

*Full Length Research Paper*

## Profitability and resource-use efficiency in poultry egg farming in Ogun State, Nigeria

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Profit maximization which is one of the common objectives of business enterprises is grossly dependent on how best productive resources are harnessed. In the light of this, this study was carried out to determine the profitability and resource use efficiency of poultry egg farmers in Ogun State, Nigeria. Primary data were obtained with the aid of structured questionnaire from a cross section survey of 120 farmers drawn through multi-stage sampling procedure. Descriptive statistics, cost and returns analysis, and Cobb-Douglas regression model were used to analyze data obtained. The results of the analysis showed that majority (90%) of the poultry egg farmers are males with 77.5% of them married. The average age and mean years of experience were 43 and 9 years respectively with majority of them having formal education. The study revealed that the poultry egg production enterprise is profitable in the study area as indicated by the gross margin of ₦2,118,280.1 and a net income of ₦2,011,857.16 per one thousand birds per production cycle. The profitability ratios further reveals that for every ₦1 invested in the enterprise, a farmer earns ₦ 0.45 gross margin and ₦0.43 net income which are higher than the commercial interest rate of 21%. The return to scale estimate of 0.99 revealed that poultry enterprise in the study area are in the stage II of the production surface. The study further revealed that most productive resources excluding the flock size maintained by the poultry egg farmers are being over utilized. The study recommended among others, directional extension services aimed at raising technical knowledge of poultry farmers aimed at effective allocation of productive resources is necessary in order to improve profitability.

**Key words:** Resource-use efficiency, cost and returns, profitability ratios.

### INTRODUCTION

The Agricultural sector in Nigeria has remained the largest contributor to the Gross Domestic Product of the nation's economy. For the past two decades it has contributed an average of 39% of the country's GDP and employing nearly 60% of its workforce. Over 80% of the country's population living in the rural areas is directly or

indirectly dependent on agriculture for its livelihood (NBS, 2005). Livestock sector plays a crucial role in rural economy and livelihood. This is one sector where the poor contributes to the growth directly instead of getting benefit from growth generated elsewhere. In Nigeria, the livestock sector forms an important livelihood activity for

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most of the farmers, supporting agriculture in the form of critical inputs, contributing to the health and nutrition of the household, supplementing incomes, offering employment opportunities, and serving as a store of wealth in times of need. It acts as a supplementary and complementary enterprise. Livestock is also important as a part of agriculture diversification and income enhancement. Livestock plays a vital role in the overall economic development of the farm households and nation as a whole.

The prolificacy of livestock which include; goat, pig and poultry are the influencing factors for rearing them. The returns are quick; losses, if any, are recovered soon and the poor can afford them. The multiple species-animal husbandry system is also environmental friendly. Income from livestock production contributes a significant percentage of the total income of rural farm households engaged in agricultural production.

Among livestock – based vocations, poultry occupies a pivotal position because of its enormous potential to bring about rapid economic growth. The importance of the poultry sub-sector is chiefly in the provision of meat and egg as well as the provision of employment either directly or indirectly and the contribution to the revenue (Gross Domestic Product) of the country. The poultry sub-sector of the economy in Nigeria remains chiefly primitive. This is because government, at all levels, has neglected it for a long time. The poultry industry in Nigeria currently has about 10% of the population, and is responsible for less than 15 to 18% employment opportunities, due to the fact that the industry is mainly subsistent. Afolami et al. (2011), in comparison with other livestock products (e.g. beef, mutton, pork), poultry egg is considered to be more palatable, having lower level of cholesterol and high protein value (Adegbola, 2000). Egg, a product of the industry, gives about 3.5 g of the total 7.2 g animal protein requires for individual dietary need per day. For developing countries, poultry contributes just about 15%, of total animal protein intake, with approximately 1.3 kg of poultry products consumed per head annum (NLDC, 2000). The World Health Organization (WHO) and Food and Agriculture Organization (FAO) recommended 3.6 kg per capita intake of poultry products per annum. Therefore to meet the basic minimum of the dietary needs of Nigerians, the country requires an annual production of 10 to 20 billion eggs and 0.3 to 0.6 million tonnes of poultry meat (NLDC, 2000).

Poultry meat and eggs play a very useful role in bridging the protein gap in Nigeria. They are palatable and generally acceptable. This acceptability cuts across nearly all cultural and religious boundaries in the country. The importance of poultry to the national economy cannot be overemphasized, as it has become popular industry for the small holders that have great contribution to the economy of the country. The enterprise has assumed greater importance in improving the employment opportunity and animal protein production in Nigeria. To this end, an up-to-date knowledge of the profitability and

efficiency of resource utilization in the industry will go a long way in bridging some knowledge gap and help in formulating policies aimed at ensure increased and more profitable poultry production in the country. The study therefore specifically sought to: estimate the profitability of poultry egg farming in the study area determine the returns to scale of the poultry egg enterprise in the study area determine the resource-use efficiency in poultry egg farming in the study area.

## RESEARCH METHODOLOGY

### Study area

The study was carried out in Ogun state, south-west Nigeria. This area was considered most appropriate because of heavy concentration of the poultry production, particularly layers production (Yussuf and Malomo, 2007). Ogun state was created from the old western region in February, 1976 with Abeokuta as the state capital. The state has a land mass of about 1.7million hectares and occupies about 1.9% of the total land area of Nigeria and has about 2.5% of the Nigerian population. It is made up of 20 Local Government Areas spread across the four main agricultural zones of the state- Egba, Ijebu, Remo, and Yewa/Awori. Ogun state shares an international boundary with the Republic of Benin to the west and Oyo state to the north, Lagos state to the south, and Ondo state to the east.

The population of the state stands at 3.7million according to the National Population Commission of 2006. Ogun state lies within latitude 6°N and 7°N and longitude 2.5°E. There are two distinct seasons in the state namely, the rainy season and the dry season. Ogun state has two main types of vegetation, namely, tropical rain forest and the guinea savannah. There is a fair concentration of livestock production, poultry egg production in particular in the state.

### Sampling technique, sample size and method of data collection

Multi-stage sampling technique was used to select poultry (egg) farms for this study. The first stage involved a random selection of the Abeokuta and Ijebu Zones of the Ogun State Agricultural Development Programme - OGADEP (OGADEP, the state's agricultural extension agency divided the state into four agricultural administrative zones for ease of agricultural extension services). The second stage involved the purposive selection of Poultry (egg) farms in the two zones. In addition, poultry service centres (Veterinary Stores and Feed Milling Centres) were randomly selected in the two zones. These service centres were visited on randomly selected days within the week. Farm proprietors or managers who came to patronize these service centres were interviewed. A total of one hundred and twenty farm operators were interviewed. Personal interview was used to elicit data from respondents using structured questionnaires as interview guide. Data were collected on socio-economic characteristics of poultry (egg) farmers, poultry production data (such as resources used, costs, returns, prices, constraints to poultry production, number of eggs harvested per day, feeding cost, vaccination, access to and use of credit among others) (Afolabi, 2012).

### Method of data analysis

The data collected from this study were analysed using both the

descriptive analytical tool, ordinary least square regression model and cost and return analyses and profitability ratios.

Descriptive statistics involving the use of frequency tables and percentages were used to describe the socioeconomic characteristics of poultry farmers among other qualitative variables related to poultry farming.

Costs and returns analysis estimated through the budgetary analysis was used to determine the profitability of poultry egg farming in the study area.

### Budgetary analysis

Net Profit ( $\pi$ ) = Total Revenue (TR) – Total Cost (TC)  
Gross Margin (GM) = Total Revenue – Total Variable Cost

### The OLS regression model

Ordinary least squares (OLS) was used to determine the factors affecting output. In addition, coefficients of input resources used under the Cobb-Douglas specification model are estimated and these were used to examine the resource-use efficiency and to estimate the return to scale value. It is from the coefficients of the input resources that the resource-use efficiency will be determined and subsequent returns to scale of the enterprise will be determined. Following Oladeebo and Ambe-Lamidi (2007), the implicit form of the model was specified thus:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, \mu) \quad (1)$$

The explicit form of the Cobb-Douglas model is specified as

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \mu \quad (2)$$

Where: Y = amount of poultry products produced? (Eggs and spent Layers) (Naira);  $X_1$  = Flock size (number of laying birds);  $X_2$  = Total labour (man days);  $X_3$  = Total cost of drugs and medications (Naira);  $X_4$  = Total quantity of feed (Kg);  $X_5$  = Total cost of energy (Naira);  $\mu$  = stochastic error term.

The value of marginal product (VMPs) for each resource was computed and such computed VMPs were then compared with their respective factor cost (MFC). The VMP of a particular resource was computed thus:

$$\text{VMP} = \text{MPP}_i \cdot P_y \quad (3)$$

Where:  $\text{MPP}_i$  is the marginal physical product of the input resource  $x_i$ ;  $P_y$  is the price of the output  
The MPP and the corresponding values of MVP were obtained as follows:

Cobb-Douglas production function (Double log model specification):

$$\text{MPP} = \beta_i Y / X_i; \text{VMP} = (\beta_i Y / X_i) \cdot P_y$$

Resource-use efficiency =  $\text{VMP} / \text{MFC}$

Where:  $\beta_i$  = regression coefficient; Y = mean output of poultry products (Naira);  $X_i$  = mean value of resource;  $P_{xi}$  = price of resource per unit;  $P_y$  = price of output per unit; MFC = marginal factor cost

Thus, When Resource-use efficiency  $\text{RUE} = 1$ , resources are optimally utilized; When  $\text{RUE} < 1$ , resources are over utilized. When  $\text{RUE} > 1$ , resources are underutilized; Profitability ratios determined include Return on Investment =  $\text{Net Income} / \text{Total Cost}$ , Net Profit Ratio =  $\text{Net Income} / \text{Net Sales}$ , Gross Margin Returns =  $\text{Gross Margin} / \text{Total Cost}$ , Return on Capital Employed =  $\text{Total}$

Revenue/Total Cost.

## RESULTS AND DISCUSSION

### Socioeconomic characteristics of poultry egg farmers

The average values and percentage distribution of the personal characteristics of the farmers are presented in this section. The age, gender and educational status of the poultry egg farmers are expected to have implications on the productivity of the farmer, and access to information on technology adoption. The result showed that majority (90.0%) of the poultry egg farmers was male (Table 1). The heavy participation of males in poultry egg production could be due to the rigor and stress which characterizes the poultry egg production business which not many females might be able to cope with, although in some cases the input of the proprietor is not physical but in coordination and direction. The gender of the proprietor is however expected to influence the efficiency of the farm unit because some of the input of the proprietor though managerial is sometimes as well physical. The distribution of the age of the respondents as revealed by the study shows that 72.5% were aged below 50 years of age (Table 1). The study further showed that the average age of poultry (egg) farmers in the study area was 43 years. This finding agrees with the findings of Yusuf and Malomo (2007) who reported an average age of 44 years for poultry (egg) farmers in the state.

The field survey showed that majority (77.5%) were married. The marital status of a farm proprietor has an implication for the household size and invariably the amount of family labour that may be available. Results from the study also showed that majority (89.2%) of the poultry (egg) farmers had post – secondary education (Table 1). This high level of education of the poultry (egg) farmers could be due to the fact that success and efficiency in poultry egg production like any other livestock production enterprise require some level of educational attainment by the farmer. The assertion above is premised on the fact that innovations on efficient production and management methods are constantly evolving to meet the challenges of the poultry enterprise. The years of education of the farm proprietor is thus expected to influence the efficiency or inefficiency of the farm unit. The study revealed that the average years of experience of the poultry (egg) farmers in the study area is 8.72 years with majority (59.2%) of the farmers having above 5 years (Table 1).

### Cost and returns analysis of the poultry egg enterprise in Ogun State

The gross margin and net farm income are the commonest measure of the profitability of an enterprise

**Table 1.** Socio-economic characteristics of poultry egg farmers in Ogun State.

Variable	Frequency	Percentages
<b>Gender</b>		
Male	108	90.0
Female	12	10.0
<b>Age of respondents (years)</b>		
Less than 30	23	19.2
31 – 40	27	22.5
41 – 50	37	30.8
Above 50	33	27.5
Mean (Standard Error)	43.14 (1.14)	
<b>Marital status</b>		
Single	27	22.7
Married	93	77.5
<b>Educational status</b>		
Primary education	2	1.7
Secondary education	7	5.8
Bachelor degree	91	75.8
Postgraduate	20	16.7
<b>Years of experience</b>		
1 – 5	49	40.8
6 – 10	33	27.5
11 – 15	18	15.0
16 – 20	13	10.8
Above 20	7	5.8
Mean (Standard error)	8.72 (0.648)	

Source: Field Survey, 2012.

besides a number of other profitability ratios. The results revealed that the poultry egg business is a profitable enterprise, with a gross margin of ₦ 2,118,280.1 and a net farm income of ₦ 2,011,857.16 per one thousand laying birds in a given production cycle (Table 2). The value of sales from eggs accounted for 90.19% of the total revenue with sales of spent layers accounting for 9.81% of the total revenue. Cost of feeding accounted for about 70% of the total cost, with the cost of initial stock accounting for 17.7% of the total cost. Ashagidigbi et al. (2011) noted that the cost of feeding laying birds accounted for over 70% of the total cost of production in the Jos metropolis. The result of the profitability ratios showed that for every ₦ 1 invested in the enterprise, an a farmer/investor earns ₦ 0.45 gross margin, a ₦0.43 net income and a gross revenue of ₦1.43. The study further showed that a net income of ₦0.3 is guaranteed for every ₦1 sales that is made at the farm gate (Table 2). The profit ratios reported are well higher than the agricultural interest rate of 8% and the average commercial interest rate of 21%.

**Table 2.** Cost and returns structure per 1,000 laying birds per production cycle in the study area.

Variable	Value (N)	Percentage (%)
Value of eggs	6,046,871.2	90.19
Value of spent layers	657,404.08	9.81
Total revenue	6,704,275.28	100.0
<b>Variable cost item</b>		
Cost of laying birds	830,353.65	17.7
Cost of medication	85,680.29	1.83
Cost of feeding	3,282,967	69.96
Cost of energy	30,123.53	0.64
Cost of repairs	32,099.71	0.68
Total cost of labour	324,771	6.92
Total variable cost	4,585,995.18	97.73
Gross margin	2,118,280.1	
Cost of depreciation	106,422.94	2.27
Total cost	4,692,418.12	100.0
Net farm income	2,011,857.16	
Return on investment	0.43	
Gross margin returns	0.45	
Net profit ratio	0.30	
Return on capital employed	1.43	

Source: Field Survey, 2012.

**Table 3.** Elasticity of input resources and returns to scale.

Input resource	Elasticity
Flock size	0.499
Labour	-0.005
Drugs	0.091
Feed	0.413
Energy	-8.879E-5
Returns to scale	0.9979

Source: Field Survey, 2012.

### Returns to scale

The elasticity of basic inputs used in the poultry egg production enterprise is shown in Table 3. The result of the Cobb Douglas functional model shows that the explanatory variables considered explained 98% of the dependent variable (value of egg produced) and a F-value of 741.835 was reported to be significant at 1% level of significance. The high Adjusted R<sup>2</sup> values indicate that the model explains well the performance of the poultry egg industry. The results show that the return to scale of the enterprise in the study area is 0.9979 which implies that the enterprise is still at the rational stage (stage II) of the production surface. The value of returns

**Table 4.** Result of the resource-use efficiency.

Productive resources	VMP	MFC	VMP/MFC	Conclusion
Flock	2508	₦740.42/bird	3.387	Under utilization
Labour	-64.251	₦88.54/Manhrs	-0.726	Over utilization and gross inefficiency
Drugs	443.25	₦480/unit	0.923	Fairly over utilized
Feed	525.02	₦1824/bag	0.29	Over utilization
Energy	-12.3	₦70/hr	-0.18	Over utilization and gross inefficiency

Source: Field Survey, 2012.

to scale obtained in this study is consistent with that reported by Ojo (2003) for the poultry egg enterprise. The marginal units of 0.0021 needed to attain the optimal state can transform into a substantial profit for the farms. One can thus conclude from the study that firms do not have economic scale. Variables except labour and energy should be increased in order to increase the profit of the farms.

#### Allocative efficiency of resource use in the poultry egg production enterprise

Business objective(s) most often is/are about how to maximize profit output and minimize cost. These objectives are best achieved when productive resources are maximally combined in their usage and at a least cost combination. The productive resources of a typical poultry egg business entails; the flock, labour, feed, drugs, energy e.t.c. The findings of this study showed that an average farmer in the study area is not raising the maximum number of birds required for optimal utilization of resources while on the other hand labour and energy are being over utilized and inefficiently used. Drugs and feed were also over utilized in the study area (Table 4). The study thus revealed that farms in the study area can substantially increase their profit by increasing the stock of laying birds kept on the farm, given the current expenditure on all other input resources.

#### Conclusion and Recommendation

The study showed that majority of the poultry egg farmers are male with 77.5% of them married. The average age and mean years of experience reported for the study area are 43 years and 9 years respectively with 72.5% of them aged below 50 years. Majority (83.4 %) of the poultry egg farmers have less than 15 years of experience with most of them having post-secondary education. The study revealed that the poultry egg production enterprise is profitable in the study area as indicated by the gross margin of ₦2,118,280.1 and a net income of ₦2,011,857.16 per annum. The profitability ratios further reveals that for every ₦1 investment made in the enterprise there is a potential return of ₦0.43 net farm income. The RTS revealed that poultry egg production

enterprise in the study area are operating at the stage II of the production surface. The study further revealed that most productive resources excluding the flock size maintained by the poultry egg farmers are being over utilized.

The study therefore recommends among others that if the farmers could be more efficient in the allocation of their productive resources, they can earn more from every Naira invested in the poultry egg production business. Balancing the use of feeds relative to the flock size kept per time in the course of the production cycle will have an effect on the profit from the enterprise. Furthermore, directional extension services aimed at raising technical knowledge of poultry farmers aimed at effective allocation of productive resources in order to improve profitability is recommended.

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