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Economic Efficiency of Poultry Egg Production in Kogi State, Nigeria

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Abstract

The study assessed the determinants of efficiency of poultry egg production in Ogori-Magongo Local Government Area of Kogi state. Data was collected through a multi-stage sampling technique and analysed using both descriptive and stochastic production frontier. The results revealed that feed intake and utility were the most important inputs in poultry egg production in the area. Furthermore, the study found the average efficiency estimate to be 88.77% and this was influenced positively by education, access to credit and experience. However, about 11.23% of the profit was lost to technical inefficiency. Findings from the study also showed that farmers were operating in stage one of production at 1.02, which is the area of increasing returns to scale. The study thus recommends that efforts should be made at ensuring the poultry farmers have access to credit and educational programmes should be organized to sensitize farmers more on how to improve on their efficiency level. It is also recommended that farmers increase their stock of birds, feed and utilities in other to operate at the stage two of production.

Keywords: Efficiency, Poultry Egg, Stoshastic Frontier, Nigeria.

1. Introduction

Livestock industry has been found to be an important sector in the Nigeria economy (Umar, Alamu and Adeniji, 2008) and it is important for increased productivity in the Nigerian agriculture. Additionally, the livestock industry provides the populace with protein which is required for the repairs and growth of the human body (Umar et al, 2008). Oloyede (2005) posited that an average adult in Nigeria requires approximately 65 to 85g of crude protein of which about 41% should be sourced from animal. Also, Adetunji and Adepoju (2011) has it that a hard working adult farmer requires 3500 calories and 50g of protein per day while a year old child requires 1000 calories and 15g of protein for proper growth and development to occur. However, Owen and Dike (2013) reported that an average Nigeria consumes about 9.3g of protein per day which is even less than what is required for a child.

Poultry a very important subsector of the livestock industry has the ability of promoting economic growth in the industry as egg and poultry have been found to be one of the highest contributors of output in the livestock sector after meat (Rajendran and Mohanty 2003). Furthermore, poultry birds are a good converter of feeds and it requires low capital investment which yields returns in a short time in addition to it being tender and palatable. The egg on the other hand is affordable and its sales help to provide employment and means of livelihood to thousands of people (Ojo 2003). An egg contains about 6g of protein and its consumption will go a long way to provide the needed animal protein. Aside being used in confectionaries, the egg shell is also a source of calcium. In spite of the growth recorded in the Nigerian poultry industry, egg demand still outweighs egg supply in Nigeria and imports has remained on the high side as about 732 million eggs was imported in 1999, 730 million in 2000 (United States Department of Agriculture) (USDA, 2001) and by 2012 the United States hatching egg export to Nigeria was about 500,000 dozens (USDA, 2013).The situation remains so because most of the farmers involved in egg production lack the technical knowledge, managerial ability and have failed to seek the counsel of experts and this has limited their ability to maximize profit which in turn translates into huge capital loss and hence discouragement and frustration (Audu, 2012). Therefore there is a need to examine the economic efficiency of egg production so as to advise the egg producers on ways to improve on their profit. Thus this study sought to examine the profitability and economic efficiency of poultry egg production in Ogori-Mangongo local government area of Kogi State. To achieve the stated objectives the study employed the use of descriptive analysis, farm budgetary techniques and stochastic production frontier analysis.

2. Methodology

2.1 Study Area

The study was carried out in Ogori-Magongo Local Government Area(LGA) of Kogi State located on longitude $7^0 29^{'}$N and $6^0$13'E in the North central region of Nigeria. It has a population of 39622 people and a land area of 79km^2. The LGA has two main seasons, the wet season between April and October and the dry season between November and March. The mean annual rainfall is between 1000 and 1250mm. The major crops grown are yam, cassava, maize, cocoyam, sorghum and cash crops such as cocoa and coffee.

2.2 Sampling Procedure

The study was based on a multi stage selection of 40 poultry egg farmers in Ogori and Magongo towns in Ogori-Magongo LGA of Kogi State. In the first stage, 4 wards were randomly selected from each of the towns while the second stage involved the selection of 5 small scale poultry egg producers with a minimum of 300 and maximum of 1500 birds were randomly selected from each of the wards making a total of 40 poultry egg producers. The sampling procedure is as shown on table 1.

Table 1: Sample Selection

Towns	Wards	Number of Respondents
Ogori		
	Ayeromi	5
	Eni	5
	Ileteju	5
	Okesi	5
Magongo		
	Obatigen	5
	Obinoyin	5
	OturuOpu	5
	Ugugu	5
Total	**8**	**40**

2.3 Method of Data Collection

Primary data was collected through the use of a well-designed questionnaire. The questionnaire was used to elicit information that had to do with their socio-economic and production activities such as age, farming experience, educational level, credit use, house size, contact with extension agents and other production variables.

2.4 Method of Data Analysis

Study data were analysed through the use of descriptive statistics, farm budgetary techniques and stochastic production frontier. Descriptive statistics such as mean, frequencies and tables were used to describe the socio-economic characteristics of the respondents as well as the variables included in the model. Farm budgetary analysis was carried out to determine the profitability of poultry egg production and the model is specified as follows;

NFI = GFI – TC = (1)

Where,

GFI = $\sum P_i Q_i$ is the Gross Farm Income, which is the total value of farm outputs including those sold, consumed at home and/or given out;

TNWC = $\sum r_j X_j + F$ is the Total Cost of production, including the cost of all the variable and fixed inputs employed in production;

Q_i = is the quantity of the ith enterprise's farm output;

P_i = is the average selling price of the ith enterprise's farm output;

X_j = is the quantity of the jth variable input employed by the enterprise including household and hired labour and other inputs whether purchased or owned by the household;

r_j= is the average purchase price of the jth variable input employed by the enterprise; and

F = fixed cost of production, including depreciation of farm computed by the straight line method, interest on loans, etc.

The stochastic production frontier as used by Parikh and Shah (1995), Onu*et al.* (2000) and also Adepoju (2008) was used to determine the efficiency of poultry egg producers in the study area. The model is specified as;

$$\ln Y_i = \beta_0 + \beta_1 lnX_i + \beta_2 lnX_2 + \beta_3 lnX_3 + \beta_4 lnX_4 + \beta_5 lnX_5 + \beta_6 lnX_6 + V_i - U_i \quad (2)$$

Where;

Y_i= number of poultry egg produced by the ith producer (crates)

X_1= Number of birds

X_2= wage (Naira)

X_3= depreciation on farm equipment and poultry house(Naira)

X_4= quantity of feed (kg)

X_5= drugs and medication (Naira)

X_6= Utilities (electricity, water etc (Naira)

V_i = random errors which are outside the control of the poultry egg producer and they are assumed to be independently and identically distributed normal with a mean of zero and variance that is unknown

U_i= is technical inefficiency effect and it is independent of V. it can be specified as;

$$U_i = \delta_0 + \delta_1 D_i + \delta_2 lnZ_{1i} + \delta_3 lnZ_{2i} + \delta_4 lnZ_{3i} + \delta_5 lnZ_{4i} + \delta_6 lnZ_{5i} \quad (3)$$

Where D_i is a dummy representing gender and 1 denotes a male farmer while zero represents a female farmer. Z_1 to Z_5 represent years of farming experience, years of schooling, amount of credit obtained by the ith farmer, household size of the ith farmer (number of people) and number of meetings with extension agents per poultry production season.

3. Results and Discussion

3.1 Socio economic Characteristics

The main tenet of this study was to examine the economic efficiency of poultry egg production and the findings is as presented in this section. Table 2 presents the socio-economic characteristics of poultry egg producers in Ogori-Magonho LGA of Kogi State. Result shows that 65% of the farmers were below 50 years of age while 85% of them were males that were married. This implies that poultry egg production is mainly done by young farmers that are independent by the virtue of them being males and therefore should be able to carry out the operations involved in poultry egg production which is known to be characterized by risk such as diseases, fire outbreak and burglary. In addition, table 2 revealed that the mean household size in the study area was 6 persons. However, 60% of the poultry egg producers had household size ranging from 5-10 persons. Although, the fewer the household size, the better the standard of living, large household size is pertinent in poultry production because family labour forms a buck of the labour used in production.

Poultry farming has been found to be carried out mainly by farmers who have had one form of formal education or the other Binuomote, Ajetomobi and Ajao (2008). In line with this, this study found that majority (82.5%) of the poultry egg producers had tertiary education while secondary education was the least level of education in the study area. This entails that there is a high tendency that poultry egg farmers possess the skills as well as the technical knowledge required for adopting innovations and latest technologies.

The mean farming experience was 8years (Table 2) although, some (20% and 2.5%) of the farmers had farming experience ranging from 11 to 16years and above 16 years respectively. Experience according to Ohajianya (2005) provides the farmers with insights on how to mitigate against risk and possible losses since they have become acquainted with them. Furthermore, extension contacts afford farmers the opportunity to learn and improve their knowledge of poultry egg production. However, majority (87.5%) of the poultry egg producers in Ogori-Magongo area have never had any contact with extension agent and this can reduce their efficiency since information that is supposed to be disseminated by the extension agent is may be lacking. The report on the socio-economic characteristics is in line with Adedeji *et al.* (2013) who found that poultry egg farmers in Ogbomoso were young, literate, highly experienced with large household sizes but poor extension contact.

Table 2: Socioeconomic Characteristics of Respondents

Description	Frequency (N=40)	Percentage (%)
Age (Years)		
Below 41	6	15.0
41-50	20	50.0
Above 50	14	35.0
Mean	47	
Gender		
Male	6	15.0
Female	34	85.0
Household size		
Below 5	12	30.0
5-10	24	60.0
Above 10	4	10.0
Mean	6	
Educational Level		
Secondary	7	17.5
Tertiary	33	82.5
Farming Experience		
Below 5	7	17.5
5-10	24	60.0
11-16	8	20.0
Above 16	1	2.5
Mean	8	
Extension Contact		
None	5	12.5
Yearly	35	87.5
Access to Credit		
Yes		18
No		82

Source: Study result output

3.2 Cost and Returns Analysis

The result of the cost and returns analysis is as presented on table 3. The result revealed that an average poultry egg producer in the study area has about 627 birds with a cost of about ₦112335. The variable cost constituted 98% of the production cost with feed cost having 95% share of the total variable cost of ₦5112485. Medication and drugs had a share of 0.71% of the variable cost implying that there was little or no incidence of disease outbreak unless for the routine treatment and vaccination. The Net Farm Income was ₦2466073.34 indicating that the poultry egg producers were able to cover the cost of production and still had enough to cater for their daily needs which translates into better standard of living for them.

Table 3: Cost and Returns Analysis

Items	Value(₦)	Percentage of Total Cost (%)
Total Revenue	768,2621.75	
Cost of Variable Inputs		
Chicks in Stock	112,335.00	2.15
Labour	5,237.50	0.10
Feeds	49,577,86.33	95.03
Drugs and Medication	37,126.25	0.71
Total Variable Cost	**5112485.08**	**98**
Gross Margin	**2570136.70**	
Depreciation	104,063.33	2.0
Total Cost	**521,6548.41**	**100**
Net Farm Income(NFI)	2,466,073.34	

Source: Study result output

3.3 Stochastic Production Function

The estimation of the SPF revealed that farm size, labour, feed and utilities were the significant variables that influenced poultry egg production in the study area (Table 4). The coefficient of number of birds, feed and utilities were significant and positive implying that a percentage increase in these variables will lead to percentage increase in the crate of eggs produced. That is to say 1% increases in the number of birds and also the quantity of feed used will translate into 0.005% and 0.995% increase in the crates of eggs respectively. Although labour was significant it had negative effect on poultry egg production. Indicating that labour should be decreased as a percentage increase in the labour use will decrease the number of eggs produced. This finding collaborates with that of Binuomote, Ajetomobi and Ajao (2008) who found feed and stock of birds to be the factors that influenced poultry egg production in Ilorin. However, Tijani *et al.* (2012) and Ohajianya *et al.* (2013), identified labour in addition to stock of birds and feed as a factor that influenced the number of crate of eggs produced positively.

From Table 4, the result reveals that farming experience, education, access to credit and extension were the factors that influenced the level of efficiency of the poultry egg producers. As shown the coefficients of these factors had negative signs implying that the higher the farming experience and the level of education the lower the level of inefficiency. This is however not surprising because poultry egg producers in the study area were found to be highly educated and had 5-10 years of experience (table 2) and this reflected in the level of efficiency of the poultry egg producers because the mean efficiency score was 0.88% indicating that the poultry egg producers had only about 12% of their profit lost as a result of inefficiency as shown on table 5.

Table 4: Stochastic Production Function

Variables	Coefficient	t-ratio
Intercept	0.092	9.226***
Farm Size	0.992	2.265**
Labour	-0.009	-2.507**
Capital	-0.024	0.099
Feed	0.005	7.620***
Drugs and Medication	0.009	0.014
Utilities	0.054	8.636***
Inefficiency Factors		
Intercept	0.005	0.005
Gender	0.160	-0.220
Farming Experience	-0.034	-4.472***
Education	-0.071	-7.672***
Credit	-0.011	-8.440***
Household Size	0.0067	0.0092
Extension	-0.005	-2.355**
Diagnostic Statistics		
Sigma-squared	0.232	3.395***
Gamma	0.986	2.584***
Log Likelihood Function	47.935	
LR Test	19.170	

Source: Study result output

*****, *** implies the associated coefficients was significant at 1%, 5% and 10% respectively.**

Table 5: Decile Range of Technical Efficiency (TE) of Poultry Egg Producers

Decile Range of TE	Frequency	Percentage (%)
0.60-0.69	2	5
0.70-0.79	4	10
0.80-0.89	11	27.5
0.90-0.99	23	57.5
Mean value	0.88	

Source: Study result output

3.4 Returns to Scale

The summation of the elasticity was 1.027 as shown on table 6. This implies that the poultry egg production was on stage one which is the area of increasing returns to scale. Thus, increase in inputs leads to a more than proportionate increase in the quantity of egg produced. In the case of the poultry egg producers in Ogori-Magongo study area, increase in the stock of birds, feed and utilities will lead to increased egg production as explained in table 4.

Table 6: Estimated Elasticity and Return to Scale

Variables	Coefficients
Farm Size	0.992
Labour	-0.009
Capital	-0.024
Feed	0.005
Drugs and Medication	0.009
Utilities	0.054
Returns to Scale	1.027

Source: Study result output

4. Conclusion and Recommendation

The study examined the economic efficiency of poultry egg production in Ogori-Magongo Local Government Area of Kogi State using the SPF. The study found the average efficiency estimate to be 88.77% and returns to scale of 1.07 and thus concludes that 11.23% of the farmers' profit is lost to economic inefficiency and this was influenced by level of farming experience, education and access to credit. Therefore, the study recommends efforts should be made by financial institutions and NGOs targeted at poultry producers to improve farmers' access to credit. Furthermore, farmers should be encouraged to join cooperatives so that they can also serve as a source of credit to them. In addition, new entries into the poultry egg production industries need to be advised to undergo formal education while educational programmes such as workshop, seminars should be organized for the farmers since education helps to improve economic efficiency.

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