ECONOMIC ANALYSIS OF POULTRY EGG PRODUCTION IN OBIO/AKPOR LOCAL GOVERNMENT AREA OF RIVERS STATE

BY

Owhonda, P. U, Ekine, D. I. & Okidim, I. A
Department of Agricultural and Applied Economics, Rivers State University.

Abstract

This study examined economic analysis of Poultry Egg production in Obio/Akpor Local Government Area of Rivers State. The specific objectives of the study were to describe the Socio-economic Characteristics of the poultry egg farmers, to determine cost, returns and profitability, to determine inputs –output relationship as well as constraints to poultry egg production in the Study Area. Simple random sample of 40 poultry egg farmers was used and data generate for analysis. Data were analyzed using descriptive statistics, Farm Budgetary Model and Multiple Regression Model. The result showed that majority (72.5%) of the poultry egg farmers were male. Majority of the farmers were between the ages brackets of 40-49years with the mean age of 41years. The study also showed that the mean flock size was 526 birds which implies that the farmers were mainly small scales producers. The analysis of cost and return showed that poultry egg production enterprise was profitable in the area; the Gross margin and Net farm income were ₦232594.28 and ₦174882.02 per 100 laying birds respectively. The return on investment was N0.29 and variable cost constitutes 90.5% of the total cost. The coefficient of multiple determination (R^2) which measures the amount of variation that is explained by the explanatory variables of flock size, feed, labour, utilities, medication and transportation used in the regression model was 90% the stochastic frontier production showed that flock size, utilities, transportation were significant at 5%. The major constraints encountered in Poultry Egg Production in order of their severity were disease outbreak, inadequate fund, high cost of feeds, poor quality of day old chicks, inefficient efficient extension services,. There is possibility of further increase in production and profits if policies meant to improve on farmC ers accessibility to funds, disease resistant birds, availability of drugs and vaccines and effective extension services.

1.0   INTRODUCTION

Nigeria and many other sub-Sahara African countries are battling with food insecurity challenges which have deepened due to rapid population growth. Poultry products (meat and egg) constitute a major source of animal protein in these countries. Poultry farming is one of the most lucrative livestock businesses to start up in Nigeria. This aspect of livestock farming presents investors and entrepreneur's opportunity to make profit or recoup from their investment within a short period of time. The poultry industry contributes significantly to economic growth of the nation through job creation, poverty reduction and ensuring food security.

Egg is an important source of animal protein to man. The usefulness of food for body building depends on the amount of protein it contains (Nmadu, Ogidan and Omolehin, 2014). Iyangbe and Orewa (2009), observed that the nutritional status of many Nigerians is characterised by low calorie and protein intake and Nigeria's greatest problem is that of inadequate animal protein in their diet. Lawal and Alfred (2018) reported that the animal protein in the diet of most households in Nigeria stood at below 8gm caput per day. This is contrary to the recommendation by Food and Agriculture Organisation (FAO) which recommended 65gm by an average person per day; out of which 36gm should be of animal sources (Nsikak-Abasi *et al* 2013).

Egg production has continued to record a steady rise since eggs are universally acceptable and are recognized by nutritionist as a major source nutritional value with less health hazard compared to other livestock. The demand for food especially animal protein has become quite critical in the country over the years due to rapid population growth. The production of food has not increased at the rate that can meet the increasing population. Central Bank of Nigeria (2004) reported that food production increases at the rate of more than 3.5% due to high rate of food demand supply had led to hunger, malnutrition, food insecurity, massive food importation, food smuggling and high rates of increases in food prices with their adverse effects on the economy.

Poultry farming compare to other livestock farming has the advantage of fast growth rate and efficiency in feed conversion (Ekine *et al*, 2015). Thus, poultry birds are good converters of feed into usable protein in meat and egg. The production cycle of poultry farming is short as a result capital invested is not tied up over a long period (Sanni and Ogundipe, 2005), Due to these advantages of poultry rearing, Nigeria has the highest poultry farms as well as highest participation of people in Africa but inspite of this, farmers run farms in very unsustainable profit margin due to lack of technical experience, poor production and management which has made many farmers quit the industry (Food and Agriculture Organisation, 2010).

Poultry egg farming has been troubled by lots of challenges which constitute barrier to the expansion of the industry. Some of the major problems confronting the poultry industry includes; high cost of feeds, outbreak of diseases, poor quality of day-old-chicks, inadequate extension service, and marketing problems (Suleiman, *et al* 2017).

In order to ameliorate the dwindling and not too impressive performance of agricultural sector, successive government in the past had come up with different programmes and policies. The ban on

importation of poultry products been one of such policies was targeted at increasing local production. These policies and programmes were unable to yield tangible result which is evident in the gap between domestic food supply and demand. The wide gap between poultry products supply and demand is worrisome and a real challenge to a government with a population of about 200million.

It is against this backdrop that this study is carried out in order to investigate the following objectives:

i. describe the socio-economic characteristics of poultry egg farmers

ii. examine cost, return and profit of poultry egg production in the study area.

iii. determine input-output relationship in poultry egg production in the study area.

iv. identify constraints militating against poultry egg production in the study area.

2.0 Methodology

2.1. Study Area

The study was conducted in Obio/Akpor Local Government Area of Rivers State, Nigeria. It is one of the 23 Local Government Areas of Rivers State with a population of 462,350 people at 2006 (NPC, 2006). Obio/Akpor is made up of 53 communities spread across 17 political wards with a total land mass of approximately 311.71km$^{2..}$ It shares boundaries with Emuoha, Ikwerre, Etche, Oyigbo, Eleme, Okirika and Port Harcourt Local Government Area (Ekine *et al* 2015).

The primary occupation of the people is farming. farming is at the level of subsistence level and crops like cassava, yam, cocoyam, maize, plantain, banana fluted pumpkin are produced in the study area. Poultry farming is the most popular livestock enterprise followed by goat rearing. Aquaculture is also practiced here.

2.2 Sampling Technique and sample size.

First, 10 poultry producing communities were purposively selected. These communities were selected base on the preponderance of poultry farms in the communities. Secondly, Four (4) farms were randomly selected from each of the 10 communities, in all a total of 40 poultry egg farmers in the study area were selected.

2.3 Method of Data Collection

Primary data were collected through the use of structured questionnaire administered to 40 poultry egg farmers.

2.4 Analytical technique

The socio economic characteristic of the farmers were analysed using descriptive statistics such as frequency, mean and simple percentages. Farm budgeting technique was used to analyse objective (ii), the objective (iii) was determined by multiple regression while objective (iv) was analysed with a 4-point likert scale.

2.4.1 Farm Budgeting Technique

The costs and returns associated with egg production were carried out to determine profitability of egg production in the study area. The farm budgeting model was specified as follows;

NFI $=$ TR – TVC + TFC ....(1)

Where   NFI is Net farm income (₦)

TR is Total Revenue (₦)

TVC is Total variable cost (₦)

TFC is Total Fixed cost (₦)

To determine the worth of each fixed assets the straight line method of depreciation was adopted. It assumed that the salvage value of the fixed assets used in the business was zero, below is a straight line model.

D $=$ $\dfrac{C- S}{N}$ ....(2)

Where   D $=$ Depreciated Amount

C $=$ Initial Cost of the asset

S $=$ Salvage value

N $=$ Useful lifespan

GM $=$ TR – TVC

Where, GM is Gross Margin.

Other profitability ratio that were used

RRI $=$ $\dfrac{TR}{TV} \times 100$ ....(3)

GR $=$ $\dfrac{TC}{TR}$

OR $=$ $\dfrac{TVC}{TR}$

Where   RRI is rate of return on investment

GR is Gross Ratio

OR is operating Ratio

2.4.2 Multiple Regression Model

Y $=$ $f(X_1, X_2, X_3, X_4, X_5, X_{6,} + e)$ .... (4)

Y $=$ $\beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + e$ .... (5)

Where Y = Output of eggs (crates)

X_1 = Flock size (number of birds)

X_2 = Feed (kg)

X_3 = Labour (man-day)

X_4 = Medication (N)

X_5 = Utilities

X_6 = Transportation

e = error term

The double log form (Cobb Douglas)

$$\text{Log } Y = \beta_o + \beta_1 logX_1 + \beta_2 logX_2 + \beta_3 logX_3 + \beta_4 logX_4 + \beta_5 logX_5 + \beta_6 logX_6 + e \ldots \ldots \text{(6)}$$

Where Y is output of egg (Crates)

X_1 - X_6 is independent variable (Explanatory)

β_1 - β_6 is Regression coefficient

β_o is Intercept

e   =   error term

2.4.3   4-point Likert Scale

The respondents were asked to rate the constraints to poultry egg farming on a 4-point numerical rating scale of very serious problem = 4, serious problem = 3, less serious problem = 2 and not a problem = 1.

3.0   Results and Discussion

3.1   Socio-Economic Characteristics of Respondent

Table 1. Socio –Economic Characteristics of the Respondents

S/N	Character	Frequency	Percentage	Mean
1	**Gender**			
	Male	29	72.5	
	Female	11	27.5	
	Total	**40**	**100**	
2	**Age (years)**			
	20-29	6	15	
	30-39	10	26	
	40-49	19	47.5	
	50-59	3	7.5	
	60 and Above	2	5	
	Total	**40**	**100**	41
3	**Marital Status**			
	Married	32	80	
	Single	6	15	
	Widow	2	5	
	Total	**40**	**100**	
4	**Educational Status**			
	Informal Education	2	5	
	Primary Level	3	7.5	
	Secondary Level	12	30	
	Tertiary Level	23	57.5	
	Total	**40**	**100**	
5	**Household Size**			
	1-4 persons	10	25	
	5-8 ,,	29	72.5	
	9-12 ,,	1	2.5	
	Total	40	100	6
6	**Years of Experience**			
	1-5 years	23	57.5	
	6-10 Years	12	30	
	11-15 years	5	12,5	

	Total	**40**	**100**	6
7	**Flock Size**			
	1-500	21	52.5	
	501-1000	17	42.5	
	1001-2000	2	5	
	2001 and Above	-	-	
	Total	**40**	**100**	526

Source: Field Survey, 2019.

The descriptive examination of socioeconomic characteristics of poultry egg farmers in Table1; the study showed 72.5% of the respondents were male. This implies that males dominate in poultry egg production. This is expected given the drudgery nature of the enterprise which few female may tolerate. The implication of male dominance implies that productivity is expected to be higher because males have tendency to be more labour efficient. This finding is consistent with several research that reported male dominance in poultry production such as (Nmadu *et al*, 2014; Akerele *et al* 2018.

The Age

The result showed that 47.5% of the respondents fall within the age group of 40-49years with the mean age of 41years. This finding indicates that the poultry egg farmers were relatively young and still in their active productive years. Poultry egg producers falls within the labour force of the economy and have the propensity for increase poultry production if given the right incentives.

Marital Status

The Marital Status of the respondents were showed 80% married while 15% and 3% were single and widower respectively. This finding is consistent with studies of (Nmadu *et al* 2018) who reported that married persons dominate the business of poultry egg production with 92% and single with 6% egg production.

Educational Status

The result also showed 57.5% of the poultry farmers had tertiary education, 5% had no formal education, while 30% and 7.5% had secondary and primary level of education respectively. This indicates high level of literacy among poultry egg farmers in the study area. This implies that the high level of literate farmers will likely adopt new innovation to increase their output.

Years of Experience

The result showed that respondents in the years of experience ranging from 1-5years was 57.5%, while 6-10years and 11-15years range in years of experience were 30% and 12.5% respectively.

The mean years of experience was approximately 6years. This suggest that majority of the farmers were fairly new entrants into the poultry egg farming. It is expected that productivity increase with years of experience. Farmers and workers generally master the techniques of production with minimal mistakes. Experienced farmers are likely to make better decision to enhance productivity.

Household Size.

The findings of this study showed that majority of the respondents had a household size ranging between 5-8 persons which represents 72.5% . The mean household size was 6 persons. The large household size

enhances family labour availability. Poultry farming is labour, intensive, the large household size will help in reducing labour constraints (Suleiman et al 2017).

Flock Size.

The result of the finding shows that 52.5% of the farmers had less than 500 birds while 42.5% had 501-1000 birds. This implies that majority of the poultry egg farmers in the area were small scale farmers having a flock size of equal or less than 1000 birds.

This confirm the assertion by Lawal and Alfred (2018), that poultry production is mostly at small and medium scale producer who on the aggregate raise the bulk of the birds for eggs and meat. The output of a poultry farm is partly dependent on the number of birds in the farm.

3.2 Analysis of Cost and Returns

Table 2. Costs and Return Structure per 100 laying birds

Variables cost	Value (₦)	%	Return	Value (₦)	%
Cost of day-old chicks	24822.47	4.10	Sales of Eggs	663499.42	85.01
Cost of Feeds	436444.94	72.07	Sales of spent layers	110378.70	14.14
Cost of Labour	49910.11	8.24	Sales of Manure and Empty bags	6577.98	0.85
Cost of Medication	21580.22	3.56	**Total Revenue(TR)**	**780455.4**	**100**
Cost of Utilities	6027.87	1.0			
Wood Shaving	9075.51	1.50			
Total Variable Cost (TVC)	547861.12	90.5			
Cost of Depreciation	57712.20	9.5			
Total Cost (TC)	**605573.32**	**100**			
Gross Margin (TR-TVC)	232594.28				
Net Farm Invest. (NFI)	174882.08				
Return on Invest. $(\frac{NFI}{TC})$	0.29				
Gross Margin Returns $\frac{GM}{TC})$	0.38				
Net Profit ratio $(\frac{NFI}{TR})$	0.22				
Return on Capital Employed $(\frac{TR}{TC})$	1.29				
Gross Ratio	0.77				

Source: Field Survey, 2019.

The analysis of costs showed that variable costs components were the most important cost in poultry egg production in the study area, accounting for 90.5% of the total cost. this agrees with report of Nmadu *et al* (2014) that total variable cost constitutes 92.05% of total cost of poultry egg production in Abuja, Nigeria. It was also showed that feed cost constitute 72.07% of the total cost of production while the cost of day-old-chick and labour accounted for 4.10% and 8.24% respectively, of the total cost of production.

The cost analysis showed a total variable cost of N547861.12 per 100 birds. The total cost of production comprises of the total variable cost and depreciation charges on fixed assets. The total cost of production was N605,573.32 per 100 birds.

The returns realized from poultry egg enterprises were from the sales of eggs, spent layers (Culled birds), organic manure and empty bags. The amount from sales of eggs was N663,499.49 per 100 birds and it constitute 85.01% of the total returns. The returns from sales of spent layers or culled birds and organic manure were N110, 378.70 and N6577.98 respectively per 100 birds in a production cycle.

The net farm income was N174,882.08 per 100 birds which implies that poultry egg farming is profitable in the study area. This finding is in line with Hassan et al (2016) on Economic analysis of poultry enterprises in Kaduna state, Nigeria. The analysis also showed a gross margin of N232594.28 and the capital return on investment was N1.29. the return on investment implies that for every naira invested in the enterprise a return of N0.29 was earned as profit. This further affirmed that poultry egg farming was profitable.

The gross ratio which was 0.79 per 100 birds implies that total farm cost was about 77% of the total revenue.

Table 3. Regression analysis

Variable	Coefficient	t-Statistic	Prob.
C	-1168.628	-0.316184	0.7540
X1	-63.14911	-1.334443	0.1918
X2	0.261812	0.400874	0.6913
X3	35.27387	4.393922	0.0001
X4	-0.003037	-0.555425	0.5826
X5	0.002397	0.080841	0.9361
X6	0.189961	1.238160	0.2250
R-squared			0.999496
Adjusted R-squared			0.999399
F-statistic			10254.00
Prob(F-statistic)			0.000000
Durbin-Watson stat			1.891589

Source: *EViews computation*

Table 3: shows the result of multiple linear regression model used to analyse the effect of explanatory variables on the output of egg. The linear form has the value of F-Statistics (10254.0) and Coefficient of multiple determination R^2 (0.999) which implies that 99.9% of the dependent variable is being explained by the explanatory variables X_1-X_6. The Linear form had by X_1-X_4 (flock size and medication) has negative relationship with the dependent variable. This is contrary to the apriori expectation.

Table 4. Log-linear Regression Estimate

Dependent Variable: Egg Production (lnY)

Variable	Coefficient	t-Statistic	Prob.
C	2.586010	1.393199	0.1735
LOG(X1)	0.367252	0.251464	0.8031
LOG(X2)	-0.196931	-0.766956	0.4489
LOG(X3)	0.813221	0.685369	0.4982
LOG(X4)	-0.054980	-0.419641	0.6776
LOG(X5)	0.001415	0.008335	0.9934
LOG(X6)	0.081232	0.454039	0.6530
R-squared			0.901899
Adjusted R-squared			0.882912
F-statistic			47.50023
Prob(F-statistic)			0.000000
Durbin-Watson stat			2.032232

Source: *EViews computation*

Table 4, shows the relationship between poultry output and amount of inputs used in the production process. Inputs considered to be influencing egg output were flock size, feed, labour, medication, utilities, transport, and rate of their influence was measured by the regression coefficient. Flock size (X_1) and medication were (X_2) were not significant at 5% level of significant while feed, labour and transportation were significant. Thus implies that increasing spending in feed, labour and transport would bring about significant increase in revenue realization when all other factors were held constant. The R^2 value of 0.901899 implies that 90.2% changes in egg production output was explained by variation in the explanatory variables.

The output - input relationship is as expressed below:

Log Y $= 2.586 + 0.3672\log X_1 - 0.1969\log X_2 + 0.8132\log X_3 - 0.05498\log X_4 + 0.00142\log X_5 + 0.08123\log X_6$

3.3 Constraints to Poultry Egg Production

Table 5. Constraints to Poultry Egg production of the Respondents

Constraints	4 Very Serious	3 Serious	2 Less Serious	1 Not a Problem	Total	Mean	Rank
High Cost of Feeds	20	16	1	1	38	3.5	3rd
Inadequate Fund	26	11	1	-	38	3.6	2nd
Poor Quality of Day Old Chicks	-	20	18	-	38	2.5	4th
Theft	1	8	26	3	38	2.2	6th
Diseases Outbreak	30	7	-	1	38	3.7	1st
Inefficient Extension Services	3	13	18	4	38	2.4	5th
Marketing of Products	-	18	12	-	38	2.1	7th
Scarcity of Equipment	-	2	10	26	38	1.4	8th

Source: Field Survey, 2019.

Table 5, presents the constraints to egg production in the ranking order of severity of the constraint or challenges. The findings showed that disease outbreak, inadequate fund, and high cost of feeds were the

three major constraints to poultry egg farming in the area. It shows that disease outbreak is ranked the highest challenge with a mean score of 3.7 on the 4-point likert scales.

Diseases outbreak was closely followed by inadequate fund with mean score of 3.6 on the likert scale and ranked 2nd in ranking of problem to poultry egg farming high cost of feeds was identified as the least of the problems were scarcity of equipment and marketing of products.

Conclusion and Recommendation

Conclusion

Based on the findings, it was revealed that commercial poultry egg farming was profitable in the study area with a gross margin of ₦ 232594.28 and a net farm income of ₦174882.08 per 100 laying birds per production cycle. The return on investment was ₦0.29, which implies that for every naira invested in the business a return of 29 kobo was earned as profit. The findings revealed that there exist a significant relationship between inputs and output in poultry egg production in the study area.

The study also revealed that the three major cost components of poultry egg production in the study area were cost of feed, labour and day-old chick. Cost of feed constitutes 72.07 percent of total cost of production, while cost of labour and day–old chick constitutes 8.24 percent and 4.10 percent respectively. Sales made from egg constituted about 85% of total revenue from the enterprise.

The mean age of the poultry egg farmers in the study area was 41 years. About 84 percent of them were married and majority (60%) of the farmers attained tertiary level of education.

The major constraints to poultry egg production in the study area were disease outbreak, inadequate fund, high cost of feed, inefficient extension services, poor quality of day old chicks, etc.

Recommendations

From the findings, the following recommendations are made;

i. Improved veterinary services through effective vaccination programmes in commercial poultry production should be encouraged to minimize mortality and losses from outbreak of diseases.

ii. Poultry Farmers should be encouraged to form co-operative societies or join existing ones to enable them secure loans from commercial banks and other financial institutions. Membership of co-operative societies will also enable them to benefit from economy of scale through bulk purchases of inputs.

iii. To reduce the high cost of production, the E-wallet programme of the Federal Ministry of Agriculture, which supplies feeds, drugs, day-old chicks to farmers at subsidized rate should be intensified to include more beneficiaries.

iv.   Modern Feed Mills which make use of local raw materials should be established so as to provide feeds to farmers at reduce rate.

v.   Improved extension services to enhance the technical knowledge of poultry farmers. Thus, the State Government should rejig the Agricultural Development Programme.

vi.   Poultry Egg Farmers should be encouraged to increase their scale (Flock size) of production for increased profitability.

References

Adeyemo A. A. & Onikoyi, M. P. (2012), Prospect and Challenges of large scale commercial poultry production in Nigeria. *Mewell Agricultural Journal.* 7(6):388-393.

Akerele, E. O. Ologbon, O.A.C & Akintayo, B. D. (2018). Resources Use Efficiency in small and medium Scale Poultry egg farming in Ogun State. *ACTA Scientific Agriculture.* 2(11).

Central Bank of Nigeria (2004) Annual report and Statement of account. *CBN Production*, Abuja Nigeria.

Ekine, D.I., Ndubueze, Ogaraku, M.E. & Oputa, E.N. (2015). Assessment of Broiler Production in Obio/Akpor Local Government Area, Rivers State. Nigerian *Journal of Agricultural Economics (NJAE)* Vol. 5(1), 2015 page 81-91. http://ageconsearch.umn.edu.

Food and Agricultural Organisation (FAO) (2010), Chicken genetic resources used in smallholder production system and Opportunities for their development. *FAO Smaller holder Poultry Production paper* No.5 FAO, Rome Retrieved from: www.fao.org/docrep/013al675e/al675eou pdf.

Food and Agricultural Organisation FAO (2005). *Livestock sector brief*:

Hassan, A. A. Ahmadu, H. J. Oseni, Y. Dawang, N. C., Ralman, S. A. & Abdusalam (2016). Economic Analysis of Poultry egg enterprise in Kaduna State, Nigeria. *Journal of Animal Production, Re*search. 28 (1):196-204. http://www.Statista.Com/Statistics/263971/top-10-Countries worldwide egg production

Iyanbe, C. O & Orewa, S. I (2009).Determinant of daily protein intake among rural and low- income urban households in Nigeria, American-*Eurasian Journal of Scientific Research.* 4(4):290-301.

Lawal, H & Alfred, B (2018), Resource use Efficiency of small scale poultry Egg Production in Yola North and Yola South Local Government Areas of Adamawa State, Nigeria. *Bayero Journal of Pure and Applied Science.* 11(1): 86-90.

National Population Commission (2006), National Census.

Nnamdu, J. N. Ogidan, I.O. and Omolehin, R. A. (2014), Profitability and Resource Use Efficiency of Poultry egg production in Abuja, Nigeria: *Kasetsart Journal of Social Sciences* 35: 134-146.

Nsikak-Abasi, A. E. Nse-Abasi, N. E, Edem, E.A.O. & Esther, U.E (2013). Resources use Efficiency in small- holder poultry egg production in Rural Nigeria: *Global journal of Biology, Agriculture and Health Sciences* 2(3):146-149.

Suleiman, R. Mahmud, A. M. Oladimeji, Y.U, Olanrewaju, T. O & Ojeley, O.A. (2017), Effect of Socio Economic Characteristics on the profitability of poultry production among poultry farmers in Kaduna State. Preceding of Annual Conference of the Agricultural Extension Society of Nigeria 23rd-26th April 2017, University of Port Harcourt, Rivers State Nigeria.

Tijjani, H., Tijani, B.A., Tijjani, A. N & Sadiq, M.A (2012) Economic Analysis of Poultry egg production in Maiduguri and Environs of Borno State, Nigeria scholarly *Journal of Agricultural science* 2(12), 319-324.