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## ECONOMIC ANALYSIS OF POULTRY EGG ENTERPRISE IN KADUNA STATE, NIGERIA

<sup>1</sup>Hassan, A. A., <sup>2</sup>Ahmadu, H. J., <sup>1</sup>Oseni, Y., <sup>3</sup>Dawang, N. C.; <sup>4</sup>Rahman, S. A. and  
<sup>1</sup>AbdulSalam, Z.

<sup>1</sup> *Department of Agricultural Economics and Rural Sociology, Ahmadu Bello University, Zaria.*

<sup>2</sup> *National Agricultural Extension Research and Liaison Services (NAERLS), Ahmadu Bello University, Zaria.*

<sup>3</sup> *National Animal Production Institute (NAPRI), Ahmadu Bello University, Zaria*

<sup>4</sup> *Department of Agricultural Economics and Extension, Federal University of Gashua, Gashua, Yobe State.*

*Corresponding Author's Email Address and Mobile No.: [abuifadhilah@gmail.com](mailto:abuifadhilah@gmail.com);  
+234 803 320 6667*

### ABSTRACT

This study determined the input-output relationship and cost and return in egg production in Kaduna state. Primary data were collected from 225 egg producers drawn from the study area by a simple random sampling technique. Data was analysed by the use of descriptive statistics, multiple regression, cost and return analysis. The total cost of production was N206, 610. 44 per 100 layers and net farm income was N208, 079. 75. The return per Naira invested was N1.01. Feed cost accounted for 69% of the total cost of egg production. The regression result revealed that all the parameters estimated except labour (-0.742) carry positive sign. This implied that flock size (1.287), feed (0.911) and medication cost (0.305) have direct relationship with the farmer's egg output. The t-ratios showed that flock size, and feed were significant at 5% and 10% level of significance respectively. To improve profitability, better management practices should be implemented to minimize incidence of disease outbreaks; feed should be formulated locally to reduce feed cost.

**Keywords:** profitability, feed and layer

### INTRODUCTION

The term poultry refers to local and exotic fowls which are raised and fattened for their products, this include eggs, meat and in some cases feathers. Birds that are raised as poultry include fowls, turkey, ducks and geese, among others. Poultry production consists of two parts: poultry egg production and poultry meat production. In the case of poultry meat production, the production results from body growth, although feed still has dual proportion of the body maintenance and growth. This is because birds have to feed on proper diet to aid egg production. The industry under either egg or meat production has continued to be major livestock industry in Nigeria, substantial number of small, medium, and large scale poultry farms are located in this industry. Egg production, has continued to record a steady rise since eggs are universally acceptable and are recognised by doctors as major source of nutritional value with less health hazard compared to other livestock Adewumi (2008).

Poultry in Nigeria can be broadly divided into two systems: traditional rural backyard and commercial farming system. Commercial poultry farming system started in the early 1960s and

government's poultry development policy enhanced commercial poultry production which resulted in a spectacular increase in the number of poultry farms. For ease of analysis of the development of poultry egg production in Nigeria, the periods are divided into three. These are 1978 - 1985, which is regarded as the pre-structural adjustment programme (SAP) era; 1986-1993, SAP era and 1994-2001 era of guided deregulation. In the period prior to SAP (1978-1985), the performance of the poultry sub- sector of livestock sector in terms of egg output revealed that the average egg production within the period was 12.49%. In term of the volume of egg produced, there was a decrease in the internal supply of egg in Nigeria between 1986 and 1993. The year 1986 - 1993 is regarded as the SAP period and from this period (SAP) the poultry sector in Nigeria has witnessed a number of changes as a result of different types of agricultural policies by the Government (Hassan, 2014). Despite the foregoing, scavenging poultry farming still dominates the total poultry production enterprise in Nigeria Tijjani *et al.* (2012).

Nigeria is a large Poultry egg producer recording an average annual growth rate of 4% between 2000 and 2012 when output of egg reached 640,000 tonnes. However, the rate of expansion has slowed to around 2.5% since 2008, reflecting a large increase in input costs and their impact on profitability (Food and Agriculture Organisation (FAO). 2012).

The Nigerian poultry sub-sector has a great potential for wide range of reasons. Poultry farming has considerable potentiality for providing income opportunities, reducing malnutrition, generating employment opportunity and alleviating poverty especially for small farmers in Nigeria. Small farmers can start poultry farm at their homestead area at low cost compared to other livestock farming. In addition, poultry farming also provides opportunities for other industries like feed mills, hatcheries, veterinary drugs, feed ingredients market and as a market outlet for maize and soybeans farmers.

Within the past few years, poultry egg production has increased significantly, the growth rates of poultry egg production has increased but not impressive. The output level still remains low compared to the input committed in production (Ajibefun and Daramola, 2000) and the poultry products are grossly inadequate because the supply is lower than demand. A short fall in egg production in Nigeria has been as a result of grossly high demand for poultry egg and a dwindling supply of the product (Ojo, Jirgi and Ajayi, 2012).

Poultry is highly dependent on grains and other feed ingredients normally utilized by man. They therefore compete directly with man for feeds but grain production in Nigeria is far less than demand. A change in output of maize and its price are immediately reflected in change in poultry feed price and prices of poultry products and consequently its profitability (Sani, 2015). Poultry feed being the single item with the highest cost in poultry production, the increase in its price would affect the total profit of the farmers because the increase in poultry products price could not be commensurate with feed price increase especially due to the dwindling purchasing power of the populace Hassan (2014).

The objective of the study therefore, was to:

- i) Determine the profitability of poultry egg enterprise in the study area; and
- ii) Determine the input/ output relationship in the enterprise.

## **MATERIALS AND METHODS**

This study covered a one-year period from January - December 2013. Primary data were collected from 225 poultry egg farms in the 23 Local Government Areas of Kaduna State. Purposive sampling technique was adopted for the study as only poultry farmers that kept poultry egg breeds were selected for the study. Data were collected with the aid of a structured questionnaire.

### **Analytical technique:**

#### **Budgeting technique**

Budgeting technique was used to achieve the objective I of this study. The indicators used include Net Farm Income (NFI) and profitability index.

NFI is represented by:

$$NFI = \sum_{i=1}^n P_i Y_i - \sum_{j=1}^m P_{xj} X_j - \sum_{k=1}^k F_k \dots\dots\dots (1)$$

Where:

NFI = Net Farm Income (per 100 birds)

$Y_i$  = Output (in Crates per 100 birds)

$P_i$  = Unit price of outputs (₦/ Crate)

$X_j$  = Quantity of variable input per 100 birds (where  $j = 1, 2, 3, \dots, m$ )

$P_{xi}$  = price/unit of variable input (₦)

$F_k$  = Cost of fixed inputs (where  $K = 1, 2, 3 \dots k$  fixed inputs)

$\sum$  = Summation sign.

Profitability index (rate of return on an investment) was employed to explain the extent to which a Naira invested into the business will contribute to total value of outputs. The rate of return of investment into an enterprise is the ratio of net income to total cost of egg output.

## **PRODUCTION FUNCTION ANALYSIS**

### **Function specification**

A Cobb-Douglas function was chosen as the functional form of the production function. The reason for choosing this type of production function is that it is linear in its logarithmic form, and therefore easy to estimate by using Ordinary Least Squares estimation technique (OLS). At the same time, this function type has been widely used for production function analysis by many authors. The function has the following form.

$$Y = aX_1\beta_1 + X_2\beta_2 + X_3\beta_3 + X_4\beta_4 + e \dots\dots\dots(2)$$

Where:

Y is poultry egg output in crates

X<sub>1</sub> is labour (man-hours)

X<sub>2</sub> is flock size (number of birds)

X<sub>3</sub> is amount of feed (Kg)

X<sub>4</sub> is medication cost in Naira

And a, β<sub>1</sub>, ..., β<sub>4</sub> are parameters to be estimated and e is an error term

## RESULTS AND DISCUSSION

### Profitability of Commercial Poultry Egg Production in Kaduna state, Nigeria

The returns realized from the commercial poultry egg production per 100 layers in the study area were from the sale of eggs, sale of spent layers and poultry droppings as organic manure for utilization on crop farms. The cost of feeds constituted a larger proportion (68.68%) of the total cost of commercial poultry egg production (per 100 layers) and this is in tandem with Hassan, (2002); Hassan, Nwanta and Mohammed (2005) and Yusuf and Malomo (2007) who reported that feeds constituted the highest percentage (80%, 73% and 78.09% respectively) of total cost of poultry egg production in their studies on profitability of poultry enterprise in Nigeria. Cost of flocks and cost of labour accounted for 15.03 % and 8.66% respectively of the total cost incurred in commercial poultry egg production (per 100 layers) in the study area. This indicates that the three most important cost components of commercial poultry egg production in the study area were cost of feeds, cost of flocks and cost of labour with the cost of feeds accounting for a larger proportion (68.68%) of the total cost of poultry egg production. Thus the commercial poultry egg farmers can increase their profitability level by exploring the avenue of reducing the costs of feeds. This is in line with the findings of Adewumi (2008) who obtained similar results in a study on the economics of poultry production in Egba division of Ogun State. The total cost of production was ₦206, 610.44 per 100 layer birds per production cycle. In terms of the returns realized from the commercial poultry egg production in the study area, the amount realized from sale of eggs was ₦ 364,857.00, ₦ 42,017.13 from sale of spent layers and ₦ 7,8 16.05 from sale of poultry manure giving a total revenue of ₦414,690.18 per 100 layer birds per production cycle. From the costs and returns, the net farm income was estimated to be ₦208, 079.75 per 100 layer birds per production cycle which implies that commercial poultry egg production in the study area was profitable. This finding agrees with Afolabi, Folawole, Phillip and Fakoya (2013) whose study revealed that the poultry egg business is a profitable enterprise, with a gross margin of ₦ 211,828.01 and a net farm income of ₦201,185.72 per 100 laying birds in a given production cycle. Also, Ala and Boniface (2009) who affirmed that poultry egg production is profitable as farmers made an average net farm income of about ₦ 194, 698.39 per production season from poultry egg enterprises in Sokoto Metropolis of Sokoto State.

From the estimated net farm income and total cost of production, the returns to Naira invested in commercial poultry egg production in the study area was estimated to be 1.01 and this implies that that for every one naira invested in commercial poultry egg production, a return of ₦1.01

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was earned as profit and this further indicated that commercial poultry egg production was profitable in the study area. The implication is that there is existence of a constant return to scale meaning that for every one Naira invested one Naira is obtained as a profit. This result corroborates the finding of Haruna, Jibril, Kalla, and Suleiman, (2007) who reported that the returns to naira invested in poultry egg production in Jos North Local Government Area, Plateau State, Nigeria was 1.35 indicating that the poultry egg production was profitable. Hence, with the demand for poultry egg exceeding supply in the study area, investment in poultry egg production is a viable agribusiness enterprise for income generation, job creation especially for the teeming youths in the study area, poverty alleviation and enhancement of food security in line with the objectives of the poultry value chain transformation action plan of the on-going agricultural transformation agenda of Nigeria which seeks to increase the annual egg yield from 553,000 MT in 2011 to 1,000,000 MT by 2015, Federal Ministry of Agriculture and Rural Development (FMARD), 2012.

There is a significant difference between revenue from egg output and poultry egg production costs at 5% level of significance. Calculated Z value was 15.98 and exceeds the critical value (Z- critical two tail) of 1.96 at 5% LOS. This result of analysis indicates that poultry egg production in Kaduna state, Nigeria is profitable.

**Table 1: Average costs and returns of commercial poultry egg production per 100 layers.**

<b>Items</b>	<b>Amount(₦)</b>	<b>Percentage</b>
<b>A. Variable cost</b>		
Cost of feeds	141,800.03	68.68
Cost of labour	17,895.03	8.66
Cost of flock	31,045.02	15.03
Cost of medication	7,937.60	3.84
Cost of water	7,01.18	0.34
Cost of electricity	5,025.15	2.43
Cost of litter materials	1,017.00	0.49
Total variable costs(TVC)	205,421.01	99.42
<b>B. Fixed cost</b>		
Depreciation cost on:		
Building/ poultry house	465.60	0.23
Feeders and Drinkers	201.61	0.10
Battery cages	417.74	0.20
Others (weighing scale, wheel barrow, and laying nests)	104.48	0.05
Total fixed costs(TFC)	1189.43	0.58
Total cost(TC)= TVC + TFC	206,610.44	100.00
<b>C. Revenue</b>		
Sales of eggs	364,857.00	
Sales of spent layers	42,017.13	
Sales of poultry manure	7816.05	
Total revenue(TR)	414,690.18	
<b>D. Net farm income</b>		
NFI= TR - TC	208,079.75	
Returns to Naira invested(NFI/TC)	1.01	

**Table 2: Z test result of profitability of commercial poultry egg production in Kaduna state, Nigeria**

Variable	Average revenue	Average cost
Mean	208,079.75	206610.44
Known Variance	922,539.88	673,362.11
Observations	225.00	225.00
Hypothesized Mean Difference	0.00	
Z	15.98	
P(Z<=z) one-tail	0.00	
z Critical one-tail	1.64	
P(Z<=z) two-tail	0.00	
z Critical two-tail	1.96*	

\*P&lt;0.05

**Results of Cobb-Douglas regression analysis between inputs and output**

To determine whether there is significant relationship between the inputs and output of commercial poultry egg production in the study area a hypothesis was tested using the result of Cobb-Douglas regression result between the inputs and output of commercial poultry production presented in Table 3. Number of egg crates obtained by the producers was regressed against variables such as labour, flock size, feed and medication cost.

The result in Table 3 revealed that all the parameters estimated except labour ( $X_1$ ) carry positive sign. This implied that flock size ( $X_2$ ), feed ( $X_3$ ) and medication cost ( $X_4$ ) have direct relationship with the farmer's egg output in the study area. The t-ratios showed that flock size, and feed were significant at 5% and 10% level of significance respectively. The t-ratio for medication cost was not significant. Labour had a negative estimated coefficient but is significant at 5% level of significance.

The F-value, 51.01 is significant at 1% level of significance and implied that the explanatory variables taken together have a significant effect on the dependent variable (Y), egg output.  $R^2$  value of 0.89 implies that 89% of the variation in the egg output (dependent variable, Y) has been explained by the independent variables such as labour, ( $X_1$ ), flock size ( $X_2$ ), feed ( $X_3$ ) and medication cost ( $X_4$ ) and that the remaining 11% was as a result of random variable or error term e.

The result indicates that the estimated coefficient for labour is – 0.742 which is negatively signed but significant at 5% level of significance. This agrees with the *a priori* expectation. The negative coefficient showed over utilization of labour input in poultry egg production.

This result agrees with the findings in a study by Afolabi, Adegbite, Ashaolu and Akinbode (2013), in their study of profitability and resource-use efficiency in poultry egg farming in Ogun state, Nigeria found out that labour input has a negative signed coefficient of elasticity of production of -0.726 and these shows over utilization of labour input.

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The coefficient of flock size was 1.287 and is significant at 10% level of significance. The positive coefficient is the elasticity of production and it shows that there is a direct relationship between flock size and egg output in the study area. It shows that a unit increase in flock size would bring forth a corresponding 1.287 increase in poultry egg output. This finding is in line with those by Ajibefun and Daramola (2000); Subahash, Joynal and Fakhrol Islam (1999); and Tijjani, Tijani, Tijjani, and Sadiq (2012) that the larger the flock sizes of a poultry farm, the higher the number of egg output and income the producers generate in their poultry egg production.

Poultry feed input has a coefficient of 0.911 which is significant at 1% level of significance. This agrees with the *a priori* expectation. This implies that a unit increase in feed intake by the birds would result in a 0.911 increase in the egg output. The estimated coefficient of medication cost is 0.305 and was not significant; it however indicates that a unit increase in medication cost would result in an increase in egg output by 0.305 units. Studies by Helfand, (2003); Effiong (2005); and Effiong and Umo (2011) revealed that medication cost is the least proportion of the operating cost in poultry egg production.

The foregoing analysis implies that there is a significant relationship between the inputs and the output of commercial poultry egg production in the study area and hence, the null hypothesis which stated that there is no significant relationship between the inputs and output of commercial poultry production in the study area is rejected and the alternative is accepted.

**Table 3: Cobb- Douglas regression result for input/output relationship in commercial egg enterprise in Kaduna state, Nigeria.**

Variables	Estimated parameters	Estimated coefficients	Standard errors	T-values
Constant		4.567	2.101	2.174
Labour	X <sub>1</sub>	-0.742**	0.355	2.090
Flock size	X <sub>2</sub>	1.287***	0.756	-1.702
Feeds	X <sub>3</sub>	0.911*	0.223	4.085
Medication	X <sub>4</sub>	0.305	0.412	0.740

Diagnostic statistics:

R<sup>2</sup> = 0.89

Adjusted R<sup>2</sup> = 0.83

F-value = 51.01

n = 225

\*P<0.10 \*\*P<0.05 \*\*\*P<0.01

## CONCLUSION

Based on the findings from the study, it can be concluded that there exist a significant relationship between inputs and output in commercial poultry egg enterprise and also it is a profitable venture in the study area stemming from the high profit margin of commercial poultry egg production in the study area. With the growing demand for poultry egg in the study area, investment in poultry egg production is a viable agribusiness enterprise for income generation, job creation especially, poverty alleviation and enhancement of food security in line with the poultry value chain transformation action plan of the on-going agricultural transformation agenda of Nigeria.

## RECOMMENDATIONS

In the light of the findings of the study, the following recommendations have been put forward:

- i.) Adequate measures aimed at reducing the cost of commercial poultry egg production through research in the study area especially the cost of feeds which constituted the largest proportion of the total cost of commercial poultry egg production will help in increasing the profit outlay of commercial poultry egg production.
- ii.) Poultry egg production should be integrated as a vital component in government programs geared towards empowerment especially for the teeming unemployed youths in Nigeria due to its profitability.

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