Profitability of Poultry Egg Farming in Rivers State, Nigeria

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HIGHLIGHTS

- Poultry egg farming demonstrates significant profitability, with a monthly gross margin of ₦368,457.91 and net farm income of ₦325,957.91. t

- For every ₦1 invested, farmers achieve ₦0.49 gross margin returns and ₦0.46 return on investment, highlighting the enterprise's economic viability.

Abstract

Maximizing profit is one of the major aims of business ventures and is obviously and largely reliant on how proficient and efficient resources, especially finance, are utilized. Hence, this research examined the profitability of poultry egg farming in Rivers State, Nigeria. The research depends on primary data collected using questionnaires and interview schedules from 120 poultry egg farmers using multistage sampling procedures. Descriptive statistics, ordinary least squares (OLS) regression model, and cost and returns analysis were employed to analyze the data collected. Analysis revealed that the majority (60.8%) of the farmers were males, and the majority (82.5%) were married. The mean age of the farmer was 44.69 years, with about 38.3% of them taking poultry egg farming as their primary occupation. The study showed that stock size, labor, and feed cost were statistically significant at 1% in the enterprise's profitability. The research indicates that poultry egg farming is profitable, as specified by the gross margin of ₦368,457.91 and a net farm income of ₦325,957.91 per month with all the respondents selected. The profitability ratios show that for every ₦1 invested in poultry egg farming, the farmer can earn ₦0.49 as gross margin returns, ₦0.46 as return on investment, and ₦0.30 as net profit ratio. The research, therefore, recommends that females and youths should be encouraged to engage in poultry egg farming; extension agents should also aim to increase farmers' knowledge of efficient utilization of financial resources to improve profitability.

Keywords: Poultry egg; Cost and return; Profitability ratios; Gross margin; Nigeria

1. Introduction

Agricultural operations remain central to the Nigerian source of economic growth, reduction of poverty, contribution of gross domestic product (GDP), job opportunities, and income generation (Philip et al. 2009). Agriculture is essential among the major sections of the economy; agriculture employs above 60% of the working population using contributions from livestock, crops, forestry, and fisheries; it contributes approximately 42% to GDP (CBN 2007). Livestock production forms a crucial and fundamental segment of the agricultural sector economy of Nigeria; a form that stretches further than absolute food productivity

conversely integrates employment generation, source of revenue and livelihood to farmers, economic growth and development of the nation, and source of several multiuse purposes. The poultry production segment is very significant in the livestock sector of agricultural production, including chickens, ducks, and turkeys. However, chickens single-handedly comprise about 95% of poultry farming globally (Kallaet al. 2007). Poultry productivity is distinctive, as it proffers a maximum turnover ratio and the fastest returns to investment cost regarding the livestock farming business (Sanni and Ogundipe 2005). Poultry production has remained and is recognized as the quickest and most vivacious way of resolving the challenge of protein inadequacy in the Nigerian diet (Akpabio et al. 2007). Poultry farming is unique; it possesses a high level of feed conversion rates and minimum price and is a preeminent supplier of animal protein.

Poultry production in Nigeria presently is approximately 10% of the population and accountable for between 15-18% of job opportunities, as a result of the reality that the poultry enterprise is majorly small-scale in practice (Afolami et al. 2011), as compared with other animal products such as beef, pork, ham among others, poultry egg is further regarded to be more tasty and edible, cheap in cost, possessing low cholesterol level with high protein content (Odimegwe et al. 2015). However, one of Nigeria's main difficulties is the satisfaction of the constantly increasing requirement for protein. The majority of Nigerian diets are inadequate in animal protein. Egg poultry production product contributes approximately 3.5g of the whole 7.2g of the animal protein demanded for an individual daily nutritional needs. For developing nations like Nigeria, poultry supplies approximately 15% of the aggregate animal protein consumption, with just about 1.3kg consumed annually per individual. (NLDC 2000). The World Health Organization (WHO) and Food and Agriculture Organization (FAO) recommended that poultry products be consumed by about 3.6 kg per capita annually. The consequences of not meeting these protein requirements are widespread hunger, poor nutrition, stunted growth, and disease epidemics evident in the country. Consequently, to meet the essential lowest amount requirement of the nutritional protein requirements of Nigerians, the nation needs yearly production of 10-20 billion eggs and 0.3-0.6 million tons of poultry meat as reported by NLDC (2000).

Poultry eggs and meat are beneficial in bridging and straddling the protein gap Nigerians require. Generally, poultry eggs are agreeable and suitable; this agreeability and suitability cuts across virtually all sociocultural and religious borderlines in Nigeria. The value of poultry production to the nationwide economy cannot be overstated, as it remains a popular enterprise for small-scale farmers with small owners who have enormous influence and contribution to the country's economy. Poultry egg production has assumed better significance in enhancing job prospects and animal protein production requirements in the country.

To this intention, knowledge on profitability and productivity in the enterprise should be an up-to-date issue that has a sustainable means of bridging several knowledge gaps and aiding in articulating accurate policies intended to enhance the increase in profitable poultry egg farming in the nation. Therefore, this research examined the profitability of poultry egg farming, determined the net profit ratios and gross margin returns; and determined the rate of return on investment in poultry egg farming in the sampled area.

2. Materials and Methods

The study was conducted in two agricultural zones in Rivers State, Nigeria. The two zones were considered most suitable due to the heavy concentration of poultry farming, specifically layers' production. The State lies between longitude 7o00'E and Latitude 5o70', which covers an area of 11,077km2 (NDRDMP 2006). The neighboring States towards the north side are Imo, Abia, and Anambra State, while the State towards the east side is Akwa/Ibom State, and the State towards the west side is Bayelsa State. Towards the south side, it is bordered by the Atlantic Ocean (RSADP, 2008). The dried highland part of Rivers State covers. The drier upland region of Rivers State embodies about 61% of the total land area, whereas the riverine parts with an alleviation range of 2-5m occupied about 39% (RSADP 2008). The population of the State stands at 5,198,716 based on the NPC (2006). Major food crops grown include yam, cassava, maize, and vegetables; cash crops grown include oil palm, rubber, coconut, banana, and plantain. Livestock reared in the State include poultry, pigs, goats, and fish. The poultry bird reared includes laying birds for eggs, broilers, cockerels, and turkeys.

Multistage sampling procedures were utilized. First, six Local Government Areas (LGAs) were selected using a simple random method; namely Oyigbo, Obio/Akpor, Emohua, Ikwere, Etche, and Eleme LGAs. Four communities in each LGA were selected using the simple random method, making twenty-four communities. Thirdly, five poultry egg farmers were selected using a simple random method from the chosen communities, which gave an aggregate of one hundred and twenty poultry egg farmers. Data were garnered by utilizing a questionnaire and interview schedule. Descriptive statistics and inferential such as ordinary least square OLS, net profit ratios, and gross margin were employed to analyze the data garnered.

Specification of Model:

$$\pi = TR - TC \tag{1}$$

Where;

π is the net profit
TR is the total revenue
TC is the total cost

$$GM = TR - TVC \tag{2}$$

Where;

GM is the gross margin
TR is the total revenue
TVC is the total variable cost

The OLS regression function model was utilized to examine the factors influencing profitability. The explicit form of the profitability model is specified thus:

$$\pi = \beta_0 + X_1\beta_1 + X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + X_5\beta_5 + X_6\beta_6 + \varepsilon \tag{3}$$

π = profit (₦)
X_1 = Total cost of renting pen (₦)
X_2 = Stock size (number of laying birds)
X_3 = Labour/salary cost (₦)
X_4 = Total cost of feed (₦)
X_5 = Total cost of drugs (₦)
X_6 = Total cost of transportation (₦)
ε = Error term
β_0 = Constant
β_1 - β_6 = Coefficients of variables

The theory behind Cost and Return and OLS Regression

The output level that maximizes profits may be ascertained using the cost-return relationship. By examining the point at which marginal revenue equals marginal cost (MR = MC), businesses aim to maximize their profits because producing more would result in lower earnings (Frank and Bernanke 2013). This connection can help businesses make decisions about production, resource allocation, and strategic planning to maximize productivity and profitability.

OLS regression assumes that one or more independent variables, X1, X2, …, X6, and the dependent variable, π, may be modeled (Koutsoyiannis 2003), as shown in equation (3). In this case, the error term is˚, the independent variable coefficients are β_1, …, and the intercept (constant) is β_0. To minimize the sum of squared residuals (differences between observed and predicted values), OLS looks for values of β_0, β_1 …, β_6. Moreover, observations are independent, and there is a linear connection between the independent and dependent variables (Koutsoyiannis 2003; Gujarati and Porter 2009). Therefore, the OLS regression model implies a linear connection between profitability and different factors for examining the profitability of chicken egg production.

3. Results and Discussion

The socioeconomic characteristics of the poultry egg farmers are shown in Table 1:

Table 1. Socioeconomic characteristics distribution of the poultry egg farmers

Variables	Frequency	Percentage
Age		
25 and below	4	3.3
26 – 35	21	17.5
36 – 45	35	29.2
46 – 55	42	35.0
56 and above	18	15.0
Mean	44.69	
Gender		
Male	76	60.8
Female	47	39.2
Marital Status		
Single	21	17.5
Married	99	82.5
Occupation		
Poultry as a primary occupation	46	38.3
Poultry as a secondary occupation	74	61.7
Stock size (number of laying birds)		
1000 and below	51	42.5
1001 – 2000	39	32.5
2001 – 3000	17	14.2
3001 – 4000	7	5.8
4001 – 5000	3	2.5
5001 and above	3	2.5
Mean	1635	
Annual Income (in Million naira)		
1 and below	31	25.8
1.1 – 5	80	66.7
5.1 – 10	5	4.2
10.1 and above	4	3.3
Mean	2681930.00	

Table 1 shows that 35.0% of the poultry egg farmers' age ranges from 46 – 55 years and about 29.2% range from 36 – 45 years, agrees Henri-Ukoha et al. (2011) found that age bracket of about 31 to 50 years active, objective and interested individuals in farming among small-scale farmers in Abia State Nigeria. While the mean age is 44.69 years, this agrees with Tibi and Adaigho (2015), who found 46 years among small-scale poultry farmers in Delta State, Nigeria. The implication of these findings about age implies that a more significant number of those participating in poultry egg production were within the middle age which was the workforce, strong enough to undertake vigorous and strenuous activities associated with poultry farming. About 60.8% of the respondents were males. This explains the age-long tradition confirming that men are breadwinners and must provide for their households. About 82.5% were married, which is in agreement with Tibi and Adaigho (2015), who discovered that 78.3% of small-scale poultry farmers in Delta State, Nigeria, were married. About 38.3% took poultry farming as their primary occupation, this agrees with Fakhrul et al. (1999) who found out that about 10% considered poultry production to be the primary occupation in the Gazipur district of Bangladesh. The majority (42.5%) of stock are less than 1000 laying birds with a mean of 1635, and this implies that most of the poultry egg farmers were small-scale poultry farmers. About 66.7% of

the egg poultry farmers have annual income ranges from ₦1,100,000.00 – to ₦5,000,000.00, this implies that the enterprise despite the high risk is still profitable.

Table 2. OLS Regression results of profitability of poultry egg farming

Variables	Coefficient	Standard error	t-values	Sig. levels
Constant	19111.250	28615.802	0.668	0.506
Cost of renting pen (₦)	0.253	0.196	1.293	0.199
Stock size (number of birds)	107.589	31.864	3.377	0.001***
Labour/salary cost (₦)	5.797	1.306	4.438	0.001***
Cost of feed (₦)	-0.221	0.056	-3.958	0.001***
Cost of drugs (₦)	-0.457	1.319	-0.346	0.730
Transportation cost (₦)	0.051	1.976	0.026	0.979

R = 0.821; R-squared = 0.674; Adjusted R-squared = 0.656; Standard Error = 172421.2469; Observation = 120; df = degree of freedom
Source: Field Survey 2018

From Table 2, the R-value of 0.821 signifies a good point of likelihood. The coefficient of the determinant factor of the relationship of variance in the dependent variable expounded by the explanatory variable, which is the R-squared; the value of 0.674 was obtained, which shows that independent variables explain 67.4% of the changeability of the dependent variable (profitability). This implies that 67.4% of the variation that occurred in the dependent variable has been elucidated and described by the explanatory variables, such as stock size (X_2), labour/salary cost (X_3), and cost of feed (X_4), and that the remaining 32.6% was as a result of the random variable. The findings show from Table 2 that out of the six variables analyzed, only three were statistically significant at 1%, affecting the profitability of the poultry farmers in their enterprise. Stock size (number of laying birds), labour/salary cost, and feed cost were statistically significant at 1%.

Profitability is positively impacted by a high statistical significance (p = 0.001) and a stock size (number of birds) coefficient of 107.589. This outcome is consistent with the findings of Oke (2024), who discovered that stock size is a significant factor influencing profitability. Larger chickens frequently result in lower expenses per unit and higher total sales. According to similar results from research conducted in Ghana by Wongnaa et al. (2023), increasing stock size maximizes resource utilization and boosts productivity.

The significantly significant labour/salary cost coefficient of 5.797 (p = 0.001) indicates that labour investment boosts profitability. This aligns with the findings of Oke (2024), who discovered a favorable correlation between labour costs and farm profitability in Nigerian poultry. The health and egg output of birds are often improved by skilled work. Kibunja and Musau (2024) also discovered that Kenyan farms that invested in trained workers saw increased production, confirming that labour costs and profit in chicken farming are positively correlated.

With a coefficient of -0.221, the feed cost harms profitability and is highly significant (p = 0.001), suggesting that greater feed costs translate into lower earnings. This is consistent with Jacob et al. (2014) and Oke (2024), who showed that feed costs were the most significant expense in chicken production and directly affected profitability. Similar patterns are reported by Ugochukwu and Uzoma (2019), who highlight the significance of cost-effective feed supply for preserving profit margins by describing how feed cost variations pose significant risks.

According to the model, the three main factors influencing profitability are feed cost, labour cost, and stock size. In line with findings from related research conducted throughout Nigeria and West Africa, high feed prices lower profitability while the stock size and labour expenses increase it. This implies that increasing operations and investing in competent workers while controlling feed costs are essential for raising chicken egg farming's profitability.

Table 3. ANOVA profitability in poultry egg farming

Model	Sum of squares	df	Mean square	F-value	Sig. level
Regression	6.932×10^{12}	6	1.155×10^{12}	38.860	0.001***
Residual	3.359×10^{12}	113	2.973×10^{10}		
Total	1.029×10^{13}	119			

df = degree of freedom
Source: Field Survey 2018

The F-ration in the Analysis of variance (ANOVA), as shown in Table 3, is whether the whole regression model is a worthy measure of the data. It shows from the Table that the explanatory variables were significantly statistically envisaged the dependent variable, $F (6,113) = 38.860$, $p = 0.000$, hence, the regression model is a worthy measure of the data. F-value 38.86 showed that all explanatory variables significantly affect the dependent variable (profit). Since the p-value of 0.000 was obtained, which is less than 0.01 (0.000 < 0.01) at the significance level, it means that, overall, the regression model statistically significantly predicts the outcome variables. This implies that poultry eggs are profitable as a business and source of livelihood.

Table 4. Estimation of cost and returns of poultry egg production

Variables	Mean quantity	Unit cost (₦)	Mean values (₦)	Percentage
Value of eggs	1260	850.00	1,071,000.00	
Variable cost				
Cost of drugs			19,784.80	2.7
Cost of feeding			642,361.46	86.2
Cost of labour			28,958.33	3.9
Cost of transportation			11,437.50	1.5
Total variable costs			702,542.09	
Cost on rent			42,500.00	5.7
Total fixed cost			42,500.00	
Total cost			745,042.09	100
Gross margin			**368,457.91**	
NFI			**325,957.91**	
ROI			**0.46**	
GMR			**0.49**	
NPR			**0.30**	

Note: NFI = net farm income; ROI = return on investment; GMR = gross margin returns; NPR = net profit ratio
Source: Field Survey 2018

Table 4 shows the cost return and profitability estimation of poultry egg farming. It shows that the poultry business is profitable, with a gross margin value of ₦368,457.91 and a net farm income of ₦325,957.91 per month. The total revenue from sales of eggs was ₦1,071,000.00. Feeding the poultry birds is the highest (86.2%) cost incurred by the farmer out of the overall costs. This agrees with Ashagidigbi et al. (2011), and Odimegwe et al. (2015) found that the feeding cost of the laying poultry was more than 70% of the overall cost incurred during the production of eggs in Osun State and Ogun State in Nigeria, respectively. The estimation of profitability ratio shows that at any time ₦1 is spent on poultry egg farming business, a farmer earns ₦0.49 as gross margin, a ₦0.46 net income as return on investment, and a gross revenue of ₦1.44 as return on capital employed on the business, with net profit ratio of ₦0.30 is definite as net profit for every single ₦1 exchange for egg at the farm gate. This finding agrees with Odimegwe et al (2015), who reported ₦0.30 net profit ratio and ₦1.43 return on capital employed in their study in Ogun State Nigeria, among poultry farmers.

4. Conclusion and Recommendations

It is established from the research that the poultry egg farming business in Rivers State was profitable even though the majority (60.8%) were male, with about 82.5% married and an average age of 44.69 years. About 38.3% took poultry farming as the primary source of livelihood, this shows that the majority were part-time or took poultry egg farming for leisure, despite this, the average stock size was 1635 with an average annual income of about ₦2,681,930.00. OLS regression analysis revealed that stock size (number of laying birds), labor/salary cost, and feed cost were statistically significant at 1%. The gross margin of about ₦33,390,950.00 and a net income of about ₦28,290,950.00 per month prove that the poultry enterprise is profitable. In addition, the profitability ratios reveal that whenever ₦1 is spent on the production of eggs, there is a prospective revenue of ₦0.30 net farm income. The study further revealed that the profit rations gotten were highly more significant than the rate of interest on agricultural credit or loan of about 8% as well as higher than the mean interest rate on commercial credit or loan of about 21%, which implies that the poultry egg farming is highly viable and profitable.

The study, therefore, recommends, among others, that if more people, particularly females, and youths, be encouraged to participate in poultry egg farming, this shall make eggs available for consumption and create employment opportunities. Also, if farmers were more proficient in utilizing financial resources, they would likely earn more revenue from every naira spent in producing poultry eggs. Furthermore, extension agents should aim to increase the farmers' knowledge of how to effectively utilize the financial resources in such a way as to enhance the farmers' profit. Furthermore, feed accounts for a sizeable portion of the overall production expenses in poultry farming. Policies that give feed subsidies or discounts for large purchases can assist farmers in lowering these costs. The government or agricultural cooperatives may make this possible through alliances with feed providers. It is essential to guarantee consistent demand and reasonable prices. Farmers may be shielded from market volatility by policies establishing reliable distribution networks, connecting them to regional and local markets, and enabling price floors for eggs. Creating farmers' groups or cooperatives may also give you more negotiating leverage.

Conflicts of Interest: The author has not declared any conflict.

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