ECONOMIC ANALYSIS OF TABLE EGGS PRODUCTION IN IBADAN, OYO STATE,NIGERIA

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ABSTRACT
Table eggs production is one of the major livestock industry contributions both to the protein intake of the citizens and the national income. Its profitability and viability must always be ascertained. This study analyzed the economics of table eggs production in Ibadan, Nigeria. A multistage sampling technique was used for sample 150 respondents from the five villages across Ibadan. Primary data used for the study were obtained using well constructed questionnaire. Descriptive statistics were used to analyze the socio-economic data while budgetary technique using gross margin analysis was employed to estimate the profitability of table eggs production. Multiple regression analysis was used to express the technical relationship between inputs and outputs of the production cycle. Double-log functional form was chosen as the lead equation. In determining the constraints of table eggs production, five point likert scales was used. The results showed that majority (33.3%) of them were within the age –range of 43-52 years. The study also revealed that 94.0% of the respondents had formal education and that both male and female were involved in table egg production business with 62.0% of them being married. In the same vein, 63.3% of them had long years of experience above 5 years. For the family size 53.3% had 1-5 household while 26.0% had above 10 people in the family. The result of costs and returns analysis showed that an average gross farm income of ₦18,835,150.00 was realized; with an average total cost of production of ₦ 11,568,700.00; thereby giving a net farm income of ₦7,266,450.00; and return per naira invested of 1.63. The result of the estimated parameters shows that the coefficients for age, family size, education, feed and access to credit were positive and significant at varied probability levels. Among the constraints, transportation problem was identified to be the major problem, followed by inadequate water supply, high cost of feeding stuff inadequate credit facilities and problem of diseases outbreak. The study therefore recommends that with supports from government and other stake holders, increased table eggs production can be achieved if infrastructures and research are given necessary attention.
Keywords: Economic analysis, table eggs, production, Ibadan, Nigeria

INTRODUCTION
The agricultural sector in Nigeria is the most important non-oil economic activity; it is also the single largest employer of labor force, employing about 70 percent of its workforce (NBS, 2014; USDA, 2013) and contributed 40.07% and 22% (pre and post debasing respectively) of Gross Domestic Products (GDP) in 2010 and 2014 respectively (NBS, 2014). The sector consists of crops, fishery, livestock and forestry sub-sectors. Over 80% of the country's population living in the rural areas is directly or indirectly dependent on agriculture for its livelihood (NBS, 2014).

According to Nasiru *et al.* (2012) Nigerian's livestock population consists of 16.3 million Cattle; 40.8 million Goat; 27 million Sheep; 3.7 million Pigs and 151 million poultry. Going by this figure, poultry alone constitutes more than 60% of the total livestock production, indicating the dominance of poultry sub sector in the livestock industry. The poultry industry plays important roles in the development of Nigerian economy. The industry provides employment opportunities for the populace, thereby serving as a source of income to the people. Also, it provides a good source of animal protein in meat and eggs which have a high nutritional value (Abedullah *et al.,* 2007; Nasiru *et al.*, 2012). Poultry meat and eggs are palatable and generally acceptable with little or no cultural and religious boundaries in Nigeria. Chickens and eggs contribute to a nutritious, balanced diet, which is especially important for children, nursing mothers and people who are ill (ACIAR, 2009). Egg is an excellent source of iron, zinc and vitamin A, all of which are essential for health, growth and well being; egg is a complete protein with excellent quality (FAO, 2005; Tijani, *et al.,* 2006).

In Nigeria, despite growth in the egg production industry since 2000, local demand has not been matched by local supply. In 2011, the Nigerian egg production stood at 636.000 million metric tons (USDA, 2013).With population of about 165, million in 2011 (NBS, 2014), a huge demand- supply gap was created given the one egg per day advocacy.

The objective of this study therefore, was to analyze technical efficiency of poultry egg farmers in Ibadan metropolis. The study will specifically describe the socio-economic characteristics of the poultry egg farmers in the study area; analyze the technical efficiency of the farmers and determine the factors contributing to technical inefficiency in poultry egg production.

One of the major challenges facing Nigeria is the satisfaction of the ever-increasing demand for protein. Most Nigerian diets are deficient in animal

protein. The FAO recommends that the minimum intake of protein by an average person should be 65 g per day; of this, 36 g (that is, 40%) should come from animal sources. The country is presently unable to meet this requirement. The animal protein consumption in Nigeria is 15 g per person per day (Tijani *et al.,* 2006) which is a far cry from the FAO recommendation. As a result, wide spread hunger, poor, and stunted growth as well as increase in spread of diseases are evident in the country.

Okoli *et al.,* (2004) revealed that 85% of rural families keep small ruminants and local fowls primarily as an investment and sources of manure or meat at home or for use during festivals. In spite of this, livestock production is not keeping pace with the protein requirements of the rapidly increasing Nigeria population as demand is always higher than supply.

Considering poultry production as a commercially viable business demands the application of the knowledge of farm management (Olukosi and Erhabo, 1998) in the area of economic measurement of it profitability, with the utmost aim of guiding the farmers in the appropriate use of resources and combination to maximize profit and encourage potential entrants to increase output and bridge the gap between national demand and supply of animal protein. This study is therefore analyzing the economics of poultry production in Oyo State.

METHODOLOGY
The study was carried out in Ibadan metropolis which is made up of 11 Local Government Areas. It is the capital of Oyo State, Nigeria and is located on geographic grid reference longitude 3°5'E, latitude 7°20'N. The city has a population of 1,338,659 in 2006 and more than 96 per cent of the inhabitants are Yoruba (National population commission 2006). Ibadan has a tropical wet and dry climate, with a lengthy wet season and relatively constant temperatures throughout the course of the year. This good weather condition makes poultry business common among farmers in the area.

Five local government areas (Ido, Oluyole, Akinyele, Egbeda and Ona-Ara) were selected purposively as most poultry farms are located in these areas, Poultry farmers were randomly select from the five local government areas each and data were collected from small and medium scale poultry farmers that have layers birds. In all data were collected from 150 poultry egg farmers. Information were collected on production input and output for each of the respondent poultry egg farmers.

Descriptive statistics were used to analyze the socio-economic data such as frequency, tables, means, and percentages; budgetary technique using gross margin analysis was employed to estimate the profitability of table eggs production. Gross margin is the difference between the gross farm income and the total variable cost. It is a useful planning tool in situations where fixed capital is negligible of the farming enterprises in the case of small-scale subsistence agriculture (Olukosi and Erhabo, 1998). The model is expressed as follows:

Where:-
GM = Gross margin
GFI = Gross farm Income
NFI = Net farm income
TVC = Total variable cost
TFC = Total fixed cost

Multiple regression analysis was used to express the technical relationship between inputs and outputs of the production cycle. Linear, Semi-log, Double-log and Exponential functional forms were employed, fitted and tried, and on the basis of economic theory, statistical and econometric criteria; Double-log functional form was chosen as the lead equation. The explicit form of the model is presented below:-

$LnY = lnbo + b_1 lnX_1 + b_2 lnX_2 + b_3 lnX_3 + b_4 lnX_4 + \ldots bnlnXn + ei$

Where:
Y = Output of table eggs (in crates)
X_1 = Age of the farmer (years)
X_2 = Family size (numbers)
X_3 = Farming experience (years)
X_4 = Educational level (years)
X_5 = Gender (female = 1, male = 0)
X_6 = Marital status (Married = 1, otherwise = 0)
X_7 = Flock size (number)
X_8 = Labour input (Man-days)
X_9 = Cost of Medication (₦)
X_{10} = Quantity of feed (kg)
X_{11} = Access to credit (₦)
X_{12} = Cost of water (₦)
ei = Error term
bo = Constant term
b_1- b_{12} = Coefficients to be estimated.

In determining the constraints of table eggs production, five point likert scale was used (as used in Ike, 2010), the responses to an item for each variable was multiplied by the weight attached to obtain response scores.

The mean response values are as follows:
Strongly Disagreed = 1, Disagree = 2, Undecided = 3, Agreed = 4, Strongly Agreed = 5

$X = \sum fx/n$
Where   X = Mean
         f = Frequency of response made each mode
         x = Normal value of the response
n = Number of respondents to an item

The cut – off point was determined by finding the mean of the norminal value assigned to the options using the formula $X = \sum fx/n$
$X = (1 + 2 + 3 + 4 + 5)/5 = 15/5 = 3.00$

To make inferential statements, the mean score was compared with the critical mean 3.00. If the calculated mean is greater than the standard critical value, the hypothesis is rejected otherwise, it is accepted (Mitchell and Agenmonmen, 1994).

RESULTS AND DISCUSSION
Socio-Economic Characteristics of Respondents
Table 1: Socio-economic Characteristics of Respondents

Variables	Frequency (n=150)	Frequency (%)
Gender		
Male	89	59.3
Female	61	40.7
Age in years		
25-33	23	15.3
34-42	40	26.7
43-52	50	33.3
53-61	15	10.0
62-70	22	14.7
Marital Status		
Single	31	20.7
Married	93	62.0
Divorce	12	8.0
Widow	8	5.3
Widower	6	4.0
Education level		
No formal education	9	6.0
Primary education	10	6.7
Secondary education	29	19.3
Tertiary	102	68.0
Farming experience (years)		
Less than 5	55	36.7
5-10	50	33.3
11-15	18	12.0
16-20	17	11.3
Above 20	10	6.7

Analysis of the socio-economic variables of the respondents (table 1) showed that majority (33.3%) of them were within the age range of 43-52 years. This implies that they are still in their productivity ages. The study also revealed that 94.0% of the respondents had formal education. It is to be noted that acquisition of formal education will enhance reading and interpretation of improved technological packages developed by the research institutes to enable them know how to apply them. This is in consonance with the findings of Abiola *et al.,*(2015) who opined that the ability and readiness with which a particular producer accepts or rejects an innovation depends on their educational background. The result further indicated that both male and female are involved in table egg production business with majority (62.0%) of them being married. In the same vein, 63.3% of them had long years of experience above 5 years. This implies that most of them are well-experienced in table eggs production. For the family size 53.3% had 1-5 household while 26.0% had above 10 people in the family. However, under peasant agriculture, mush reliance is often placed on the strength of the family to supply the much needed farm labor in the absence of mechanical equipment. The larger the family size, the higher the supply of family labor.

Table 2: Costs and Returns of Table Egg Production in the Study Area

Budget items	Unit	Quantity	Price/unit (N)	Values(N)
Output / gross farm income				
Eggs	Creates	27,375	600	16,425,000.00
Culled birds	No	2,375	1,000	2,375,000.00
Empty feed bags	Bags	703	50	35,150.00
Gross farm income				18,835,150.00
Variable Costs				
Cost of birds	No	2,500	200	500,000.00
Chicks mash	Bags	106	2,200	233,200.00
Grower mash	Bags	240	2,150	516,000.00
Layers mash	Bags	357	2,100	749,700.00
Medication cost				70,000.00
Water cost				56,000.00
Labor	Man-day	50	1,500	75,000.00
Total variable cost (TVC)				8,947,200.00
FIXED COST				
Depreciation				12,800.00
Land rent				16,700.00
Staff salary				2,592,000.00
Total fixed cost (TFC)				2,621,500.00
Total Costs (TC) = (TVC + TFC)				11,568,700.00
Gross Margin (GM) = (GFI-TVC)				9,887,950.00
Net Farm Income (NFI) = (GM-TFC)				7,266,450.00
Return on Naira invested = (GFI/TC)				1.63

The result of costs and returns analysis (table 2) showed that table eggs production in the study area is lucrative; as an average gross farm income of ₦18,835,150 was realized; with an average total cost of production amounting to ₦ 11,568,700.00; thereby giving a net farm income of ₦7,266,450.00; and

Return per naira invested of 1.63. This implies that for every naira invested on table eggs production in the study area; there is a profit of 63 kobo. This shows that the business of table egg production in the study area is highly profitable.

Table 3: Results of multiple regression estimates of the factors determining the output of table eggs produced.

Variables	Coefficients	Standard error	T- values
Constant	-0.801	1.206	-0.502
Age (X_1)	0.098	0.032	2.713**
Family size (X_2)	0.081	0.044	2.05**
farming experience (X_3)	-0.061	0.049	-1.380
Education (X_4)	0.177	0.081	2.233**
Gender (X_5)	-0.015	0.064	-0.302
Marital Status (X_6)	-0.091	0.011	-6.671***
Flock size (X_7)	0.100	0.082	1.210
Labour (X_8)	0.031	0.075	0.425
Cost of medication (X_9)	-0.222	0.090	-2.462**
Feed (X_{10})	0.536	0.081	7.011***
Access to credit (X_{11})	5.640	1.085	5.160***
Cost of water (X_{12})	-0.081	0.019	-4.961***
R^2		0.749	
Adjusted R^2		0.723	
F- Ratio		18.519***	

The result of the estimated parameters is presented in table 3. Of the four functional forms that were fitted and tried with the production function models, the double- log functional form emerged as the lead equation based on its conformity with established statistical and econometric criteria. The criteria for selection include; number and signs of significant variables, magnitude of coefficient of multiple determinations (R^2) and the F-ratio.

The coefficients for age, family size, education, feed and access to credit were positively signed and significant at varied probability levels. Those with

negative coefficients include; marital status, cost of medication and water. In specific terms, age with a positive sign is not in line with a priori expectations; but could be deemed plausible given the tremendous decline of young people from the agricultural sector due to rural-urban migration. Family size and education are positively signed and significant at 5% level of probability. The usefulness of family size is reflected by the fact that it is a veritable source of farm labour which adds to cost-saving of the household, while increasing output. This is in line with Ezeibe (2010) who reported that family size has major implications in the provision of labor for farm work. It might be also because educated table egg producers are more receptive to new ideas and are more likely to adopt new technologies meant to increase output and profitability than their uneducated counterparts. This is in agreement with Abiodun et al., (2017) who also had a positive coefficient for education in a related study.

A negative coefficient for marital status implies that other form of marital status with positive signs, such as single, divorce or the widowed contributed more to table eggs production than their married counterparts. This is understandable, given the fact that married people are usually distracted by ever-increasing family responsibilities.

The coefficients of cost of medication and water posited the expected negative signs, but were statistically significant at 5% and 1% probability levels respectively. The signs are expected, since both variables are cost items which can only increase the profit of the enterprise. Despite their cost implications they are both very important Bolade,(1990). Water, on the other hand is a very important resource for maintaining a high level of sanitation and body weight. The result also indicated that the coefficients for feed and access to credit were positive and highly significant at 1% level of probability. This implies that as egg production increases by 1%, there is a concomitant increase in the quantity of feed and credit access / utilization to the tune of 0.536% and 5.640% respectively. This result therefore proves beyond reasonable doubts that feed and credit play a very important role in poultry egg production in the study area.

On the part of the diagnostic statistics, the coefficient of multiple determinations (R^2) of 0.749 indicates that the table eggs production explained the variation in the independent variables to a reasonable level (75%). This goodness of fit measure is reasonably high, but also shows that error and omitted variables were responsible for 25%. The F- ratio of 18.519 is highly significant and confirms the overall significance of the model.

Table 4: Constraints facing profitability of table eggs production

S/N	Constraints	SA	A	UD	D	SD	Means	
I	Low demand of poultry meat (old layer)	0(0.0)	1(0.7)	0(0.0)	140(93.3)	9(6.0)	1.95	NC
2	Low demand of table eggs	5(3.3)	4(2.7)	1(0.7)	109(72.7)	31(20.7)	1,77	NC
3	Inadequate credit facilities to start the business	65(43.3)	60(39.3)	12(8.0)	10(6.7)	4(2.7)	4.17	C
4	Transport problems	118(78.7)	31(20.7)	0(0.0)	1(0.7)	0(0.0)	4.77	C
5	High cost of feeding stuff	65(43.3)	72(48.0)	3(2.0)	2(1.3)	8(5.3)	4.23	C
6	Inadequate water supply	115(78.7)	19(12.7)	2(1.3)	11(7.3)	3(2.0)	4.54	C
7	Problem of diseases outbreak	20 (13.3)	117(78.0)	5(3.3)	5(3.3)	3(2.0)	3.97	C

NC = Not a constraint; C = Constraint, SA= Strongly Agreed, A= Agreed, UD= Undecided, D= Disagreed, SD= Strongly Disagreed

Seven constraints to table eggs production were sought out which includes, low demand of old layer meat, low demand of table eggs, inadequate credit facilities to start the business, transportation problem, high cost of feeding stuffs, inadequate water supply and problem of disease outbreak. Among the said constraints, transportation problem was identified to be the major problem, followed by inadequate water supply, high cost of feeding stuff inadequate credit facilities and problem of diseases outbreak. This finding agreed with work of Padhi (1998) that poultry farmers in Nigeria are faced by some problem such as transportation, cost of feeding stuff, water supply, and disease outbreak are major problems facing table egg production in Nigeria.

CONCLUSIONS AND RECOMMENDATIONS
The study revealed that feed and labor play prominent roles in improving poultry egg production and profitability in the study area. Both males and females are involved in its production in the study area. The study shows that feed alone constituted major part of the total variable costs and this means that it is the most expensive resource in poultry eggs production. Nevertheless, table eggs production is a very rewarding and profitable enterprise, if well managed. The problems identified include; high cost of feed, inadequate capital, disease outbreak and high mortality rate.

This study has shown that egg production business is highly profitable, hence it is recommended for prospective investors. The study also shows that

poultry farming could be a veritable means of creating job for the unemployment people in the country. This in turn will lead to poverty reduction and increase in Gross Domestic Products (GDP) of Nigeria.

Socio-economic variables had significant impact influence on poultry egg (Layer) production in the study area. Poultry egg production in the study should continue be managed by young and better education farmers, who will be able to adopt the new and improved technologies.

Poultry egg production is important food in the daily diet of the people of Ido Local Government Areas (LGAs) of Oyo State.

On the basis of the findings of this study it is appropriate to recommend that with adequate government supports in terms of provision of necessary infrastructures in the rural areas where these farms are situated farmers productivity will be enhanced.

Credit facility should be made available to existing and prospective poultry farmers by support agencies and institution like the banks and NGOs at reasonable repayment terms to facilitate expansion and start-ups respectively. Research into poultry diseases should be taken seriously by all stake holders. Construction of feeder roads to rural areas should embarked upon by the State government in order to make it easy for the farmers to transport their goods to the cities with minimal costs.

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