FACTORS INFLUENCING PROFITABILITY OF POULTRY EGG PRODUCTION IN IBADAN METROPOLIS, OYO STATE, NIGERIA

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ABSTRACT

This study was executed to estimate the profitability of poultry egg production and its determinants in Ibadan, Oyo State, Nigeria. A two-stage sampling technique was used to survey 120 poultry farmers, and primary data was collected using a structured questionnaire. The data obtained was analyzed using descriptive statistics, cost and returns analysis and multiple regression. Results revealed that the majority (75%) were male, with an average age of 41 years. Many (64.2%) of the poultry farmers had secondary education, and 25.8% had farming experience of 1-4 years. The majority (88.3%) were cooperative society members, and 87.5% operated a battery cage system of poultry management. The cost and returns result showed that poultry egg production was profitable, with a net income of ₦1,823,252.61. The profitability ratio further revealed that for every ₦1 invested in poultry egg production, the poultry farmer earned ₦0.26 as profit. In addition, factors influencing profit level among the farmers include age (β = 0.23, p<0.01), experience (β = 0.71, p < 0.05), feed cost (β = - 0.12, p < 0.01), labour cost (β = - 1.30, p < 0.01), cost of medication (β = - 1.06, p < 0.01), stock size (β = 0.79, p < 0.01), price of crate of eggs (β = 0.90, p < 0.01) and cost of laying birds (β = - 0.28, p < 0.05). Based on the findings of this study, it is recommended that policies that will assist poultry egg farmers to attain a drastic reduction in the cost of poultry feed, possibly through subsidies,

should be formulated by the government. In addition, it is essential to encourage the use of locally sourced raw materials in feed formulation to increase profit.

KEYWORDS: Cost and returns, Egg, Poultry, Production, Profitability ratios

INTRODUCTION

Agriculture is a prominent non-oil sector in Nigeria that contributes remarkably to the country's economic growth. In real terms, this industry produced approximately 22.36% of the Gross Domestic Product (GDP) in the first quarter of 2022. According to the National Bureau of Statistics (NBS), the livestock business is one of agriculture's subsectors, as it employs about 85 million Nigerians directly or indirectly and primarily in the poultry industry on a small to medium scale (NBS, 2022). Livestock contributed between 6% and 8% of the nation's GDP (Africa Sustainable Livestock, ASL, 2018). According to FMARD (2021), livestock are tools that can improve the socioeconomic conditions of the rural populace, particularly in developing countries. They can be raised on a small, medium, or big level. Nigerian livestock includes poultry (chickens), cattle, pigs, sheep, and goats. According to the Federal Ministry of Agriculture and Rural Development (FMARD, 2021) report, the annual output of livestock produced in Nigeria was 22 million cattle, 38 million sheep, 57.3 million goats, 7.1 million pigs, 180 million poultry birds and 1.4 million equids (horses, donkeys and so on). According to the Federal Ministry of Agriculture and Rural Development (FMARD, 2021) report, the output realized from the poultry population was 650,000 metric tonnes (MT) of eggs and 300,000MT of meat as against the demand for eggs and meat, which is about 790,000MT and 1,500,000MT respectively, thus creating a huge demand gap which is often met through smuggling from the Benin Republic. There are numerous lucrative prospects in the poultry industry in Nigeria, although chickens are more commonly raised than other poultry birds. For example, a broiler is reared for meat production and layers for egg production under a free-range, semi-intensive or intensive management system.

Poultry offers a wide range of economic opportunities, including egg and meat production, hatcheries and input suppliers, which generate additional revenue for the household. Despite the obstacles, the production of poultry products in Nigeria has increased throughout the years. However, the proportion of increases still falls short of demand as it only caters for 30% of the chicken eggs and meat needs of Nigerians as per capita egg consumption is 60 eggs per annum compared to advanced countries where per capita egg consumption is 250 eggs per annum

(Babban 2021). According to FMARD (2021) and FAO (2019), the main reasons for the low poultry output in Nigeria compared to what is obtainable in other African countries are inadequate capital, diseases and parasite infection, enormous feed costs and the use of poor breeds of birds. The high costs of maize and soybeans have put most poultry producers out of business (Sahel, 2015). The exorbitant cost of foreign-sourced feed has caused most farmers to improvise and reformulate poultry feeds with sub-standard materials such as peanut cake, cottonseed and palm kernel meal, thus exacerbating the input dilemma (World Poultry, 2013). The high cost of inputs is a big problem in the poultry industry because feed purchases consume as much as 70% of the cost of production, leading to a significant reduction in the number of commercial poultry farmers, particularly small-scale ones who are unable to bear the high-cost of egg production (Adebiyi, 2000; Ashagidigbi *et al.,* 2011) and subsequent reduction in the farmer's profit level (Hamzat *et al.,* 2020). The exorbitant input cost would undoubtedly impact the income level of poultry egg producers. The Nigerian government has implemented several programmes both in the past and in the present aimed at addressing the issue of high input costs, bridging the demand-supply gap, creating more job opportunities, reducing hunger and reducing heavy dependency on importation in the poultry industry. These include the Micro-Credit Scheme for Livestock Production and the Community-Based Agricultural and Rural Development Project (African Development Fund, ADF, 2003, FAO, 2019). However, some of these programmes appear to be no longer functional, possibly due to a lack of funding and proper monitoring that would ensure continuity.

Poultry egg farming is crucial in meeting the growing demand for high-quality protein sources. Therefore, ensuring the sustainability and profitability of poultry egg farming is germane given the ongoing population growth. In addition, despite its importance, poultry egg farming confronts numerous challenges that affect its profitability. Poultry egg enterprise is affected by many factors, including high production costs and technical constraints in marketing due to poor infrastructures, among others. Therefore, identifying the critical variables that affect its financial sustainability is necessary. The current study aims to evaluate the profitability of poultry egg production and its determinants in the Ibadan metropolis, Oyo state. The study specifically described the socioeconomic characteristics of poultry farmers and calculated the costs and returns involved in poultry egg farming and its determinants. Findings from this study would enable the relevant stakeholders to make well-informed choices and have in-depth knowledge of these factors, thereby potentially improving the profitability and sustainability of the poultry egg farming industry in Nigeria.

METHODOLOGY

The research was conducted in the Ibadan metropolis, Oyo State, Nigeria, which comprises 11 Local Government Areas (LGAs). It lies between longitude $3°55'0''$E and latitude $7°23'47''$N and had an estimated population of 6,000,000 as of 2021. Ibadan has a tropical wet and dry climate, with a long wet season and relatively consistent temperatures (between 24°C and 25°C) all year. Because of the favourable weather, poultry farming is popular among the farmers in the study area. A well-structured questionnaire was used to elicit relevant information from the respondents that supported the study objectives. A two-stage sampling procedure was employed to select the respondents. The first stage involved the purposive selection of two (Lagelu and Oluyole) out of the 11 LGAs in the metropolis due to intensive poultry egg farming in the area. The Poultry Association of Nigeria, Oyo state chapter (PANOY) provided a register of all poultry egg farmers in the selected LGAs. The second stage involved a proportionate sampling of 120 poultry egg farmers from the list obtained from PANOY, as the number of registered poultry farmers from the two local governments was different and also, a large number of the registered farmers had deserted the enterprise due to high production cost, thus leaving very few behind in the business. Fifty farmers were interviewed in Lagelu, while 70 were interviewed in Oluyole. Data were analyzed using descriptive statistics in the form of frequency counts and percentages to describe the socioeconomic characteristics of the respondents, cost and return analysis for profitability and multiple regression analysis for determinants of profitability.

Estimation of Net Income

The profitability of egg production was evaluated using the net income estimation approach. Costs incurred and returns from egg farming were estimated, including the cost of all inputs used (fixed and variable), the quantity of output (eggs) produced in crates and the price per crate. This can be specified as shown in equations 1-4.

$$NI_i = TR_i - TC_i \tag{1}$$

$$TR_i = P_i * Q_i \tag{2}$$

$$TC_i = TFC_i + TVC_i \tag{3}$$

$$\text{Therefore, } NI_i = P_i * Q_i - (TFC_i + TVC_i) \tag{4}$$

Where: NI_i = Net income realized from the sale of egg (₦);

TR_i = Total revenue realized from the sale of eggs (₦);

TVC_i = Total variable cost expended on production of eggs (₦);

Q_i = Total quantity of eggs produced by the farmer (crates);

Pi= Current price per unit of output (₦/crate);

TFCi= Total fixed cost expended by the farmer (₦)

Returns on Investment (ROI) = NI/TC

Net Profit Ratio = NI/TR

Profitability ratios, such as Net Income (NI), Returns on Investment (ROI), and Net Profit Ratio (NPR), were calculated from the cost and returns analysis.

Following Olaoye *et al.* (2016), poultry egg farming was profitable.

Determinants of Profitability in Poultry Egg Production

Multiple regression analysis was employed in this study to establish the socio-economic factors that influence profitability in poultry egg production. This was represented in equation 5 below:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \ldots . \beta_{10} X_{10} + \varepsilon_{it} \qquad (5)$$

Where

Y_i = Profit from poultry egg production (naira)

X_1 = Age (years)

X_2 = Sex (male = 1; 0 otherwise)

X_3 = Experience in poultry farming (years)

X_4 = Level of education (years)

X_5 = Feed cost (naira)

X_6 = Labour cost (naira)

X_7 = Medication cost (naira)

X_8 = Stock size (number)

X_9 = Price of crate of eggs (naira)

X_{10} = Cost of laying birds (naira)

RESULTS AND DISCUSSION

Socioeconomic characteristics of poultry egg farmers

The socioeconomic characteristics of the poultry egg farmers sampled in the study area are presented in Table 1. The majority (75%) of the poultry egg farmers are male, while very few (25%) are female. An average poultry egg farmer in the study area was 41 years old, with a cumulative majority (80%) below 50 years of age. This implies that the farmers were still economically active and productive and, thus, would be able to withstand the arduous tasks involved in poultry egg production. This result is similar to the earlier findings of Adedeji *et*

al., (2017) and Johnson *et al.*, (2020), who reported an average age of 41 years for poultry egg farmers in Oyo State, Nigeria. Most (77.5%) of the poultry farmers are married, while a few (17.5%) are single. Regarding educational qualification, very few (2.5%) had only primary education, 33.3% had secondary education, while more than half (64.2%) attained tertiary education. This high literacy rate among the farmers is a promising sign for the industry, as it could bring about more informed decisions and possibly increase output levels, as reported by Adenuga *et al.*, (2013). About one-quarter (25.8%) of the poultry farmers had 1-4 years of experience, while an average poultry egg farmer in the study area had 12 years of experience. This suggests that there are relatively few new entrants in the business. However, the long years of experience could improve profit levels, possibly due to perfection that sets in following the repetition of production activities over time, as documented by Adeyonu *et al.*, (2016); Oyinbo *et al.*, (2016) and Oke *et al.*, (2022). Many (59.2%) of the respondents had 5-8 persons in their households, while the mean household size was five persons, and the majority (88.3%) of the poultry farmers were cooperative society members, providing a strong support network for the farmers. In addition, (87.5%) of the poultry farms operate a battery cage system of management, while just (12.5%) operate a deep litter system.

Cost and Returns Analysis in Poultry Egg Production

The profitability of poultry egg production was examined using the net income estimation approach. The costs and returns to poultry egg enterprises in the study area are presented in Table 2. The depreciated cost was ₦121,841.30, representing 8.4% of the total cost (TC). The total variable cost (TVC) was ₦1,327,653.42 per annum, constituting about 92.0% of the total cost (TC). A breakdown analysis of the total variable cost (TVC) incurred during production revealed that labour cost, cost of laying birds, medications and feeds accounted for 97.9% of the total cost incurred in egg production.

Table 1: Socioeconomic Characteristics of Poultry Egg Farmers in the Study Area

Variables	Frequency	Percentage	Mean
Sex			
Male	90	75.0	
Female	30	25.0	
Age (years)			
≤30	23	19.2	
31-40	40	33.3	
41-50	33	27.5	
51-60	18	15.0	
61 and above	6	5.0	41.2
Marital status			
Single	21	17.5	
Married	93	77.5	
Widow	3	2.5	
Separated	3	2.5	
Educational Qualification			
Primary	3	2.5	
Secondary	40	33.3	
Tertiary	77	64.2	
Household size (number)			
1-4	47	39.2	
5-8	71	59.2	
9 and above	2	1.6	5
Experience (years)			
1-4	31	25.8	
5-10	36	30.0	
11-15	16	13.3	
16-20	18	15.0	
20 and above	19	15.8	11.6
Membership in cooperative society			
Yes	106	88.3	
No	14	11.7	
Poultry management system			
Battery cage system	105	87.5	
Deep litter system	15	12.5	

Source: Field Survey, 2021

The result also showed that all other variable cost items, including transportation, electricity, fuel, maintenance and repairs, water, and wood shavings, represented 2.1% of the total cost. In terms of revenue, revenue realized from the eggs and spent layer sales was ₦3,272,747.33, although egg sales represented 80.3% of the total revenue. In comparison, revenue from spent poultry birds accounted for about 19.7% of the total revenue, possibly due to the fact that the purpose of raising the birds was to produce eggs and that has been realised and also due to diminishing marginal productivity of the birds. This result is in tandem with the earlier

documentation of Emam and Hassan (2010) and Tanko *et al.* (2014), who reported that egg sales constituted the highest proportion of the total revenue. These findings imply that egg is a significant revenue source in poultry egg production. The profitability result showed that poultry egg production was profitable in the study area, given a net income of ₦1,823,252.61. The profitability ratios computed in this study revealed that the return on investment (ROI) was 1.26, which implied that for every ₦1 invested in poultry egg production, the farmer realised a profit worth ₦0.26.

Similarly, a net profit ratio value of 0.55 generated implied that ₦0.55 will be realized as a gain on every ₦1 expended on poultry egg production. There were disparities in the profit ratios because ROI is not the same as profit but rather the returns on the money invested in the poultry egg enterprise based on the net profit, while the net profit ratio measures the performance of the business. The profitability ratios reported in this study are relatively higher than the Bank of Agriculture (BOA) and Bank of Industry (BOI) lending interest rates of 10%. This implies that the enterprise can conveniently repay any borrowed funds from these sources to increase production output. The result further supports the findings of Afolami *et al.* (2013) that egg production is a profitable enterprise.

Multiple Regression Analysis of the Factors Influencing Profitability in Poultry Egg Production

Multiple regression analysis was used to examine the socioeconomic factors that influence the profitability of poultry egg production in the study area. Table 3 showed that the six explanatory variables (age, experience, feed cost, labour cost, medication cost, stock size, price of crate of eggs and cost of laying birds) substantially impact the profitability of poultry egg production at different probability levels.

The table further showed that the four substantial inputs in the production of poultry eggs were feeds, laying birds, labour and medications. These significant inputs, which took nearly all (97.9%) of the total cost involved in egg production, are the key cost drivers in the poultry egg production process. It was also noticed that about 60.3% of the total cost involved was expended on feeding the birds, thus making it the most expensive variable cost item in egg production. This result is similar to Johnson *et al.*, (2020) who also reported that the cost of feeding poultry birds accounted for the largest share of the total cost of production.

The model is correctly fitted, according to the diagnostic statistics. The coefficient of multiple determination, the R^2 value of 0.73, showed that the explanatory factors (age, experience, cost of feed, labour cost, cost of medication, stock size, price of crate of eggs and cost of laying birds) explained 73.0% of the variation in poultry egg profitability. The obtained coefficients are consistent with the *a priori* expectations. The F-ratio was 10.97 and higly significant ($p \leq 0.01$). This implies that all the included variables had a significant joint effect on egg production.

Table 2: Cost and Returns Outlay in Poultry Egg Production

Items	Mean value (₦/year)	Percentage (%)
Revenue		
Revenue from poultry eggs sold	2,629,559.75	80.34
Revenue from spent layers sold	643,187.58	19.66
Total Revenue (TR)	**3,272,747.33**	100.00
Variable Cost Items		
Laying birds	299,415.77	22.55
Feed	800,078.92	60.26
Medication	42,700.63	3.22
Labour	157,100.00	11.83
Transportation	10,225.00	0.77
Energy (Electricity, Fuel)	9,217.20	0.69
Maintenance and Repairs	5,650.40	0.42
Others (Water, Wood shavings)	3,265.50	0.26
Total Variable Cost (TVC)	**1,327,653.42**	100.00
Fixed Cost Items (Depreciated using Straight-line method)		
Farm Vehicle	34,280.25	28.14
Land and Buildings	78,675.37	64.57
Feeding and Drinking Troughs	1,980.65	1.63
Cages	5,560.81	4.56
Empty egg crates	1,083.86	0.89
Shovels, Buckets etc.	260.36	0.21
Total Fixed Cost (TFC)	121,841.30	100.00
Total Cost (TC)	1,449,494.72	
Net Income (NI)	1,823,252.61	
Returns on Investment	1.26	
Net Profit Ratio	0.55	

Source: Computed from Field Survey, 2021

The coefficient of age (X_1) is positive and highly significant ($p \leq 0.01$). As their age increased, the profit from poultry egg production also increased, possibly due to the efficient utilisation of resources and management practices of the birds. Specifically, a unit increase in the age of the poultry egg farmer will increase the profit of egg production in the study area by 23.0%. This agrees with the earlier submission of Oke *et al.* (2021), who stated that productivity increases

with age, possibly due to knowledge and expertise acquired from years of observations and experimentations with different production techniques. Poultry farming experience coefficient (X_3) is positive and highly significant (p≤0.01). This suggests that the more experienced the farmer, the more the profit. This agrees with the earlier submission of Rahman (2003) and Adesiyan et al. (2011), who opined that the more experienced the poultry egg farmer is, the more efficient the producer becomes. Cost of feed (X_5), cost of labour (X_6) and cost of medication (X_7) were negative and highly significant (p≤0.05). The negative relationship observed also conforms to the a priori expectation. This suggests that the higher the cost of buying feed, medication and farm labour, the lower the profit. This agrees with the earlier submission of Jacob et al. (2014).

Stock size (X_8) was highly significant (p≤0.01). and had a positive relationship with profit level in the study area. This implies that the higher the number of birds reared by the farmers, the more the output realized (eggs), which will increase the profit level. Specifically, a unit increase in stock size will increase the profit level by 79% among farmers in the study area. This conforms to the earlier findings of Valerien et al. (2011). The price of a crate of eggs (X_9) was highly significant (p≤0.01) and had a positive relationship with the profit level in the study area. Specifically, a unit increase in the price of eggs will increase profit by 90 per cent in the study area. This result agrees with the findings of Johnson et al. (2020). Also, the cost of laying birds was negative but significantly influenced profitability. This negative relationship implies that the higher the cost of acquiring the birds, the lower the profit. This is also in tandem with the findings of Johnson et al. (2020).

Table 3: Factors Influencing Profitability in Poultry Egg Production

Variables	Estimated β values	Standard error	t – values
Age	0.23***	0.060	3.83
Sex	19.72	15.650	1.26
Experience in years	0.71**	0.290	2.44
Level of education	0.81	0.696	1.16
Cost of feed	-0.12***	0.018	6.67
Cost of labour	-1.30***	0.340	3.82
Cost of medication	-1.06***	0.205	5.17
Stock size	0.79***	0.296	2.67
Price of crate of eggs	0.90***	0.276	3.26
Cost of laying birds	-0.28**	0.120	2.33
Intercept	6.27	5.42	1.16
F-value 10.97, R^2 = 0.73			

Note: **Significant at p<0.05 and ***significant at p<0.01.

CONCLUSION AND RECOMMENDATION

The study concluded that poultry egg production is profitable in the study area, given the net income and profitability ratios, which are positive and more significant than zero. However, efforts and policies that will assist the poultry egg farmers in achieving a drastic reduction in the cost of poultry feed, possibly through subsidies and the need to encourage the use of local materials in feed formulation that will eventually increase profit level, are recommended.

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