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Determinants of Income from Poultry Egg Production in Imo State, Nigeria: An Econometric Model Approach

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The study evaluated the determinants of income from poultry egg production in Imo State, Nigeria. Multistage random sampling techniques was used in selection of respondents. The sample size comprised sixty poultry egg producers. The main tool for data collection was a set of structured questionnaire. Data collected were analyzed using descriptive statistical tools, gross income analysis and econometric regression model. Findings revealed the mean age to be 43.10years. Results also showed that poultry egg production in the area is dominated by females (61.67%). Majority (76.67%) were married with an average household size of 6.1 persons. The average farm income was ₦77,300.00 (\$515.33) while the mean farm size was 488.00 birds. Greater proportion (96.67%) keeps Cinnamon Queen as their breed of layers. Result revealed that under suitable condition (feeds and water Ad -libitum), A Cinnamon Queen is efficient and capable of producing between 25-30 quantities of eggs per month. Finding shows that cost of feeding (₦126,000.00)(\$840.00) was the highest total variable cost recorded. Producers earned a positive net return of ₦180,320.00 (\$1,202.13) and return per capital invested was ₦0.36 (\$0.0024). Estimated econometric analysis revealed that farm size (4.346), education (2.567), farming experience (5.495), farm income (5.029), household size (4.910), extension contact (2.696) and membership of cooperative (2.834) were found to be the significant determinant of output and income. The relationships were statistically significant at 1% level of probability. The F-ratio (37.968) revealed the overall significant of the model. Poultry egg production is efficient and lucrative in the area. However, producers complained of high cost of feeds and poor feeder roads. It was therefore recommended that producers/farmers should be encouraged to form agricultural co-operatives to eliminate the exploitative and dubious activities of the some input agencies as well as enable them obtain credits from the government and other credits institutions. Government effort should address to high cost of poultry feeds in the area. Ultimately, infrastructural facilities such as good feeder roads should also be provided in the area to reduce the rate of spoilage, shorten the chain of distribution and enable producers to receive better prices at reduced transportation cost.

Keywords: Poultry-Egg, Poultry-egg Farmers, Socio-economic Characteristics, Breeds of Layers, Laying Rates, Costs and Return, Econometric Model, Constraints

INTRODUCTION

In Nigeria, large scale poultry egg production began in the early 1960s (FAO, 2009). Ever since, it has assumed relatively important position in the nation's livestock industry. Nutritionally, eating an egg a day is a good way of putting protein, fat, vitamins and minerals in human diet (Madubuike, 2012). Egg contains not only a trace of carbohydrate, but it is also adjudged to be a replacement for meat as it contains all essential amino acids in adequate proportion required by the body for general body growth and repair (Dolberg, 2003). Ademtimirim (2000) revealed that poultry egg is a good source of vitamin A, which protects against night blindness and prevents skin infections. With other vitamins such as B₁, B₂, D and with minerals such as Ca, Fe and P (are all present in Poultry egg). Poultry egg production serve as major ingredient in some food industries such as the confectionaries and cocoa powder. Also Agricultural marketing dictates how often the producer will increase and/or produce their output/yield. A good marketing organization directs production along the most suitable needs of the consumers (Esiobu *et al.*, 2014). The market mechanisms have to be efficient to be able to play the role of propelling yield. An efficient market system therefore is the one that provides satisfactory and cheap services to consumers or one that maximize the ratio of input and output of marketing. However, poultry is one of the world's major and fastest growing sources of meat, representing over 22% of the meat production in 1989 (Ekunwe and Alufohai, 2009). Because of their high nutrient content and relatively low caloric value, egg and poultry meat are natural commodities to meet emerging consumer demands of human protein. Survey showed that the production of the poultry industry in 1977/1978 experienced a remarkable increase (Stenholm and Waggoner, 2005). In 1960s, the Nigerian government was supplying poultry egg inputs at subsidized rates to farmers. The gesture was discontinued in 1986 following the introduction of the Structural Adjustment Programme (SAP) policy. The aftermath has been a sharp increase in the cost of inputs needed for poultry egg production. Poultry products in most developing countries especially in Nigeria are still expensive and the production system is generally informal and poorly developed. Many commercial poultry egg production in the study are now striving for hybrids. This is because it gains weight more quickly, are disease resistance and lays more healthy eggs than the local breed and therefore generally used by poultry egg producers. Poultry egg and poultry egg products has been in short supply in the study area due to the ever increasing cost

feed stuffs With this high cost of feed stuffs many producers are either out of production or are producing poor quality of poultry eggs. However, despite the nutritional and commercial values of poultry egg, its production remains low in Nigeria when compared to other Nations of the World. The problem of protein and caloric malnutrition has been repeatedly highlighted as a major part of contributing factor to the serious health hazard in developing countries especially Nigeria (Nurudeen, 2012). In Nigeria alone, the demand for poultry egg has risen from 500,000 metric tonnes in 1980 (FAO, 2012) to about 1500,000 metric tonnes in 2012 (FAO, 2009). The problem of satisfying this demand is the increasingly human population and diminishing production capacity. Nigeria is the major contributor of poultry egg in Africa, producing about 784,000 metric tonnes of Africa's total of 951,000 metric tonnes (FAO, 2012). Also it has been reported that the protein supply per caput was 44grams out of which animal product constituted less than 2 percent. As such, the average Nigerian still consumes less than 0.1 percent of animal protein per day compared to 0.7 percent of animal protein consumed in developed countries. Thus, malnutrition and under nutrition affect all age groups in Nigeria and pose serious threat in the study area. Currently, in Imo State, Nigeria, we do not know producers socio-economic characteristic, producers breeds of layers, laying rates of breeds of layers, costs and return of poultry egg production. Constraints of poultry egg production in the area are also not known. Also production increases without a well elaborated profitability potentials of poultry egg production leads to all possible gains from the production effort going into the drains of post-harvest losses. Often, producers are compelled if not forced to sell their egg product at a very low price to avoid huge wastage or total loss and this reduces their income efficiency. However, it is expected that as production increases, marketing should increase as well. But this is not so in the study area and maybe beyond. Agribusiness enterprise dictates how often the producer will increase and/or produce their output/yield. A good agribusiness organization directs production along the most suitable needs of the consumers. The production and market mechanisms have to be efficient to be able to play the role of propelling need. An efficient production and marketing system therefore is the one that provides satisfactory and cheap services to consumers or one that maximizes the ratio of input and output of marketing and production. Besides, the empirical evidences emerging from few studies (Dolberg, 2003; Oji and Chukwumah, 2007; Ekunwe and Alufohai, 2009; Mukhtar, 2011 and Nurudeen, 2012) on economics of poultry egg production at household level yielded mixed results that are

inconclusive and conflicting. Particularly in Imo State little or no study has rigorously modeled the determinants of income from poultry egg production in Imo State, Nigeria. Empirical evidence remains largely scanty, isolated and devoid of in-depth analysis of costs and return, profitability, determinants of income and socio economic characteristics that influence poultry egg producers Imo State, Nigeria. This creates a deep vacuum in research, knowledge and literature. Thus, the study is still worthy of further research. To fill this dearth in research, the study identified socio-economic characteristics of the farmers; identified different breeds of layers used by the farmers; assessed the laying rates of different breeds of layers; estimated costs and return of poultry egg production; determined socio-economic characteristics that influences output and identified constraints of poultry egg production in the area.

RESEARCH METHODOLOGY

The study was carried out in Imo State, Nigeria. Imo State is located in the eastern zone of Nigeria. The State lies between latitudes 5 45'N and 6 35'N of the equator and longitudes 6 35' E and 7 28' E of the Greenwich Meridian (Microsoft Corporation, 2009). It occupies the area between the lower River Niger and the upper and middle Imo River. It is bounded on the east by Abia State, on the west by the River Niger and Delta State; and on the north by Anambra State, while Rivers State lies to the south. Imo State covers an area of about 5,067.20 km², with a population of 3,934,899 (NPC, 2006 and NBS, 2007) and population density of about 725km² (Ministry of Lands Owerri, 1992 and Microsoft Corporation, 2009). The State has three Agricultural zones (Orlu, Owerri, and Okigwe Agricultural Zones). These divisions are for administrative and extension services and not for any agro-ecological difference. It is also delineated into 27 local government areas (Imo ADP, 2004). The State has an average annual temperature of 28°C, an average annual relative humidity of 80%, average annual rainfall of 1800 to 2500mm and an altitude of about 100m above sea level (Imo ADP, 2004 and Microsoft Corporation, 2009). Ultimately, Imo State was selected because of proximity, cost, familiarity and predominates by poultry egg farmers. Multistage random sampling technique was used for the study. Firstly, the three agricultural zones of the State were selected. In each agricultural zone, two Local Government Areas (LGAs) were randomly selected. In each of the selected LGA, six communities were randomly selected. Ultimately, twelve farmers were randomly selected in each of the community to give a sample size of seventy-two poultry egg farmers

for the study. However, the study found only sixty responses valid and was used for data analysis. These farmers were selected from the list of households who are into poultry egg production in the communities and this list was obtained from the community heads and Agricultural Development Programme (ADP) extension agents. Primary data were collected through the use of a set of well structured questionnaire and it was supplemented with oral interview in situations where the respondents could neither read nor write. The primary data that were collected for the study include the socio-economic characteristics of the farmers, breeds of layers, different laying rates of breeds of layers and constraints associated with poultry egg production in the area. Data collected were analyzed with descriptive statistics, gross income analysis and multiple linear regression analysis. The implicit model of the regression is stated as follows; $Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10} + e_i)$

Where Y = Output /yield (Crates of Egg)

X₁ = Age (years)

X₂ = Gender (Male =1 and Female=0)

X₃ = Level of Education (years)

X₄ = Marital Status (Married =1 and single=0)

X₅ = Farming Experience (years)

X₆ = Household size (Number of persons)

X₇ = Membership of co-operative (Yes =1 and Otherwise=0)

X₈ = Extension contact (Number of visits per month)

X₉ = Annual Farm Income (Naira)

X₁₀ = Farm Size (Number of Birds)

e_i = Error term

While the Gross income analysis was computed using the formular;

$$GI = TR - TVC$$

Where = Gross Income

TR = Total Revenue

TVC = Total Variable Cost

NR = TR – TC

Where NR = Net Returns

TR = Total Revenue

TC = Total Cost

Gross Margin Analysis:- The gross margin is taken as the difference between the total value of production and the total variable cost of production.

$$GM = TR - TVC$$

Profitability = TR-TC where = Profit; TR = Total Revenue;

TVC = Total Variable Cost;

TC = Total Cost.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Farmers/Producers

Table 1 reveals that majority (81.67%) of the poultry egg farmers fell within the age bracket of 41-50 years. It also showed that 13.33% of the fell within the age bracket of less than 40 years, while 5.00% fell within the age bracket of 51 years and above. The mean age was 43.10 years. The implication is that younger farmers are likely to adopt new innovation faster than the older ones. The finding is in agreement with Onubuogu *et al.*, (2013) who reported majority of farmers within this age range of 41 to 50 years are still in their active age, more receptive to innovation and could withstand the stress and strain involved in agribusiness activities. Entries in Table 1 also show that majority (51.67%) of the poultry egg farmers were females while 38.33% were males. The finding is in line with Esiobu *et al.*, (2014) who asserted that females constitute a greater proportion of those involved in agribusiness activities. The implication of females greater proportion may be that productivity is expected to be higher because females have tendency to be more labour efficient than males (Onubuogu *et al.*, 2014). Result of educational level is also reported in Table 1 and it reveals that majority (65.00%) of the poultry egg farmers had secondary education, 18.33% had primary education, 10.00% had tertiary education, while 6.67% had non-formal education. The mean educational year was 11.15 years. The result implies that approximately 93.33% of the farmers had trainings in formal educational institutions which no doubt increases their literacy levels. It is expected that the higher level of education will contribute significantly to decision making of a farmer. Exposure to high level of education is an added advantage in terms of achieving huge yield/output, efficient marketing and sustainable poultry egg production (Esiobu *et al.*, 2014). This finding supports Onubuogu *et al.* (2013) who higher level of education determines the quality of skills of farmers, their allocative abilities, efficiency and how well they are informed of the innovations and technologies around them. It also support the findings of Onubuogu *et al.*, (2014) who asserted that individuals with higher educational attainment are usually faster in adoption of improved farming technologies. Table 1 also shows majority (76.67%) of the poultry egg farmers were married, 16.67% were single while 6.67% were widowed. This shows that poultry egg farmers in the area are married individual and are responsible according to the societal standard and therefore are likely to have some experience of life (Oluwatayo *et al.*, 2008). The findings support the result of Nurudeen (2012) that married farmers tend to

have easy access to production variables such as land and large family which are traditionally owned and provided by household heads (husbands) to compliment family labour to enhance production and reduce the cost of hired labour. Farming experience is also reported in Table 1 and it reveals that greater proportion (63.33%) of the farmers had less than 20 years of farming experience, 15.00% of the farmers had 21 to 30 years of farming experience, 13.33% of the farmers had 41 years of farming experience and above, while 8.33% of the farmers constitute those with 31 to 40 years of farming experience in poultry egg production in the study area. The mean farming experience was 16.13 years. The result is in line with the findings Onyebinama (2004) who reported that farmers with more years of farming experience would be more efficient, have better knowledge of climatic conditions and market situation and are thus, expected to run a more efficient and profitable enterprise. Also support the finding of Esiobu *et al.*, (2014) and Onubuogu *et al.*, (2014) who asserted that previous experience in agribusiness enable farmers to set realistic time and cost targets, allocate, combine, utilize resources efficiently and effectively, identify production and marketing risks. Table 1 also shows that majority (76.67%) of the poultry egg farmers had a household size of 6-10 persons while 23.33% had a household size of 1-5 persons. The mean household size was 6.1 persons. This implies that poultry egg farmers in the study area have a large household size. Large household size reduces the cost of hired labour, ensures availability of labour as well as expansion of farm size. This findings support the result of Teklewold *et al.*, (2006); Onubuogu *et al.*, (2013) Esiobu *et al.*, (2014) and who reported that large household size is a proxy to labour availability, ensure ease adaptation to climate change and reduce the cost of hired labour. A household comprises all persons who generally live under the same roof and eat from the same pot (FOS, 1985 and Esiobu *et al.*, 2014). Lipsey (1986) and Onubuogu *et al.*, (2014) also describe a household as all people who live under one roof and who make or are subject to others making for them joint financial decision. For the purpose of this study, a household comprises the head, the wife/wives, children and other dependents that live in the same house. This findings support the result of Onubuogu *et al.*, (2013) and Esiobu *et al.*, (2014) who reported that large household size is a proxy to labour availability, ensure ease adaptation to climate change and reduce the cost of hired labour. A household comprises all persons who generally live under the same roof and eat from the same pot (FOS, 1985 and Esiobu *et al.*, 2014). Lipsey (1986) and Onubuogu *et al.*, (2014) also describe a household as all people who live under one roof and who

Table 1. Socio-economic Characteristics of Farmers

Age (years)	Frequency	Percentage (%)
Less than 40	8	13.33
41-50	49	81.67
51 and above	3	5.00
Total	60	100.00
Gender		
Female	37	61.67
Male	23	38.33
Total	60	100.0
Educational Level (Years)		
Non Formal	4	6.67
Primary	11	18.33
Secondary	39	65.00
Tertiary	6	10.00
Total	60	100.0
Marital Status		
Married	46	76.67
Single	10	16.67
Widowed	4	6.67
Total	60	100.0
Farming Experience (Years)		
Less than 20	38	63.33
21-30	9	15.00
31-40	5	8.33
41 and above	8	13.33
Total	60	100.0
Household Size (Number of Persons)		
1-5	14	23.33
6-10	46	76.67
Total	60	100.0
Extension Contact (Number of Visit)		
1-2	37	61.67
3 and above	23	38.33
Total	60	100.0
Membership of Cooperative		
Member	41	68.33
Non Member	19	31.67
Total	60	100.0

Table 1. Continued

Average Income (Naira)		
Less than 20,000	3	5.00
21,000-40,000	11	18.33
41,000-60,000	6	10.00
61,000 and above	38	63.33
Total	60	100
Farm Size(Number of Birds)		
Less than 200	3	5.00
201-300	7	11.67
301-400	4	6.67
401-500	38	63.33
501 and above	8	13.33
Total	60	100.0

Average age = 43.10years; Mean Educational level= 11.15 years; Average Farming Experience = 16.13 years; Mean Household size= 6.1 persons; Average Income = N77,300.00; Average farm size = 488.00 Birds; Source: Field Survey Data, 2013

make or are subject to others making for them joint financial decision. For the purpose of this study, a household comprises the head, the wife/wives, children and other dependents that live in the same house. Extension contact is also reported in Table 1 and it reveals that majority (61.67%) of the poultry egg farmers receives 1-2 of extension visits per month while 38.33% receives 3 and above of extension visits per month. The mean visit per month was 2.0 times. This implies that the farmers in the study area are poorly visited by extension agents to ascertain their farming problem and know where they need assistance (Onubuogu *et al.*, 2013 and Onubuogu *et al.*, 2014). The implication of the finding is that extension contact which is a channel through which agricultural innovations and information are passed to farmers for improvement in their standard of living, production and productivity are missing. This could bring about low productivity due to lack of innovative information. Table 1 also reveals the results of membership of cooperative which shows that majority (68.33%) of the poultry egg farmers in the study area are members of one form of cooperative society or the other, while 31.67% do not belong to cooperative society. The implication of this result is that majority of the farmers have access to credit facilities through the cooperative society to which they belong, to enhance their production and boost their resource use efficiency, productivity and income effectively. Membership of cooperative society affords

farmers the opportunity of sharing information on modern production techniques, purchasing inputs in bulk as well as exchanging labour (Simonyan *et al.*, 2012). The result supports the findings of Esiobu *et al.*, (2014) who reported that membership of cooperative help agribusiness entrepreneur are information and project a collective demand. Table 1 also shows that majority (63.33%) of the poultry egg farmers in the study area have an average annual farm income between N61,000 – N80,000, 18.33% have an between N21,000- N40,000, 10.00% have between of N41,000-N60,000, 5.00% have less than N20,000 while 3.33% have between N81,000 and above. The mean annual farm income was N77,300.00 which is less than N5,000 per month in spite of large families which they supported. The marginal propensity to consume the produce of these farmers far exceeds their propensity to save, making the generation of working capital as well as expected to be ear marked fund almost impossible. This further perpetuates the vicious cycle of poverty that had engulfed these farmers and their inability to purchase the needed inputs. Adeniyi, (2006); Adeyemo and Onikoyi (2006) and Onubuogu *et al.*, (2014) reported that farmers with the higher annual farm income will easily realize more yield than their counterparts who have poor annual farm income. Ultimately, farmers farm size is also presented in Table 1 and it reveals that majority (63.33%) of the poultry egg farmers in the study area have a farm size between the range of 401-500 birds, 13.33% have 501 birds and

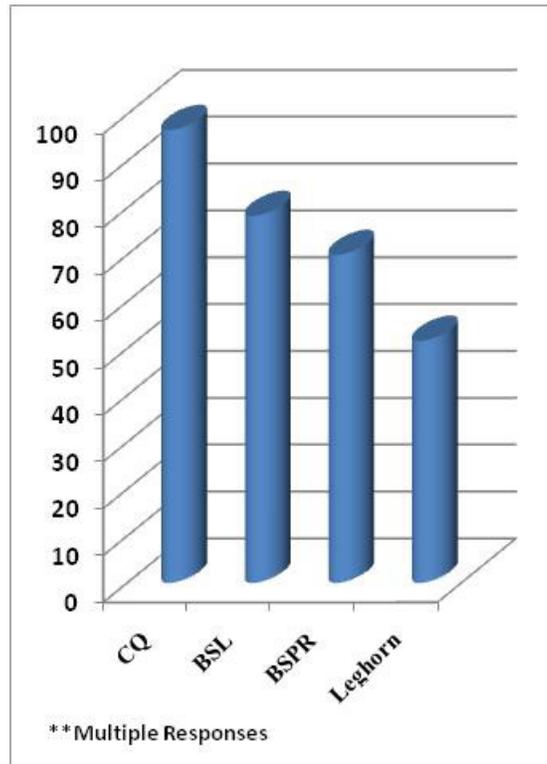


Figure 1. Bar Chart Distribution of Farmers Breed of Layers ; where CQ; Cinnamon Queen; BSL; Black Sex Link and BSPPR; Barred Standard Plymouth Rocks
 Source: Field Survey Data, 2013

above, 11.67% have between 201-300 birds, while 6.67% and 5.00% have a farm size of between 301-400 birds and less than 200 respectively. The mean number of birds kept was 488 birds. This implies that poultry egg farmers in the study area are mainly smallholder farmers operating on less than or equal to 500 birds. This could be as a result of poor technical know-how, fear of risk and uncertainty, tenure system predominant in the area or increasing human population. It is expected that farmers with large farm size would realize more yield/output than their counterpart with less farm size. Adeyemo (2009) and Onubuogu *et al.*, (2013) reported that large farm size increases livestock farmers productivity, improves their technical and allocative efficiency.

Poultry Egg Farmers Breeds of Layers

Figure 1 reveals that majority (96.67%) of the poultry egg farmers in the study area keep Cinnamon Queen (CQ) as

their breed of layer, 78.33% keep Black Sex Link (BSL), 70.00% keep Barred Standard Plymouth Rocks (BSPPR) while 51.67% keep Leghorn as their breed of layers. This implies that poultry egg farmers in the study area keep different breed of layers for effective and efficient poultry egg production. However, it is expected that greater proportion recorded in Cinnamon Queen (CQ) breed of layer could be that they are highly resistance to pests and diseases, have a high laying rate, lay quality and healthy brown eggs as well as are efficient in productivity all year round. Thus Cinnamon Queen breed are profitable and lucrative and easy to manage in the study area. Also smaller proportion recorded in Leghorn breed could be that they lay healthy and quality white eggs but not as highly resistance to diseases as that of Cinnamon Queen breed. Analysis of the two poultry eggs (brown and white) shows that brown eggs has good market value than the white egg in the study area. Majority consumes brown poultry egg than white poultry egg in the area.

Table 2. Frequency Distribution of Poultry Egg Farmers Breed of Layers According to their Different Laying Rates

Breeds of Layers	Laying rate per month	Frequency	Percentage (%)
Cinnamon Queen	25-30	23	38.33
Black Sex Link	20-30	19	31.67
Barred Standard Plymouth Rocks	20-25	11	18.33
Leghorn	18-25	7	11.67
Total	---	60	100.0

Source: Field Survey Data, 2013

Different Laying Rates of Farmers Breed of Layers

Table 2 reveals that majority (38.33%) of the poultry egg farmers reported that Cinnamon Queen lays between 25-30 eggs per month, 31.67% reveals that Black Sex Links lays between 20-30 eggs per month. While 18.33% and 11.67% reported that Barred Standard Plymouth rocks and Leghorn lays between 20-25 and 18-25 eggs per month respectively. This implies that poultry egg farmers in the study area realize a reasonable crate of eggs from their different breed of layers per month as well as per farming season. This depicts while large output/yield and income was realized by the farmers as earlier found out in the study.

Costs, Return and Profitability Analysis of Poultry Egg Farmers in Imo State

Table 3 reveals that greater proportion (42.97%) of the variable cost was recorded in feeding, 34.11% of the variable cost was from stocking, while 5.97% of the variable cost came from medication. Others 4.26%, 0.58%, 0.49% and 0.27% of the variable cost in poultry egg production was from vaccination, transportation, storage, and watering respectively. The cost of feeding (N126,000.00) was the highest total variable cost recorded while cost of water (N800.00) was the least variable cost identified. The contribution of the fixed cost was low compared to the variable costs incurred. The fixed cost contributed only 10.54% of the cost of involved in poultry egg production. The return on capital invested was found to be N0.36. It could be inferred that for every naira invested, there is 36.00 kobo returns for poultry egg production in the study area. The result revealed a total

revenue (TR) of N473,520.00, gross margin (GM) of N211,1700.00 and a net farm income (NI) of N180,320.00 respectively. The result also revealed that profitability index was N0.38. This implies that for every naira earned as revenue from the poultry egg enterprise, 38.00kobo returned to farmers as net income. The result obtained revealed that poultry egg production is profitable and lucrative in the area. The implication of the findings is that when efficiently, effectively and carefully managed, poultry egg production is capable of producing good output/yield as well as reasonable net return over time to any agribusiness entrepreneur.

Determinants of Poultry Egg Farmers Output/Income

Table 4 shows the result of determinant of poultry egg farmers socio-economic characteristics on their output/income. A multiple regression analysis was carried out in four functional forms (linear, semi-log, double-log and exponential forms). Based on the statistical significance of the coefficient, goodness of fit and the econometric model that supports production concept, the double-log function was chosen as the lead equation. The double-log regression function was chosen as the lead equation based on the value of $R^2(0.947)$, F-Ratio value (37.968), and highest number of significant variable (seven variables). The coefficient of multiple determinations (R^2) was found to be 0.947 (94.7%). This is an indication that 94.7% of the variation in the output of the poultry egg farmers was explained by the explanatory variables (socio-economic characteristics) while approximately 5.30% was accounted-for due to error term (e). Hence, the findings present the marginal effects of the estimated econometric analysis.

Table 3. Estimated Costs, Return and Profitability Analysis of Poultry Egg Farmers in Imo State (Naira)

Items	Average Cost (N)	Number owned/used	Total cost (N)	Percentage (%)
C. Total Revenue	473,520.00			
Variable Costs				
Transportation	850.00	2km	1,700.00	0.58
Stocking	200.00	500	100,000.00	34.11
Labour	1,200.00	2 man hour	2,400.00	0.82
Water	800.00	100 litres	800.00	0.27
Feeding	2,250.00	56 bags	126,000.00	42.97
Medication	35.00	500	17,500	5.97
Vaccination	25.00	500	12,500.00	4.26
Storage	1,450.00		1,450.00	0.49
A. Total Variable Cost			262,350.00	
Fixed Cost				
Depreciation on drinkers	85.00	120	10,200.00	3.49
Depreciation on feeders	85.00	120	10,200.00	3.49
Depreciation on empty crates	55.00	100	5,500.00	1.88
Depreciation on Buildings	1650.00	3	4,950.00	1.68
B. Total Fixed Cost			30,850.00	
Total Cost (TFC+TVC)			293,200.00	100.0
C. Revenue				
Average crates of egg	770.00	188 crates per season	144,760.00	
Droppings	50.00	36 bags	1,800.00	
Empty feed bags	35.00	56 bags	1,960.00	
Spent layers	650.00	500.00	325,000.00	
Net farm income [C-(A+B)]	180,320.00			
Gross margin	211,170.00			
Return on Capital Invested	0.36			
Profitability index	0.38			

Source: *Field Survey Data, 2013*; Depreciation on Drinkers, Feeders, Empty Crates, and Buildings were calculated using the Straight Line Depreciation Method (SLDM).

Table 4. Estimated Econometric Analysis of Poultry Egg Farmers Socio-economic Characteristics and Determinants of Output/Income in Imo State

Explanatory Variables	Double-Log Y	Semi-Log Y	Exponential Y	Linear Y
Constant	12.6137 (17.959)***	-444539.731 (-15.678)***	10.825 (11.512)***	-50035.837 (-9.175)***
Age (X ₁)	-0.004 (-0.004)	2611.055 (0.452)	0.008 (0.257)	2512.569 (0.425)
Gender (X ₂)	-0.975 (-0.024)	4549.871 (1.132)*	-1.002 (-1.032)*	-19183.691 (-0.122)
Educational Level (X ₃)	0.347 (2.567)***	369.893 (0.261)	0.042 (1.531)**	7843.716 (0.475)
Marital Status (X ₄)	0.381 (0.265)	-648.805 (-1.146)*	0.050 (0.035)	-190642.332 (-0.284)
Farming Experience (X ₅)	0.741 (5.495)***	-3859.449 (-1.381)**	0.061 (0.248)	16365.387 (2.912)***
Household Size (X ₆)	0.595 (4.910)***	802.278 (0.455)	0.166 (1.807)**	23448.446 (1.263)*
Membership of Cooperative (X ₇)	0.870 (2.834)***	-3876.591 (-0.883)	0.079 (0.071)	13214.544 (0.883)
Extension Contact (X ₈)	0.946 (2.696)***	-2971.755 (-1.378)**	-0.457 (-1.170)*	-91235.556 (-1.219)*
Annual Farm Income (X ₉)	0.581 (5.029)***	46208.834 (7.078)***	-5.004E-6 (-0.515)	1.087 (2.544)**
Farm Size (X ₁₀)	0.914 (4.346)***	-89.943 (-0.075)	0.001 (1.976)**	129.358 (2.084)**
R ²	94.7	89.2	86.2	74.2
R- ²	92.6	84.7	82.6	70.1
F-Ratio	37.968***	25.978***	22.028***	20.427***
Sample Size (n)	60	60	60	60

Source: Computer Printout of STATA (2013); Values in Parenthesis are t-ratio * Significant at 10%; ** Significant at 5% and *** Significant at 1% level of probability

Education (X_3): Education had a positive coefficient with the output of the poultry egg farmers hence it is statistically significant at 1% level of probability. It is expected that the higher level of education will contribute significantly to decision making of a farmer. Exposure to high level of education is an added advantage in terms of achieving huge yield/output, efficient marketing and sustainable poultry egg production (Esiobu *et al.*, 2014). This finding supports Onubuogu *et al.* (2013) and Onubuogu *et al.* (2014) who higher level of education determines the quality of skills of farmers, their technical and allocative abilities, efficiency and how well they are informed of the innovations and technologies around them.

Farming Experience (X_5): Farming experience had a positive coefficient with the output of the poultry egg farmers hence it is statistically significant at 1% level of probability. Farmers with higher years of farming experience knows the problems involved in poultry egg production and are in a better position to overcome them to improve on the yield than those that had little farming experience. The result is in line with the findings Onyebinama (2004) who reported that farmers with more years of farming experience would be more efficient, have better knowledge of climatic conditions and market situation and are thus, expected to run a more efficient and profitable enterprise. Also support the finding of Esiobu *et al.*, (2014) and Onubuogu *et al.*, (2014) who asserted that previous experience in agribusiness enable farmers to set realistic time and cost targets, allocate, combine, utilize resources efficiently and effectively, identify production and marketing risks.

Household Size (X_6): Household size had a positive coefficient with the output of the poultry egg farmers in the study area. This could be that increase in household size makes for increase in labour hence ensures expansion of farmland. Poultry egg farmers who had large household size made more yield than their counterpart with less household size. Thus large household size reduces the cost of hired labour, ensures availability of labour as well as expansion of farm size. This findings support the result of Oluwatayo *et al.*, (2008) who large household size compliment labour to enhance production and reduce the cost of hired labour. The relationship was statistically significant at 1% level of probability.

Membership of Cooperative (X_7): Membership of cooperative had a positive coefficient with output of the

poultry egg farmers and it is statistically significant at 1% information on modern production techniques, purchasing inputs in bulk as well as exchanging labour (Simonyan *et al.*, 2012). The result supports the findings of Esiobu *et al.*, (2014) who reported that membership of cooperative help agribusiness entrepreneur are information and project a collective demand.

Extension Contact (X_8): Extension contact was found to be positively related to the output of the poultry egg farmers. This implies that a farmer who receives much extension visit realized more yield than their counterpart with poor extension contact. The reason for this could be that those who receive much extension visit acquire new farming techniques than their counterpart with less extension contact. Chukwu (2013) and Onubuogu (2014) reported that extension contact is the channel through which agricultural innovations and information are passed to farmers for improvement in their standard of living and production. The relationship was significant at 1% level of probability.

Annual Farm Income (X_9): Annual farm income had a positive coefficient with the output of the poultry egg farmers and the relationship is statistically significant at 1% level of probability. Adeniyi, (2006); Adeyemo and Onikoyi (2006) and Onubuogu *et al.*, (2014) reported that farmers with the higher annual farm income will easily realize more yield than their counterparts who have poor annual farm income.

Farm Size (X_{10}): Farm size was found be positively related to output of the poultry egg farmers in the study area. It is expected that farmers with large farm size would realize more yield/output than their counterpart with less farm size. Adeyemo (2009) and Onubuogu *et al.*, (2014) reported that large farm size increases livestock farmers productivity, improves their technical, allocative and resource-use efficiency. The relationship is significant at 1% level of probability. The F-ratio (37.968), which determines the overall significance of the econometric model, is highly significant at 1% level of probability, hence concludes that the poultry egg farmers socio-economic characteristics is the major significant determinant of output/income of poultry egg production in the study area.

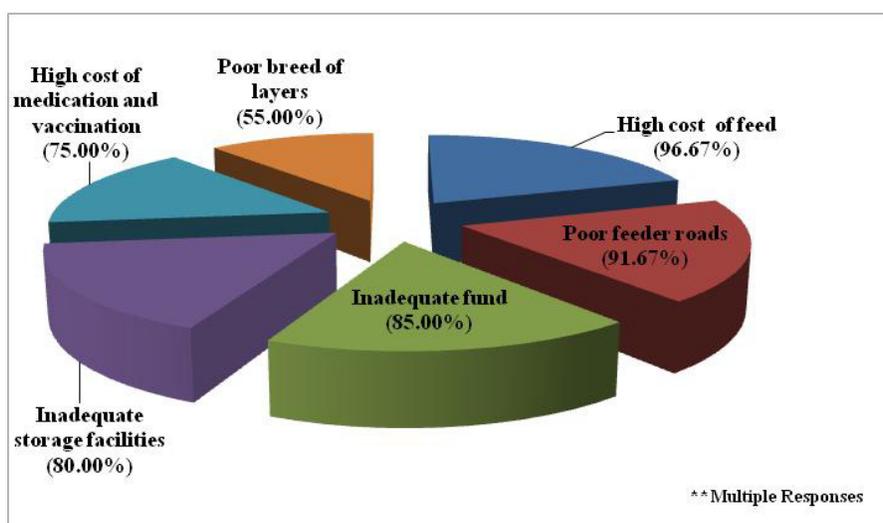


Figure 2. Pie Chart Distribution of Poultry egg Farmers Constraints

Constraints Encountered by Poultry Egg Farmers

Figure 2 reveals that majority (96.67%) of the poultry egg farmers in the study area complained of high cost of feeds as constraint to poultry egg production. This constraint makes the farmers unable to purchase the required quantity of feeds for efficient poultry egg production in the area. This could be attributed to exploitative and dubious activities of feeds agencies in the study area. 91.67% identified of poor feeder roads. This constraint left the farmers unable to reach out to market outlet; they only resort to farm gate sales which reduce their marketing efficiency and marketing margin. This could be attributed to poor infrastructural facilities in the study area. 85.00% complained of inadequate fund. This could be attributed to high cost of inputs. Inadequate fund hinders farmers from getting the necessary resources and technologies which assist them to produce efficiently and remain in production. Poultry egg production resources are costly. This constraint makes the farmers unable to attain large scale production. Also due to the high cost of inputs, achieving economics of scale by the small scale poultry egg farmers in the study area is completely impossible. 80.00% complained inadequate poor storage facilities. Poultry egg could be stored for few days in which case must be disposed even when the price is not favourable, this accounts for the severe losses suffered by poultry egg farmers in the study area. 75.00% identified of high cost of medication and vaccination. This constraint makes the farmers unable to give the required quantity and quality of

medication and vaccination to their layers. This could be attributed to exploitative and dubious activities of some middlemen in the study area. It could be inferred that many small-scale poultry egg farmers have been compelled to close down and those still managing to survive are producing at very high cost and contending with serious inputs limitations. Others 55.00% and 48.33% identified of poor breed of layers and price fluctuation respectively. Stocking of poor breeds of poultry is tantamount to waste of effort because such breeds are positioned to get infected with pests and diseases than good breeds of layers. Poor quality day old chicks make farms investment less profitable if not a complete loss. Also inappropriate of breed of layer is one of the major constraints affecting poultry industry in Nigeria. Price fluctuation left many farmers unaware of frequent changes in prices of inputs. Ultimately, there is no doubt that these constraints are responsible for small and medium scale poultry egg production recorded in the area. Fighting these problems will be vital in promoting not just subsistence production but commercial poultry egg production in the area and maybe beyond.

CONCLUSION AND RECOMMENDATIONS

Based on the findings from the study, it can be concluded that the largest proportion of poultry-egg producers in the area operated on a small-scale and that poultry-egg production was a profitable venture across scale of operation. The average farm income was ₦77,300.00

(\$515.33) while the mean farm size was 488.00 birds. Greater proportion (96.67%) keeps Cinnamon Queen as their breed of layers. Result revealed that under suitable condition (feeds and water *Ad-libitum*), A Cinnamon Queen is efficient and capable of producing between 25-30 quantities of eggs per month. Cost of feeding constitutes a major problem to most of the poultry farmers as it accounts for a larger percentage of total cost of production, since poultry birds cannot do without feeds. Despite complains of poultry egg farmers on the rapid increase in price of feed ingredient. The poultry egg producers still benefit from egg production in form of income and egg farming is profitable in the study area. Estimated econometric analysis revealed that farm size, education, farming experience, farm income, household size, extension contact and membership of cooperative were found to be the significant determinant of output and income. The relationships were statistically significant at 1% level of probability.

RECOMMENDATIONS

The following recommendations were made based on major the research findings;

- i. Effective agricultural policies and programmes should focus on how improve farmers' access to credit.
- ii. Investment strategies should also focus on expansion of poultry farmers' farmland as this would affect their output positively.
- iii. Farmers should be encouraged to form agricultural co-operative groups this would enable them eliminate the activities of some inputs agencies and help them obtain credit from government and other financial institutions.
- iv. The government must also design policy that would be geared on subsidizing agricultural inputs in order to enhance poultry egg production within the study area and beyond.
- v. Availability of farm input such as drugs and vaccine to the farmers at the right time and at subsidized prices.
- vi. Infrastructural facilities such as good feeder roads should also be provided in the area to reduce the rate of spoilage, shorten the chain of distribution and enable producers to receive better prices at reduced transportation cost.
- vii. Policies that will make micro-credits from appropriate agencies accessible to these farms owners will go a long way in addressing their resource use inefficiency problem. This can be

- viii. attained by making inputs such as good quality day-old chicks, adequate medicine/vaccines and land as well as building materials available at right places and at affordable prices.

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