leading to reduced output and increased mortality rates within snail populations.

Poor disease monitoring and control measures are common challenges that further hinder productivity. Without proper systems to detect early signs of disease or stress among the snails, farmers experience substantial losses, as outbreaks often spread before interventions can be made. This not only affects the quantity of the snails produced but also undermines their quality, limiting farmers' ability to access more profitable markets.

Market access and profitability also present significant concerns for snail farmers in Ekiti State. Without reliable data on market trends, prices, and demand, farmers often struggle to make informed decisions about when to harvest and sell their snails. This can lead to situations where snails are sold at lower prices, reducing overall profitability and discouraging further investment in the farming venture.

The inefficiencies in snail farming in Ekiti State are largely due to the lack of technological integration. While agriculture in other regions has benefited from innovations such as Artificial Intelligence (AI) and automation, farmers in Ekiti have limited exposure to these advancements. The absence of AI-driven tools, which could assist in monitoring environmental conditions, optimizing feeding schedules, and predicting market trends, keeps snail farming productivity in the region below its potential. The underutilization of these technologies, combined with the labor-intensive nature of traditional farming methods, creates significant barriers to the scalability and sustainability of snail farming in the region.

In light of these challenges, there is a pressing need to explore ways to enhance the efficiency of snail farming in Ekiti State. Integrating AI into snail farming practices could provide solutions to many of the issues faced by farmers. By automating routine tasks, monitoring environmental factors more precisely, and offering data-driven insights into optimal farming practices, AI has the potential to revolutionize snail farming and unlock the industry's economic potential in the region. Without such interventions, farmers in Ekiti State may continue to struggle with low yields, limited market access, and unfulfilled economic opportunities.

Purpose of the Study

The main purpose of this study is to examine the efficiency of snail farming in Ekiti State through the integration of Artificial Intelligence (AI) technologies. Specifically, the study

i. assess the current challenges faced by snail farmers in Ekiti State.
ii. examine the potential applications of AI technologies in monitoring environmental conditions for snail farming.
iii. investigate how AI can optimize feeding schedules and reproductive cycles in snail farming.

Research Questions

The following questions will be answered in the course of this study:

i. What are the major challenges currently affecting the efficiency of snail farming in Ekiti State?
ii. How can AI technologies be applied to monitor and regulate environmental conditions in snail farming?
iii. In what ways can AI improve the feeding and reproductive management of snails for higher productivity?

Methodology

A descriptive survey design was employed. It allows the collection of data from a large number of participants and provides insights into their experiences and perceptions regarding the use of AI in farming practices. The population of the study consisted of snail farmers across Ekiti State. The sample was determined using a purposive sampling technique, selecting farmers who have experience in snail farming and those who are open to the idea of integrating new technologies into their farming practices. A sample of 150 snail farmers were selected for the study. Data were collected using a well-structured close ended questionnaire and 4-Likert scale questions. The data were collected using descriptive statistics of mean scores and standard deviation to answer the research questions.

Results

Research Question 1: What are the major challenges currently affecting the efficiency of snail farming in Ekiti State?

In answering the question, mean scores on the major challenges currently affecting the efficiency of snail farming in Ekiti State were computed and compared. The result is presented in the table below.

Table 1: Major Challenges Currently Affecting the Efficiency of Snail Farming in Ekiti State

S/N	*Items*	$\bar{x}$	*SD*	*Remarks*	*Ranking*
1	Unfavorable weather conditions negatively impact my snail farming efficiency	3.40	.82	Agree	2nd
2	Managing the appropriate humidity levels for snails is difficult and affects production	2.93	.76	Agree	5th
3	The cost of snail feed is too high, affecting farm profitability.	3.71	.89	Agree	1st
4	Many famers lack the proper tools and resources to detect and prevent diseases in snails early	3.39	.83	Agree	3rd

5	There is inadequate veterinary support or expert advice available for snail farmers in Ekiti State	2.94	.92	Agree	4th
	GRAND MEAN	3.27	.84		

n=147

Data collected in table 1 indicated that the mean scores ranged from $\bar{x}$ 2.94-3.71. The parameter mean score was 2.50, showing that the respondents agreed on five (5) major challenges currently affecting the efficiency of snail farming in Ekiti State. Item 3, the cost of snail feed is too high, affecting farm profitability has the highest $\bar{x}$ score of 3.71, SD .89 and ranked first while item 2, Managing the appropriate humidity levels for snails is difficult and affects production has the lowest $\bar{x}$ score of 2.93, SD 0.76 and ranked last.

Research Question 2: How can AI technologies be applied to monitor and regulate environmental conditions in snail farming?

In answering the question, mean scores on how AI technologies can be applied to monitor and regulate environmental conditions in snail farming were computed and compared. The result is presented in the table below.

Table 2: Application of AI technologies to monitor and regulate environmental conditions in snail farming

S/N	***Items***	$\bar{x}$	***SD***	***Remarks***
1	Automated AI solutions can adjust environmental settings automatically based on data collected.	2.27	.36	Disagree
2	AI technologies can accurately monitor temperature levels in snail farms to ensure optimal conditions.	2.93	1.05	Agree
3	AI-driven sensors can effectively measure and regulate humidity levels in snail habitats.	2.71	1.08	Agree
4	AI technologies can forecast seasonal variations and recommend adjustments to maintain optimal conditions.	2.87	1.06	Agree
5	Predictive AI models can help in forecasting potential issues with environmental control systems.	2.76	.94	Agree
	GRAND MEAN	2.71	1.08	

n=147

Data collected in Table 2 show that the mean score range from $\bar{x}$ 2.27-2.93. The parameter mean score was 2.50, showing that the respondents agreed to four (4) items and disagreed with one (1) item on how AI technologies can be applied to monitor and regulate environmental conditions in snail farming. Item 2, AI technologies can accurately monitor temperature levels in snail farms to ensure optimal conditions has the highest $\bar{x}$ score of 2.93, SD 1.05 while item 1, Automated AI solutions can adjust environmental settings automatically based on data collected has the lowest $\bar{x}$ score of 2.27, SD .36.

Research Question 3: In what ways can AI improve the feeding and reproductive management of snails for higher productivity?

In answering the question, mean scores on ways AI can improve the feeding and reproductive management of snails for higher productivity were computed and compared. The result is presented in the table below.

Table 3: Ways AI can improve the Feeding and Reproductive Management of Snails for Higher Productivity

S/N	*Items*	$\bar{x}$	*SD*	*Remarks*
1	AI can optimize feeding schedules by analyzing the growth and health data of snails to ensure they receive adequate nutrition	3.03	0.57	Agree
2	AI-driven systems can recommend the most nutritious feed formulations based on the specific needs of different snail species	2.98	0.61	Agree
3	AI can provide insights into the ideal feeding frequency and quantities for optimal snail growth	3.39	0.52	Agree
4	AI can assist in identifying the best environmental conditions for breeding snails, thus enhancing reproductive efficiency	3.67	0.48	Agree
5	AI-driven tools can monitor and analyze the conditions affecting snail reproduction, such as humidity and temperature, to improve hatch rates	2.76	.94	Agree
	GRAND MEAN	3.17	.62	

n=147

Data collected in table 3 indicated that the mean scores range from $\bar{x}$ 2.76 – 3.03. The parameter mean scores was 2.50, showing that the respondents agreed on five (5) items on the ways AI can improve the feeding and reproductive management of snails for higher productivity. Item four (4), AI can assist in identifying the best environmental conditions for breeding snails, thus enhancing reproductive efficiency has the highest $\bar{x}$ score of 3.67, SD .48 while item five (5), AI-driven tools can monitor and analyze the conditions affecting snail reproduction, such as humidity and temperature, to improve hatch rates has the lowest $\bar{x}$ score of 2.76, SD .94.

Discussion of Findings

It was established that the analysis result the major challenges currently affecting the efficiency of snail farming in Ekiti State are unfavourable weather conditions, difficulty in managing the appropriate humidity levels for snails, high cost of feeding, lack the proper tools and resources to detect and prevent diseases in snails early and inadequate veterinary support or expert advice available for snail farmers. This finding supports the discovery of Ajayi et al. (2019) that erratic rainfall and prolonged dry spells pose a major challenge to maintaining the required humidity levels, crucial for snail survival and growth. Similarly, a study by Oke and Omole (2020) supports this finding and established that snail farmers struggle to sustain humidity without advanced farming technologies, which leads to poor snail performance, especially during dry seasons.

It was discovered that AI technologies accurately monitor temperature levels in snail farms to ensure optimal conditions, effectively measure and regulate humidity levels in snail habitats, forecast seasonal variations and recommend adjustments to maintain optimal conditions and helps in forecasting potential issues with environmental control systems. AI (Artificial Intelligence) technologies are increasingly being applied in various agricultural sectors, including snail farming, to enhance efficiency and productivity. In the context of snail farming, AI offers several advantages in monitoring and controlling environmental factors crucial for the survival and growth of snails. This finding aligns with the conclusion of Ogunleye et al. (2022) that the use of AI temperature sensors in snail farms reduced mortality rates by 20% in farms that implemented AI technology compared to traditional farms in Nigeria. Also, empirical research by Adeyemi et al. (2021) found that AI-regulated farms in Ekiti State experienced higher growth rates and increased survival rates in snails due to the consistent maintenance of optimal humidity levels.

It was established that AI-driven systems can optimize feeding schedules by analyzing the growth and health data of snails to ensure they receive adequate nutrition, recommend the most nutritious feed formulations based on the specific needs of different snail species, provide insights into the ideal feeding frequency and quantities for optimal snail growth, assist in identifying the best environmental conditions for breeding snails, thus enhancing reproductive efficiency and monitor and analyze the conditions affecting snail reproduction, such as humidity and temperature, to improve hatch rates. This discovery agrees with the findings of Olatunji et al. (2021) that AI-driven feeding schedules in snail farming reduced overfeeding by 15% and resulted in a 12% increase in growth rates. Also, Adelaja et al. (2020) conducted a study on feed optimization using AI and found that AI-assisted feed formulation improved the nutrient absorption rates in snails by 18%, leading to faster growth and better shell development.

Conclusion and Recommendations

Improving the efficiency of snail farming through artificial intelligence (AI) offers valuable prospects for boosting productivity, sustainability, and profitability. AI-powered systems enhance critical areas of snail farming, such as optimizing feeding schedules, designing nutrient-rich feed, and ensuring optimal environmental conditions for breeding and growth. By constantly monitoring and adjusting factors like temperature, humidity, and feed levels, AI reduces waste and mitigates risks, leading to healthier snails and improved reproductive outcomes. Research shows that AI technologies provide innovative solutions, making snail farming more efficient and well-suited to the evolving needs of modern agriculture. Hence, the following recommendations are made:

i. The government should provide training for snail farmers on the use of AI-driven tools and technologies. The government can organize workshops, seminars, and practical sessions to educate snail farmers on how to use AI applications tailored for farming. Training programs can include hands-on demonstrations of AI tools, tutorials on data collection and analysis, and guidance on integrating these technologies into existing farming practices.

ii. Snail farmers should implement AI-powered systems for monitoring and regulating environmental factors like humidity and temperature. Farmers can install AI-enabled sensors and automation systems to track environmental conditions such as temperature, humidity, and light levels in snail pens. These systems can automatically adjust conditions to optimal levels, ensuring a conducive environment for snail growth.

iii. Snail farmers should utilize AI tools to analyze snail health and growth data for personalized feeding schedules and nutrient-rich feed formulations. Farmers can use AI-driven data analytics tools to track the growth patterns and health status of their snails. These tools can provide insights into individual snail needs and recommend tailored feeding schedules and formulations of feed to maximize growth and reproduction.

iv. The government and other stakeholders should integrate predictive AI technologies to forecast seasonal changes and environmental challenges for snail farmers. By collaborating with technology providers, the government and stakeholders can deploy AI systems capable of analyzing weather patterns and environmental data to predict conditions that might affect snail farming. This information can be disseminated to farmers via mobile apps, SMS alerts, or training sessions.

v. Snail farmers should invest in AI-based disease detection systems to identify early signs of illness and reduce mortality rates. Farmers can deploy AI systems equipped with image recognition and data analysis capabilities to monitor snails for symptoms of diseases. These systems can alert farmers to potential health issues early, allowing for prompt interventions such as isolating affected snails or applying treatments.

References

Adegoke, T. F., Oladejo, R. A., & Yusuf, K. O. (2021). Environmental factors influencing snail farming in Sub-Saharan Africa. *African Journal of Agricultural Research*, 16(7), 1123-1132.

Adewuyi, G. & Ogunleye, M. (2019). The Impact of Environmental Conditions on Snail Farming in Southwestern Nigeria. *Journal of Agricultural Science and Technology*, 14(2), 102-115.

Adeyemi, S. O., Adebayo, M. J., & Adewale, T. A. (2021). AI-Based Humidity Control Systems in Snail Farming: A Case Study of Southwest Nigeria. *International Journal of Agricultural Technology*, 9(3), 144-152.

Adeyeye, M. O., & Adesina, K. T. (2021). Sustainable snail farming: A review of challenges and opportunities in Nigeria. *Journal of Agricultural Innovations*, 10(3), 45-56.

Afolayan, O., Olumide, A., & Sanyaolu, D. (2021). Socio-economic Contributions of Snail Farming to Smallholder Farmers in Nigeria. *International Journal of Agricultural Economics and Rural Development*, 9(3), 45-58.

Agboola, O. A., & Taiwo, F. O. (2022). AI applications in disease prevention and management in snail farming. *International Journal of Agricultural Technologies*, 14(5), 87-96.

Ajayi, A. R., Akinnagbe, O. M., & Igbokwe, E. M. (2019). Environmental Challenges Affecting Snail Farming in Southwest Nigeria. *Journal of Agricultural Science and Practice*, 4(2), 100-110.

Akinola, A. J., Adewale, O. T., & Olowookere, J. A. (2020). Barriers to Effective Veterinary Extension Services in Snail Farming: A Case Study of Ekiti State, Nigeria. *Journal of Rural Development and Agricultural Extension*, 8(4), 120-130.

Bello, I. A., & Lawal, K. M. (2021). The Adoption of AI Technologies in Animal Farming: Implications for Snail Farming in Nigeria. *African Journal of Agricultural Research*, 16(5), 322-330.

Bendre, M., & Thool, V. (2023). Artificial Intelligence in Precision Agriculture: A Comprehensive Overview. *Journal of Computational Agriculture and Applied Technologies*, 15(1), 1-17.

Eze, C. I., & Nwankwo, A. J. (2022). Predictive analytics in agriculture: Opportunities and challenges for snail farming in West Africa. *Computational Agriculture Journal*, 9(4), 233-247.

Ibe, K., & Ozoemena, T. (2020). Predictive Analytics in Agriculture: A Case Study of Snail Farming in Nigeria. *Journal of Agricultural Informatics*, 12(4), 90-104.

Ibrahim, S. T., Bello, A. O., & Yakubu, I. A. (2023). Data-driven approaches to feed optimization in heliculture. *Journal of Livestock Management*, 18(2), 72-81.

Kelechi, J., Amadi, B., & Okoro, C. (2021). Automation in Agriculture: Leveraging AI for Efficient Snail Farming. *African Journal of Agricultural Research*, 16(5), 214-228.

Musa, A., Duru, C., & Yusuf, A. (2022). Barriers to the Adoption of Artificial Intelligence in Agriculture in Sub-Saharan Africa. *African Development Review*, 34(1), 34-45.

Nwosu, U. J., Okoye, P. C., & Onyekwere, M. N. (2022). Predictive Maintenance and Environmental Monitoring in AI-driven Snail Farms. *Journal of Sustainable Agriculture and Technology*, 8(1), 33-42.

Odebode, S. O., Adewumi, M. O., & Fagbenro, O. A. (2021). The Economics of Snail Farming in Ekiti State, Nigeria. *Nigerian Journal of Agricultural Economics*, 7(2), 140-150.

Ogunleye, O. R., Olayiwola, A. T., & Adedayo, A. F. (2022). The Impact of AI Technologies on Temperature Regulation in Snail Farms in Nigeria. *Journal of Agricultural Science and Technology*, 10(2), 87-96.

Ojo, D. M., Onifade, J. T., & Olatunji, G. O. (2021). Technological adoption in small-scale farming: A case study of snail farming in Nigeria. *Research Journal of Agriculture and Technology*, 8(2), 15-27.

Oke, O. S., & Omole, A. J. (2020). Evaluation of Humidity Management Practices in Small-scale Snail Farms in Nigeria. *Journal of Environmental Management and Sustainable Development*, 9(3), 85-95.

Okeke, J. U., Nwogu, N. A., & Obiekezie, C. A. (2022). Disease Management Practices Among Snail Farmers in Nigeria.

International Journal of Veterinary Science and Medicine, 10(1), 56-63.

Okonkwo, N. C., Anya, E. E., & Obiora, J. O. (2020). Barriers to the adoption of AI technologies in Nigerian agriculture. *Journal of Technology in Agriculture*, 6(1), 23-35.

Okoroafor, C. P., Ibe, A. C., & Nnamani, E. C. (2020). Addressing inefficiencies in snail farming: A call for innovation. *Journal of Agricultural Science in Africa*, 15(3), 120-130.

Olaleye, F. O., Adekunle, B. R., & Adewumi, T. S. (2022). Artificial intelligence in African agriculture: Trends and implications. *Technology and Rural Development Quarterly*, 11(2), 98-107.

Oluyemi, O., & Ajibola, S. (2020). Challenges in Snail Farming: The Nigerian Experience. *Journal of Agricultural Extension and Rural Development*, 8(2), 59-66.

Omole, A. J., Akinrotoye, K., & Olaifa, J. (2021). Nutritional Benefits and Economic Importance of Snail Farming in Nigeria. *Journal of Animal Production and Research*, 10(3), 137-149.

Pérez-Ruiz, M., González-Domínguez, J., & Suárez, A. (2022). Precision Agriculture and Artificial Intelligence: Applications and Innovations. *Computers and Electronics in Agriculture*, 190, 106438.

Sarker, I., Rahman, A., & Ahmed, F. (2022). Machine Learning in Agriculture: Recent Advancements and Future Prospects. *Computers and Electronics in Agriculture*, 195, 106-119.