DOI: https://doi.org/10.4038/tare.v29i1.5796

Tropical Agricultural Research & Extension 29 (1): 2026

RESEARCH ARTICLE

PROFITABILITY AND LONG-TERM VIABILITY OF TABLE EGG PRODUCTION IN IBADAN METROPOLIS IN NIGERIA: A MARKOV CHAIN APPROACH

Ogundeji AB[1*], Obayelu O[1], and Adeoti A[1]

Department of Agricultural Economics, Faculty of Agriculture, University of Ibadan, Nigeria

Received: 25 September 2025; Accepted: 06 March 2026; Published: 31 March 2026

ABSTRACT

The poultry sector in Nigeria, particularly table egg production, plays a crucial role in ensuring food security, generating employment, and supporting household income. This study investigated the profitability and long-term viability of table egg production in Ibadan, Nigeria, with specific attention to the role of feed costs and changing business conditions. Primary data were collected from 120 poultry farmers using structured questionnaires. Profitability was assessed using the gross margin technique. At the same time, a Markov chain model was employed to evaluate the long-term viability of table egg production by analysing the stochastic transitions between distinct economic states over time. Results showed that egg sales accounted for 86.5% of total revenue, while feed costs consumed over 81% of total variable costs—exceeding the conventional 60–70% threshold and placing significant pressure on profit margins. Although the average gross margin was positive USD 735.66, the gross margin ratio was low (4.43%), indicating marginal profitability. The Markov analysis further revealed a deteriorating business outlook, with increasing probabilities that farmers would transition from favourable to marginal or financially distressed states. In the long run, only 1.84% of producers are expected to remain in a favourable state, suggesting a high risk of business exit under current conditions. The study concludes that while table egg production remains profitable, its long-term viability is threatened without strategic intervention. Collaborative efforts between the government, private sector, and research institutions are recommended to reduce feed costs, introduce pricing policies, and promote technological innovations to safeguard the sector's future sustainability.

Key words: Egg–feed price ratio, Feed cost, Long-term viability, Markov chain, Profitability, Table egg production

INTRODUCTION

Table egg production is an essential and affordable source of protein that improves nutrition and reduces hunger (Yu *et al*., 2023). Global demand for table eggs has increased exponentially due to the growing human population (El-Sabrout *et al*., 2022). The poultry sector in Nigeria, particularly table egg production, represents one of the most important components of the country's agricultural economy, contributing approximately 25% to agricultural Gross Domestic Product (NABC, 2021). According to reports from the Food and Agriculture Organization (FAO, 2020), poultry farming accounts for a significant portion of Nigeria's livestock production, with eggs being a major source of affordable animal protein for the growing population. Ibadan, as one of the largest urban centres in Oyo State, has witnessed substantial growth in the poultry farming industry, making it a key player in Nigeria's egg production landscape. However, while the sector is crucial for food security and employment generation, there are growing concerns about the profitability and long-term sustainability of table egg production, especially amid rising feed costs and market uncertainties.

Profitability is one of the most crucial metrics for evaluating the success of any business, including agricultural enterprises like table egg production. Table egg producers in Ibadan, like their counterparts across Nigeria,

Corresponding author: ayodejibukunmi@gmail.com

face a myriad of challenges that impact their profitability, including high feed costs, fluctuating market prices, and the occasional outbreak of diseases that reduce egg production. According to previous studies in Nigeria, feed costs constitute a substantial portion of total production costs, sometimes accounting for more than 70% of variable costs (Mere, Ater, & Ezihe, 2017; Bello, 2019). In Ibadan, where egg demand is relatively high due to the city's large population, producers often struggle with rising costs of commercial poultry feed, which directly affect their bottom line. As feed prices rise, farmers are left with slimmer profit margins unless they optimise their production processes, reduce waste, or adopt cost-saving feed alternatives.

However, profitability is not solely determined by cost management; external market conditions also play a significant role. A study by Omonona *et al*. (2020) highlighted that price volatility in the egg market often poses a risk to profitability, particularly when market prices dip due to oversupply or reduced demand. In Ibadan, where producers often compete with eggs from other regions, market prices can fluctuate with seasonal demand, leading to financial instability. Furthermore, table egg producers must also navigate challenges related to transportation, storage, and distribution, which further increase costs and complicate profitability assessments.

The long-term viability of table egg production depends on a range of factors, from market stability and disease management to environmental sustainability and government policies. One of the most critical aspects of long-term viability is producers' ability to adapt to changing economic conditions. As observed in other parts of Nigeria, changes in the price of inputs such as feed, labour, and energy can significantly affect the profitability and survival of poultry businesses (Adebayo & Ajibola, 2018). In Ibadan, the issue of fluctuating feed prices is particularly pertinent, as local feed mills often rely on imported ingredients, exposing farmers to price shocks from exchange rate fluctuations and global market trends.

Another factor influencing the long-term viability of table egg production is the management of disease outbreaks, which are common in poultry farming. Diseases such as avian influenza and Newcastle disease can decimate poultry stocks, leading to significant financial losses. In Ibadan, where biosecurity measures may vary from farm to farm, producers must invest in disease-prevention strategies to safeguard their flocks and ensure continuous egg production. The effectiveness of these measures can directly impact the long-term sustainability of the industry, as producers who experience repeated outbreaks may find it challenging to remain viable in the market. Furthermore, the adoption of sustainable farming practices is becoming increasingly important for ensuring the long-term viability of poultry production. With rising concerns over environmental degradation and food safety, consumers are becoming more discerning about the methods used in food production. Sustainable practices such as waste management, renewable energy use, and reducing harmful chemical inputs can enhance the reputation of poultry farms and provide a competitive edge in the market.

Several studies (Akintola *et al*., 2018; Alabi *et al*., 2018; Johnson and Adegbite, 2019) have established that table egg production in Nigeria is generally profitable, particularly for medium-scale farmers, yielding 15-20% returns despite feed costs constituting 70% of expenses. However, Adebayo and Ajibola (2018) stressed the importance of feed management through bulk purchasing or alternative formulations to boost margins.

Fluctuating feed prices disproportionately affect smallholders, necessitating cost-effective strategies and price stabilization policies (Ayodele *et al*., 2019; Adetola *et al*., 2020). Olaniyi *et al*. (2022) explored the dynamics of the feed-to-egg price ratio, revealing that unfavourable price ratios often lead to reduced production levels and, consequently, lower profitability. This underscores the need for policies that stabilize feed prices to safeguard the economic viability of the sector. Beyond feed, challenges include disease outbreaks, high

labour costs, limited veterinary access, and inadequate credit or technology (Mere *et al*., 2017; Oluwole & Ibrahim, 2021). The sustainability of table egg production hinges on farmers' ability to navigate economic and environmental challenges. Babajide *et al*. (2020) employed Markov chain analysis to evaluate the long-term viability of table egg production, revealing that farms with better access to resources and robust management practices were more likely to remain in business over the long term. Yusuf *et al*. (2023) also utilized Markov chain analysis to assess transition probabilities and sustainability. They found that farms with higher productivity and profitability were less likely to exit the market. The long-term viability of smallholder poultry farming in West Africa requires integrating modern technologies such as automated systems, diversification strategies, and cooperatives to enhance resilience (Sani *et al*., 2021; Oke *et al*., 2021; Eze & Onwuegbuchulam, 2022). Overall, table egg production is a profitable venture. The negative impact of market dynamics on profitability indicates that price volatility often discourages long-term investments in the sector; hence, price stabilization mechanisms are required to counter market volatility (Omonona *et al*., 2020; Oke and Oke, 2023).

Numerous studies have documented the high feed-cost burdens and short-term profitability of table egg production in Nigeria (Ayojimi *et al*., 2020; Obisesan and Kehinde, 2022; Shittu *et al*., 2023). However, there is a paucity of empirical information on detailed cost–revenue analysis with dynamic, forward-looking modelling of business-state transitions under fluctuating feed–egg price ratios. In addition, there is limited information on the probability of farms moving between favourable, marginal, and distressed states over time, especially in Nigeria. Consequently, practitioners and policymakers still lack a predictive framework for anticipating how seasonal price shocks and policy interventions will affect the long-term viability of small- and medium-scale egg producers in this key metropolitan area. Hence, this study investigated the profitability of table egg production in Ibadan with a particular focus on the role of feed costs in shaping financial outcomes and provides a useful framework regarding the long-term behaviour of table egg production in Nigeria by modelling the transition probabilities between different states of production (e.g., high profitability, low profitability, and financial distress), thereby guiding producers on how to navigate challenges and ensure long-term viability.

MATERIALS AND METHODS

Study area

The study was conducted in Ibadan Metropolis, the capital city of Oyo State, Nigeria, known for its diverse poultry industry comprising small- and medium-scale farms engaged in table egg production. Ibadan's tropical climate, with average temperatures of 26–30°C and annual rainfall of approximately 1,200 mm, influences poultry health and feed management. As an urban centre with a population exceeding 3 million, it offers a robust egg market but also poses challenges, such as limited farm space. This urban setting provides a unique context for examining both profitability and the long-term viability of table egg production.

Sampling procedure and sample size

The target population of this study consisted of poultry egg farmers within Ibadan Metropolis. A two-stage sampling procedure was used to select the study sample. In the first stage, two Local Government Areas (LGAs)—Lagelu and Oluyole—were purposively selected due to their higher concentration of poultry egg farmers. Lagelu and Oluyole LGAs were selected based on the Poultry Association of Nigeria, Oyo State chapter (PANOY) membership registry, which shows they account for over 60% of registered egg-layer enterprises in Ibadan Metropolis. Using the list of registered poultry egg farmers obtained from PANOY as the sampling frame, the second stage involved a random selection of 60 farmers from each selected LGA. Of the 120 questionnaires distributed (60 per LGA), 116 were returned fully completed after follow-up phone calls were made to non-respondents to minimize

non-response bias.

Data collection

Primary data were gathered through a cross-sectional survey, which included the distribution of a well-structured questionnaire administered via personal interviews to ensure the accuracy and reliability of the responses.

The questionnaire was pre-tested on 10 farmers outside the main sampling frame to assess clarity and content validity; after which the questions were refined and reviewed by two poultry economics experts. The questionnaire was used to elicit information on socioeconomic characteristics, prices, output, costs, and quantities of inputs, including flock size, feed, drugs and vaccines, water troughs, cages, labour costs, and transport costs. The data collected were coded into Excel, which was then processed and subjected to data analysis. A combination of analytical software, including Stata 14 and R 4.0, was used to analyse the collected data.

Analytical technique

Gross Margin Ratio (GMR)

The Gross Margin Ratio (GMR) was employed to analyse the profitability of table egg production by evaluating the relationship between costs and returns. Gross Margin (GM) represents the financial surplus from a production process after deducting the total variable costs (TVC) from the total revenue (TR), as defined by Oladeebo and Ojo (2012):

$$GM = TR - TVC \quad \text{Eq. 1}$$

Where; GM: Gross Margin, TR: Total Revenue, and TVC: Total Variable Costs

The components of total revenue (TR) included proceeds from table eggs (Q_1), culled layers (Q_2), litter (Q_3), and empty feed bags (Q_4). Total variable costs (TVC) were calculated using the costs associated with significant economic inputs, specifically: laying stock (X_1), feed (X_2), Medication (X_3), and labour (X_4).

The profitability of table egg production was expressed as a percentage of the Gross Margin Ratio (GMR), calculated as:

$$GMR = \frac{GM}{TR} \text{ and } Profitability(\%) = GMR \times 100 \quad \text{Eq. 2}$$

For clarity:

- Feed cost (X_2) includes the farm-gate price of all commercial and on-farm milled feeds.
- Egg revenue (Q_1) is computed as the quantity of eggs sold × the average farm-gate price per egg during the study period.
- Other revenues (culled layers, litter, empty bags) are recorded at prevailing local resale prices.

Markov processes

Markov processes were used to assess the long-term viability of table egg production by analysing stochastic transitions among distinct economic states over time. Following Jadhav and Siddiqui (2010), the economic state of table egg production at any time can be classified as favourable, marginal, or knockout using the egg-feed price ratio. Let the ratio, denoted as X_t, be categorized as Favourable (F) when $2 < X_t \leq 3$, Marginal (M) when $4 \leq X_t < 5$, and Knockout (K) when $X_t \geq 5$. For period t, the finite stochastic process for this situation can be represented as:

$$X_t = \begin{Bmatrix} F \\ M \\ K \end{Bmatrix}, t = 1,2, \ldots, T; \; X_t = \frac{\text{Price / kg}}{\text{Price of an egg}} \quad \text{Eq. 3}$$

The economic state transitions over time were represented as probabilities (P_{ij}) of moving from state i at time $t-1$ to state j at time t, defined as:

$$Pij = P(X_{t-1} = i | X_t = j),$$
$$(i, j = 1,2, \ldots, n; t = 0, 1, 2, \ldots, T) \quad \text{Eq. 4}$$

Transitions were tabulated annually. The one-step transition probabilities were calculated using the formula:

$$P_{ij} = \frac{X_{ij}}{\sum X_{ij}}$$

Eq. 5

Where X_{ij} represents the observed frequency of transitions from state *i* to state *j*. These probabilities were summarized in a transition matrix, which highlights the likelihood of staying in the same economic state (diagonal elements) or transitioning to other states (off-diagonal elements). The matrix adheres to the Markovian property that the sum of probabilities in any row equals 1, ensuring stationarity and independence over time.

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents

Socioeconomic characteristics of the respondents show that the sample is predominantly male (83.6%) with females constituting only 16.4%, indicating that poultry farming in Nigeria remains a male-dominated enterprise due to the capital-intensive nature of the business and cultural dynamics that often limit women's access to resources. The average age of respondents is 45 years, with most (62.9%) between 40 and 59 years old. The majority of respondents are married (90.5%), consistent with findings by Omonona, Oyekale, and Olajide (2020), who highlighted that married individuals often have greater financial stability and a higher likelihood of engaging in agriculture-related businesses as a primary livelihood. Educational attainment is relatively high, with 44% of respondents having tertiary education and 40.5% with secondary education. The mean years of experience is 6 years, with 37.9% of respondents having 4–6 years of experience and 31.9% having 7–9 years. The mean flock size is 2,837 birds, with 52.6% of respondents having between 1,000 and 4,999 birds. Large flock sizes indicate commercial-level operations. The majority of respondents (62.1%) use the battery cage system, while 37.9% employ the deep litter system. This preference for battery cages aligns with the findings of Otunaiya *et al*. (2020), who noted that the system is more efficient for large-scale egg production due to better disease control and higher productivity per bird.

Profitability of table egg production

Table 1 presents results for the estimated profitability of table egg production using the gross margin technique. The total revenue (TR) accrued to an average poultry farmer from the sales of table eggs, culled layers, poultry litter, and empty feed bags was approximately 16,593.70 USD, with sales of table eggs contributing a substantial 86.50% of the total revenue.

Table 1: Cost and Revenue associated with table egg production for the average farm

Item	Amount (N)	Amount (USD)	Share%
REVENUE			
Table Egg	19,829,973.51	14,286.70	86.50%
Culled Layer	2,932,632.69	2,112.19	12.79%
Poultry Litter	155,334.05	111.90	0.68%
Feed Bag (empty)	5,865.04	4.22	0.03%
A: TOTAL REVENUE (TR)	**22,923,805.30**	16,511.02	**100.00%**
VARIABLE COST			
Laying Stock	3,351,952.03	2,414.53	15.30%
Feed	17,746,026.18	12,784.40	81.00%
Medication	476,423.01	343.21	2.17%
Labour	333,103.45	239.96	1.52%
B: TOTAL VARIABLE COST (TVC)	**21,907,504.66**	15,782.10	**100.00%**
C: GROSS MARGIN (GM) = A – B	**1,016,300.64**	732.92	
D: GROSS MARGIN RATIO (GMR) = C/A			**4.43%**

Author's computation

This underscores the critical role of egg sales in overall poultry farming income, underscoring the importance of efficient egg production processes.

The remaining revenue was generated from sales of culled layers (12.79%), which highlights the significant role that poultry culling plays in supplementing revenue, though it remains secondary to egg sales. A similar observation was noted by Omonona, Oyekale, and Olajide (2020), who found that eggs are the main income-generating source in poultry production. However, culling also adds value to the enterprise.

On the cost side, the total variable cost (TVC) incurred by the average poultry farmer amounted to 15,783.50, with the cost of feeding laying birds accounting for a significant 81% of the total variable cost. This mirrors the findings of previous studies, such as Olawumi (2008), Laseinde (2009), and Jadhav and Siddiqui (2010), which report that feeding costs typically account for 60-70% of total variable costs in egg production. A related investigation conducted in Ogun State, evaluating both backyard and commercial feeding systems, reported that feed expenditures accounted for 71.9% of total production costs—approaching the upper conventional threshold (Bamiro, 2020). However, in this study, the feed cost exceeded the upper limit of the conventional range, highlighting the rising costs of poultry feed, a trend also observed by Otunaiya *et al*. (2020) and Omonona *et al*. (2020). This increase in feed cost suggests that the economic viability of poultry farming is under pressure, with higher input costs eroding the profitability of egg production. The impact of high feed costs on farm profitability has been well-documented, as higher feed expenses increase capital requirements for starting and maintaining the enterprise, thereby reducing net farm income and overall profitability.

While the gross margin (GM) of 735.66 USD indicates that table egg production is profitable, the gross margin ratio (GMR) presents a more stringent view of profitability. The GMR value of 0.0443 implies that for every N1 invested in the poultry egg enterprise, only N0.04 is returned as gross profit. This marginal profit suggests that although the business is profitable, the returns on investment are low. This result aligns with findings from Adebayo and Ajibola (2018), who noted that while poultry farming can be profitable, profitability is often marginal due to high feed costs and other input expenses. Furthermore, such low gross profit margins signal potential financial strain, especially when farmers face volatile feed prices and other economic challenges.

Despite the low GMR, it is important to consider the broader implications for long-term sustainability in table egg production. A positive gross margin, though modest, suggests that the industry remains viable as long as costs, particularly feed costs, can be controlled or mitigated. For example, farmers can explore alternative feed sources, improve feed efficiency, or scale production to benefit from economies of scale.

Long-term viability of table egg production

Business States and Transition Probabilities

The long-term viability of table egg production is a critical concern amid rising costs and fluctuating revenue. Table egg production operates in three distinct business states, defined by the egg-feed price ratio: Favourable (F), Marginal (M), and Knockout (K). The transition probabilities presented in Figure 1(a) illustrate the dynamics of movement between these states. Notably, there is no probability of an egg farmer in the favourable state remaining in that state, with a 75% chance of moving to the marginal state and a 25% chance of transitioning to the knockout state. Conversely, a marginal state has a 36.1% chance of deteriorating into the knockout state and only a 3.1% chance of improvement. The absence of a transition from the knockout state to the favourable state underscores the challenges farmers face in recovering from adverse economic conditions. Similarly, in Figure 1(b), the vector of initial probabilities ($P_{(0)}$) which is the starting probability of egg farmers being in any of these three business states at the beginning period implies that, on the average, 2.6%,

62.1% and 35.3% of poultry egg farmers are currently in the high profitability (i.e. favourable), low profitability (i.e. marginal), and financial distress (i.e. knockout) state respectively. Hence, only about 26 egg farmers out of every thousand are in the favourable state, about 621 of them are in the marginal state, while the remaining 353 farmers occupy the knockout state with a good chance of folding up the business if the situation persists.

$$P = \begin{array}{c} \\ F \\ M \\ K \end{array} \begin{array}{c} \begin{array}{ccc} F & M & K \end{array} \\ \begin{pmatrix} 0 & 0.75 & 0.25 \\ 0.0309 & 0.6083 & 0.3608 \\ 0 & 0.5714 & 0.4286 \end{pmatrix} \end{array}$$

(a)

$$P_{(0)} = \{0.0259, 0.6207, 0.3534\}$$

(b)

Figure 1: Transition matrix and vector of initial probabilities

The implications are significant, as these probabilities suggest a deteriorating trend for table egg producers. Similar studies, such as those by Akintola *et al*. (2018) and Johnson and Adegbite (2019), have emphasized the precarious nature of agricultural enterprises in volatile economic environments, particularly when feed prices rise disproportionately relative to product prices.

Absolute probabilities and long-term trends

Using the Chapman-Kolmogorov equations, [$P_{(n)} = P_{(0)}P^n$], the absolute probabilities of being in each business state over one and two years were computed. Figure 2(b) reveals a decline in the proportion of farmers in the favourable state from 2.6% initially to 1.92% after one year and 1.85% after two years. Similarly, the proportion in the marginal state decreases from 62.1% to 59.69% over two years. In contrast, the knockout state experiences a consistent increase, rising from 35.3% to 38.45% in the second year. This is a result of the disproportionate rise in feed costs over egg prices in recent times, which has further increased the number of eggs needed to be sold before the average poultry egg farmer can afford to buy a kilogram of layers feed. If this poor economic situation persists, the average poultry farmer may get knocked out of the poultry egg business in the near future.

$$P^{(2)} \equiv P^2 = \begin{pmatrix} 0.0232 & 0.5990 & 0.3778 \\ 0.0188 & 0.5993 & 0.3818 \\ 0.0177 & 0.5925 & 0.3899 \end{pmatrix}$$

(a)

$$P_{(1)} = \{0.0192, 0.5989, 0.3819\}$$

$$P_{(2)} = \{0.0185, 0.5969, 0.3845\}$$

(b)

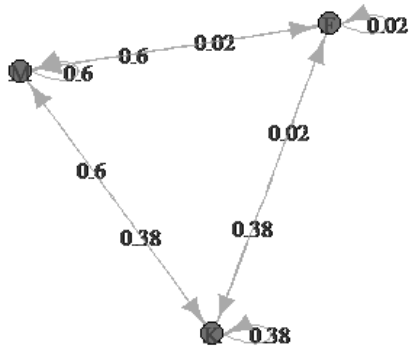
Figure 2: Two-step transition matrix and vector of absolute probabilities

These results highlight the vulnerability of the poultry egg sector, where unfavourable economic conditions drive farmers out of the business. Field surveys corroborate this finding, showing a significant number of egg farmers exiting the industry annually due to unsustainable cost-revenue dynamics. Studies by Adetola *et al*. (2020) and Oluwole and Ibrahim (2021) similarly report that high feed costs and low profit margins are critical factors contributing to the dwindling numbers of active poultry farmers.

Steady-state probabilities and limiting behaviour

The absolute probabilities after *n* transitions always converge uniquely to a limiting (steady state) distribution as *n* tends to infinity. Such that the probabilities (π) remain unchanged after one transition, and for this reason, they represent the steady-state distribution. The limiting distribution in Figure 3(b) shows that in the long run, only 1.84% of farmers remain

in the favourable state, while 59.67% and 38.48% occupy the marginal and knockout states, respectively. This implies a sustained decline in profitability, with a majority of farmers operating on the brink of unprofitability or exiting the industry altogether. Figure 3(a) visualizes these probabilities, demonstrating the eventual convergence of the system to a steady-state distribution. This finding aligns with the observations of Eze and Onwuegbuchulam (2022), who reported that smallholder poultry farmers struggle to recover from economic shocks due to limited access to affordable inputs and financial support.



(a)

$\pi_1 = 0.0184$
$\pi_2 = 0.5967$
$\pi_3 = 0.3848$

(b)

Figure 3: Limiting state transition probabilities of table egg production

CONCLUSIONS

This study assessed the profitability and long-term viability of table egg production in Ibadan, Nigeria, using gross margin analysis and modelling business-state transitions by a Markov chain approach to assess the economic sustainability of poultry farming in the region. Data collected were used to quantify revenues and costs, compute transition probabilities across three profitability states (Favourable, Marginal, Knockout), and project both absolute and steady-state distributions over time.

The results showed that while table egg production is currently profitable, with a gross margin of 735.66 USD, the gross margin ratio of 0.0443 indicates marginal returns. Additionally, the transition probabilities suggest a trend towards decreasing profitability, with an increasing number of farmers moving into the knockout state over time. This study contributes to the existing literature by providing a detailed economic analysis of table egg production in Ibadan, highlighting the critical role of feed costs and the sector's precarious profitability. It also introduces a novel application of Markov chain modelling to predict long-term trends in the profitability of poultry farming. The findings underscore the need for interventions to stabilize feed prices. These include the exploration of alternative or on-farm feed formulations and the adoption of productivity-enhancing technologies by producers (e.g., automated feeders, climate-controlled housing) to reduce feed cost burdens. Feed millers and input suppliers could also collaborate on low-cost feed inputs (e.g., locally grown maize and soybean) to stabilize prices. In addition, government agencies might consider targeted subsidies or tax relief on feed ingredients, alongside a minimum floor price for eggs, to buffer farmers against market volatility. Finally, research institutions should prioritise the development of low-cost feed formulations and extension services to disseminate best practices.

Limitations of the study

1. The sample scope was limited to producers in Ibadan, which may not capture regional heterogeneity in costs or market structures.
2. Markov chain assumptions (time-homogeneity, discrete states) may oversimplify real-world dynamics, such as farmers' adaptive strategies or credit interventions.
3. Price shocks (e.g., sudden currency depreciation) were modelled implicitly but not stress-tested in scenario analyses.

ACKNOWLEDGMENTS

The authors declare that there is no conflict of interest regarding the publication of this article. No financial support or sponsorship was received for this research, and the study was conducted independently.

AUTHOR CONTRIBUTION

ABO, OO, and AA conceptualised and designed the study. ABO conducted the research and analysed the data. ABO drafted the manuscript, and OO and AA critically reviewed and revised the manuscript.

REFERENCES

Adebayo, O. A., & Ajibola, O. O. (2018). Impact of feed cost on poultry production profitability in Nigeria: A case study of Ogun State. *International Journal of Poultry Science*, 17(10), 474-481.

Adetola, A. O., Omotayo, A. S., Alabi, R. T., and Falade, B. J. (2020). The impact of feed costs on the profitability of poultry farming. *International Journal of Livestock Studies, 8*(1), 27–34.

Akintola, J. O., Adebayo, T. A., Adeoye, I. O., and Oladimeji, K. M. (2018). Economic viability of poultry farming in Nigeria. *Journal of Agricultural Economics, 9*(3), 45–60.

Alabi, R. A., Esobhawan, A. O., & Aruna, M. B. (2018). Profitability and economic viability of poultry egg production under varying price regimes in Nigeria. *African Journal of Livestock Economics, 5*(3), 134–146.

Ayodele, A. I., Bello, A. M., & Adebayo, J. O. (2019). Feed price dynamics and their impact on the profitability of poultry production in Nigeria. *Nigerian Journal of Agricultural Economics, 11* (1), 45–52.

Ayojimi, W., Ajiboye, B.O. & Bamiro, O.M. (2020). Comparative economic analysis of poultry egg production under two feed management regimes in Ogun State, Nigeria. *International Journal of Research and Scientific Innovation (IJRSI)*, 7(8): 107-115.

Babajide, T. A., Oladipo, F. T., & Ojo, E. A. (2020). Long-term viability of table egg production in southwestern Nigeria: Evidence from Markov chain analysis. *International Journal of Poultry Science, 19*(4), 189–200.

Bamiro, O. (2020). Comparative economic analysis of poultry egg production under two feed management regimes in Ogun State, Nigeria. ResearchGate.

El-Sabrout, K., Aggag, S. & Mishra, B. (2022). Advanced Practical Strategies to Enhance Table Egg Production. *Scientifica*, 2022: 1393392.

Eze, C. A., and Onwuegbuchulam, N. O. (2022). Economic resilience strategies for smallholder poultry farmers. *Agricultural Systems Review, 12*(1), 89 –101.

Food and Agriculture Organization (FAO). (2020). *The state of food security and nutrition in the world 2020*. FAO.

Jadhav, A. S., & Siddiqui, S. A. (2010). *Poultry feed formulation and nutrition*. Springer Science & Business Media.

Johnson, F., and Adegbite, A. (2019). Feed cost management in poultry enterprises. *African Journal of Agribusiness, 14*(2), 102–115.

Laseinde, E. A. O. (2009). Tropical Poultry Production; Poultry Ventures – Prospects and Practice. Second edition. Delar Tertiary Publishers, Ile-Ife, Nigeria.

Mere, C. U., Ater, P. I., & Ezihe, J. A. C. (2017). Analysis of profitability and constraints of table egg production enterprises in Benue State, Nigeria. *International Journal of Environment Agriculture and Biotechnology*, 2(6), 2936-2943.

NABC (2021). Poultry sector study Nigeria. https://dutchafricapoultry.com/wp-content/uploads/2021/10/NA BC-Nigeria-Poultry-Report-2020-27.06.2020.pdf

Obisesan, J.A. & Kehinde, D.K. (2022). The effect of working capital on profitability of poultry egg enterprise in Osun state, Nigeria. *Applied Studies in Agribusiness and Commerce – APSTRACT*, 16(1): 19-28.

Oke, F. O., & Oke, A. O. (2023). Economics of egg production among poultry farmers in Oyo State, Nigeria. *Journal of Agriculture and Agricultural Technology*, 13(1), 15-25.

Oke, O. A., Adepoju, S. A., & Adebayo, O. O. (2021). Economic sustainability of small-scale poultry production in Oyo

State, Nigeria. *Journal of Livestock and Agricultural Economics, 13*(2), 78 –89.

Oladeebo, J. O., and Ojo, S. O. (2012). Economic appraisal of small and medium scale performance in poultry egg production in Ogun State, Nigeria. African Journal of Agricultural Research Vol. 7(37), pp. 5170-5174

Olaniyi, A. O., Falade, O. T., & Adekunle, A. A. (2022). Investigating the dynamics of feed-to-egg price ratio in Nigeria's poultry industry. *West African Journal of Agricultural Research, 18*(1), 24–36.

Olawumi, S. O. (2008). Principles and Practice of sound poultry management. Revised Edition. Baltays Publishers, Ile-Ife, Nigeria.

Oluwole, B., and Ibrahim, A. (2021). Profitability of small-scale poultry production under rising feed prices. *Nigerian Journal of Animal Production, 10*(4), 211–224.

Omonona, B. T., Oyekale, A. S., & Olajide, O. T. (2020). Economic analysis of table egg production in Nigeria: The case of Oyo State. *Agricultural Economics and Environment*, 19(2), 121-134.

Otunaiya, A. O., Ayinde, I. A., & Ayinde, O. O. (2020). Profitability and factors influencing egg production among commercial poultry farmers in Oyo State, Nigeria. *Journal of Agricultural Economics and Development, 4*(2), 12 -18.

Sani, A., Olatoye, A., Abubakar, M., & Lawal, F. (2021). Long-term economic viability of smallholder poultry farming in West Africa. *West African Journal of Agricultural Research, 15* (2), 201-213.

Shittu, K., Nwankwo, F., & Ezeude, N. W. (2023). Cost and return structure in poultry egg production in Osun state, Nigeria. *Forshen Hub International Journal of Entrepreneurial and Cooperative Studies*, 6(6), 1–13. http://journal.forshenhub.com.ng/index.php/FHIJECS/article/view/82

Yu, A., She, H., & Cao, J. (2023). Evolution of the spatial patterns of global egg trading networks in the 21 Century. *Sustainability*, 15(15), 11895. https://doi.org/10.3390/su151511895

Yusuf, K. A., Olaitan, T. J., & Ayinde, O. A. (2023). Assessing the transition probabilities and sustainability of poultry egg farming in Nigeria. *Journal of Agricultural Science and Policy Research, 30*(3), 215–228.