

## ANALYSIS OF PRODUCTION AND PROFITABILITY OF CHICKEN EGG FARMS IN ABIA STATE, NIGERIA

Sylvanus Ibeabuchi OGBONNA<sup>1</sup>, Christopher Ogbonna EMEROLE<sup>2</sup>

<sup>1</sup>National Open University of Nigeria, Department of Agricultural Economics and Extension, Faculty of Agricultural Sciences Phone: +234 8034004788, E-mail: ogbonna101@gmail.com

<sup>2</sup>Abia State University, Faculty of Agriculture, Department of Agricultural Economics and Extension, Uturu Nigeria, Phone: +234 8053289183; E-mail: emerolechriso@yahoo.co.uk

**Corresponding author:** emerolechriso@yahoo.co.uk

### Abstract

*The study was to analyze Production and profitability of Chicken Egg farms in Abia State Nigeria . Primary data gathered with structured questionnaire from 120 chicken egg producing farms were analysed with descriptive and inferential techniques (frequency distribution Tables, mean, standard deviation, farm budget and Ordinary least square regression). In terms production characteristics, 51.7% of the farms had existed for at least 10 years, with 45.8% of them located in semi-urban areas, operating with staff strength of 1-5 persons with mean monthly pay of ₦10,000.00. The mean annual production estimates revealed that the farms incurred annual cost (variable and fixed) of ₦33,602,206.0 and earned mean annual net profit of ₦18,757,794.0. Profitability of chicken egg production was highly determined by location of the farm, level of education of the manager, use of paid labour, and interest paid on borrowed funds; but moderately influenced by age of the farm manager, total eggs produced, cost of feeds consumed by the birds, and production experience of the manager. We recommended strict enforcement of disbursement of low interest livestock loans, and setting up of chicken egg production clusters managed by educated and experienced managers by farmers and Abia State Government.*

**Key words:** production, profitability, chicken eggs, Abia State

### INTRODUCTION

Chicken products (meat and eggs) had long been ranked second to Cow milk and are the most economically viable sources of animal protein [8]. Chicken eggs are familiar, versatile, nutritious, economical and quite easy to prepare as meals for well-balanced diets for man [10, 9]. Consuming chicken eggs on regular basis do effectively correct nutritional imbalance among vulnerable groups such as nursing mothers and children [14].

The Food and Agriculture [3] have advised that countries who do not want to resort to importation of chicken-fresh eggs should embrace massive production of eggs using prolific birds. Accordingly, Chickens for farm-fresh egg production offer considerable potential for bridging nutritional gap in Nigeria in view of the existence of high yielding exotic breeds of birds which easily are adapting to local environment and managed with simple production technology

with high returns on investment. Improvements in husbandry and management are needed to lower production costs and enhance production efficiency [2]. One hen lays only one egg in a day and skips some days when it does not lay any egg at all. This physiological behaviours in egg laying is based on the hen's reproductive system. An egg forms within a hen soon after the previous egg was laid. It takes about 26 hours for one egg to form fully within the egg track. Most hens lay their eggs later in the day especially when the sun has gone down, since egg laying is sensitive to sunlight. The length of time a hen lays her eggs vary and within every week, the hen skips a day before a subsequent egg lay. In intensive commercial flock production using deep litter or battery cages a hen may lay for as long as 20 to 24 months depending on her breed, management given to the pullets before egg laying, nutrition, light exposure and space allowed per bird. The longer the egg lay and the peak period of lay the more

the returns to a farmer from egg sales given that egg prices are favourable.

Profitability in chicken egg production depends mostly on breeds, cost of day old chicks, equipment, feeds, drugs, water and other veterinary charges. The production systems under which the egg laying birds are reared also have serious implications on profits realizable [15]. Chicken egg farming have been recognized as a farm enterprise to which many farmers are developing interest in Nigeria [11, 2], this study has found it necessary to identify the chicken egg farms in Abia state; discuss the production characteristics of chicken egg farms in the State; as well as analyze profitability of getting involved in the enterprise in the area.

## MATERIALS AND METHODS

### Study Area

This investigation was carried out in one of the South Eastern States of Nigeria called Abia. Abia State is amongst the thirty six states of Nigeria. Abia is located approximately within Longitudes  $04^{\circ} 45'$  and  $06^{\circ} 17'$  East of the Greenwich Meridian within Latitudes  $07^{\circ} 00'$  and  $08^{\circ} 10'$  North of the Equator. The area occupied by the state is about  $5,833.7 \text{ Km}^2$  distant from Lagos (commercial capital of Nigeria) by 596 Km and distant from Abuja the Federal Administrative Capital by 498 Km [1]. The state has its administrative headquarters at Umuahia occupied by a population of 2,833,999 made up of 1,434,193 males and 1,399,806 females [4], administered with seventeen (17) Local Government Areas (LGAs). Agricultural activities in the state are overseen under three zones namely Aba, Umuahia, and Ohafia Agricultural zones. These zones have an estimated 315,910 farm households [10]. Livestock produced in the area include muturu cattle, rabbits, poultry, goats, pigs, and sheep. Veterinary services to livestock farms are provided by Private and Ministry-based practitioners in the state.

### Sampling Technique

In selecting locations and chicken egg producing farms involved in this study, multi-stage random sampling technique was used. In

the first stage, two LGAs were randomly chosen from each of the three (3) agricultural zones giving a sample of six LGAs. The LGAs selected at this stage and their (zones) were Isiala Ngwa North, Umuahia North (Umuahia Agricultural zone), Ugwu-nagbo, Aba North (Aba Agricultural zone) and Ohafia, Bende (Ohafia Agricultural zone). Second, a random sample of 20 poultry farms with chicken egg enterprises was selected from sampling frame poultry farms drawn in the state with the assistance of zonal agricultural Extension officers. This gave a sample of 120 chicken egg producing farms from where production data was gathered for this study.

### Data Collection

Primary data on Chicken egg production activities were collected from the selected poultry farms. Data gathered included age of farm(s), location of the farm, Household labour used, Level of formal education of farm manager, number of egg laying birds, weekly egg production, poultry production system used, duration of egg gathering, quantity of feed used per week, monthly veterinary charges paid, salaries and wages paid, cost of transportation paid for feeds, wood shavings, drugs bought, payments for electricity charges, amount of loans taken, interest charges on loan, volume of water used per batch of birds reared, annual depreciation charges on poultry pens, cages, water tanks, egg crates, feeders, drinkers, and vehicles.

### Data Analytical Technique

Data were subjected to two inferential models namely farm budget model and Ordinary Least Square (OLS) regression model. These models are as shown below:

$$NFI = \sum P_i Y - \sum P_{xi} X_j - \sum Z_k \quad \dots(1)$$

Where:

NFI = Net Farm income from farm fresh whole Chicken eggs;

$Y_i$  = Quantity of Chicken Eggs gathered by ith farm in a year (crates)  $i = 1, 2, 3 \dots n$ ;

$P_i$  = Price per crate of Egg collected (₦);

$X_j$  = Quantity of jth Variable cost item incurred in Producing Chicken Egg ( $j = 1, 2, 3, \dots m$ );

$P_{xi}$  = Unit price of the  $j$ th variable cost item (₦);

$Z_k$  = The cost of  $k^{th}$  fixed cost item in Producing Chicken egg ( $k = 1, 2, 3, \dots, k$ );

$\Sigma$  = Summation sign.

The depreciation cost of all fixed production items was determined following straight line method with assumed scrap value of zero naira after three years. Thus:

$$\text{Annual depreciation} = \frac{\text{Current Value of Chicken Egg Producing Fixed cost item}}{\text{Expected lifespan of chicken Egg producing fixed cost item}} \dots(2)$$

The OLS profit regression model was implicitly stated as follows:

$$\Pi = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, \epsilon_i) \dots(3)$$

Where

$\Pi$  = Annual Net Production Profit (₦ '000);

$X_1$  = Wages/Salaries of production staff (₦ '000);

$X_2$  = Transportation Charges on feeds and other inputs (₦ '000);

$X_3$  = Age of Chicken Egg Farm (Years);

$X_4$  = Total annual number of Crates of gathered Fresh Chicken Eggs (Crates);

$X_5$  = Cost of Feed Consumed by Layer Chicken birds (₦ '000);

$X_6$  = Mode of Production (Battery Cages=0; Deep litter=1);

$X_7$  = Education level of Farm manager (Years);

$X_8$  = Amount of borrowed fund invested (₦ '000);

$X_9$  = Interest charge on borrowed funds (₦ '000);

$X_{10}$  = Depreciation of fixed Assets (₦ '000);

$\epsilon_i$  = Stochastic Error term.

## RESULTS AND DISCUSSIONS

### Chicken Egg Production

The Production characteristics of Chicken Egg producing farms in Abia State are shown in Table 1. The Table revealed distribution of the age of Chicken egg farms, their location,

system of Production, stock size, egg production system, daily egg production, and labour used. In terms of the age of the farms, the Table revealed that a reasonable proportion of the Chicken egg farms (51.7%) had existed for 6 to 10 years in Abia State and as low as 6.7% of the farms having existed for 16 years to 20 years in the area.

The mean age of the existence of the Chicken egg farms in the area is 8.0 years. Being able to sustain production for 8 years and upwards suggests that the farms at least had been breaking even. Profitability is a very important determinant of sustainability of an enterprise or business [6].

The Table further revealed that most of the Chicken egg producing farms (45.8%) was located in the semi-urban areas and as much as 37.5% of them in rural areas and the remaining 16.7% of them domicile in the urban centres.

The farms produce Chicken eggs under two popular production systems: Deep litter system (82.5%) and Battery Cage system (17.5%). In terms of production scale, they are mainly small scale poultry operators with as high as 90.9% of them stocking less than 1,000 birds. This conforms to findings of earlier researchers [7,12,13] and [15]. Cumulatively, less than 10.0% of the farms stocked between 1,001 and 5,000 laying birds. Daily egg collection varied based on the stage of growth of the birds (from the stage they started laying eggs to the stage when the birds were culled).

The Table revealed a modal range of 101 to 200 eggs per day accounted for by 33.4% of the farms and a least range of 501 to 1,200 birds accounted for by 0.8%.

Chicken egg producing farms in Abia State relied more on hired labour as 74.1% of the farms hired at most 5 persons and 4.2 % of them hired at most 20 persons depending on farm size and scale of production.

Hired labour attracted monthly wage of between ₦10,000.00 and ₦40,000.00 with a mean monthly wage of ₦11,028.20 in the area.

Table 1. Distribution of chicken egg farms by their Age (Years of existence) in Abia State

Age of Farm (Years)	Number (n=120)	Percentage (%)	Mean $\pm$ SD
1 - 5	38	31.7	
11 - 15	12	10.0	
16 - 20	8	6.7	7.6 $\pm$ 7.0
<b>Location</b>			
Urban Area	20	16.7	
Semi-Urban Area	55	45.8	
Rural Area	45	37.5	
<b>System of Production</b>			
Battery Cage	21	17.5	
Deep Litter	99	82.5	
<b>Stock Size of Chicken Egg Birds</b>			658.8 $\pm$ 180.6
< 1,000	109	90.9	
1,001 - 2,000	7	5.8	
2,001 - 3,000	1	0.8	
3,001 - 4,000	2	1.7	
4,001 - 5,000	1	0.8	
<b>Daily Egg Collected (Crates)</b>			240 $\pm$ 196.3
< 100	30	25.0	
101 - 200	40	33.4	
201 - 300	25	20.8	
301 - 400	22	18.3	
401 - 500	2	1.7	
501 - 1,200	1	0.8	
<b>Number of Hired Labour</b>			5.0 $\pm$ 3.0
1 - 5	89	74.1	
6 - 10	18	15.0	
11 - 15	8	6.7	
16 - 20	5	4.2	
<b>Hired Labour Monthly Wage (₦)</b>			9,479.4 $\pm$ 11,028.2
1,000 - 10,000	75	62.5	
10,001 - 20,000	41	34.2	
20,001 - 30,000	3	2.5	
30,001 - 40,000	1	0.8	

Source: Own Calculations, 2016

Egg production involved using inputs (laying birds, water, feed, drugs, other materials and labour) to technically give outputs as products (eggs, poultry droppings, and spent layer birds). A product is a commodity when all units of its production are identical. This shows that commodities are fungible and mean that each unit of the commodity is exactly like every other unit of it and should tend to be raw material [5]. The annual production of Chicken eggs, culled layers and poultry droppings involved combining resources which included water, feed, drugs, power, and asset depreciations as shown in Table 2.

Table 2. Estimated Net farm Annual Profit of chicken egg farms in Abia State, Nigeria in 2015

Item Estimated	Total annual cost ( N)	Percentage of total cost (%)
<b>A. Variable Cost:</b>		
Stock of Birds(3000 Birds at egg laying stage)	3,000,000.0	8.9
Commercial Feed (14,100 Bags*)	30,033,000.0	89.4
Hired labour (mean=4persons)	72,000.0	0.2
Water ( 416,000 litters)	208,000.0	0.6
Transportation cost/month	36,000.0	0.1
Taxes and Levies/month	18,000.0	0.05
Medication/bird	38,100.0	0.1
Egg storage cost/month	24,000.0	0.07
<b>Total Variable Cost (TVC)</b>	<b>33,429,100.0</b>	<b>99.5</b>
<b>B. Fixed Cost</b>		
Depreciation of Drinkers/month	20,919.6	0.06
Depreciation of Feeders/month	14,164.8	0.04
Depr. of Egg Packaging crates/month	21,310.8	0.06
Depr. of Production pens/Buildings/month	116,710.8	0.3
<b>Total Fixed Costs (TFC)</b>	<b>173,106.0</b>	<b>0.5</b>
<b>Annual Total Production cost</b>	<b>33,602,206.0</b>	<b>100.0</b>
<b>C. Revenue</b>		
Egg Sales (28,000 crates)	22,400,000.0	
Poultry Droppings (8,000 bags)	2,000,000.0	
Empty feed bags (249,600 bags)	24,960,000.0	
Spent Layers (3,000 birds)	3,000,000.0	
<b>Total Revenue (TR)</b>	<b>52,360,000.0</b>	
<b>Gross Margin GM= (TR - TVC)</b>	<b>18,930,900.0</b>	
<b>Net Profit (GM-FC)</b>	<b>18,757,794.0</b>	

Source: Own Calculations, 2016.

\* Feeds were sourced from various vendors and many farmers formulated the feeds used.

### Profitability

The profitability of Chicken egg producing farms was estimated as annual net farm profit from farmers whose birds had been laying and who have been selling eggs as at the time of the survey shown in Table 2.

The Table revealed the Total Variable Cost (TVC), Total Fixed Cost (TFC) and Total

Revenue estimates of the farms. The TVC of ₦33,429,100.0 estimated included 3,000 layers at egg laying stage, feeds fed, hired labour, water, transportation, taxes and levies, medication and egg storage charges. Among these cost items, the feed cost of egg laying birds constituted largest proportion of 89.4% and egg storage cost was the least accounting for 0.07% of the total costs.

The Table further showed the TFC of ₦173,106.00 to consist of cost of depreciation of assets (building, feeders, drinkers, and empty egg crates). The total revenue items included eggs sold, poultry droppings sold, empty feed bags sold and old layers sold within the year under review. The annual profits were shown in terms of Gross Margin or difference between annual total revenue and the variable cost (₦18,930,900.0) and net profit or difference between annual Gross margin and the fixed costs (₦18,757,794.0).

### Determinants of Profitability of Chicken Egg Production

Table 3 shows estimates of factors influencing profitability of chicken egg production enterprises based on use of the Ordinary Least Square in Abia State, Nigeria. Four functional forms tried: Linear, Exponential, Double-logarithmic, and semi-logarithmic posted highly significant F-ratios suggesting that any of them can be used to explain the factors influencing the profits realized by farms in production of the chicken eggs in the area. Comparatively, the double logarithmic functional form was chosen as the lead equation having the highest F-ratio of 67.92 and exposing the highest number of significant variables (nine out of eleven variables regressed). The coefficient of these variables conformed to *a priori* expectations. The highly positive significant factors that influenced profitability of chicken egg production in the state were staff wages and salaries, education level of farm manager, and location of egg producing farms. The Table revealed only one highly significant factor (interest paid on borrowed funds) and two moderately significant factors (transportation charges, cost of feeds consumed by the birds) as negatively influencing profitability of chicken egg production. This suggests that the

higher the interest paid on production loans, and the higher the transportation charges on products and inputs the less the profit earned by chicken egg producing farmers.

The number of eggs produced, age of the farm, and the borrowed funds invested are factors that positively but moderately influenced profitability of production in chicken egg farms in Abia State, Nigeria. The higher the value of any of these factors, the higher the profits realized from producing chicken eggs.

Table 3. Ordinary Least Square Estimates of factors that influenced profitability in chicken egg production in Abia State, Nigeria

Variable	Functional forms			
	Linear	Exponential	Double Log. <sup>§</sup>	Semi Log.
Constant	2921 (8.3)***	13.22 (5.2)***	5.82 (8.5)***	3724 (-6.8)***
Produced eggs (crates)	-7453 (-2.6)**	0.025 (2.6)**	1.89 (2.5)**	-351 (-2.7)**
Staff wages and Salaries	1845 (1.7)	0.123 (2.3)*	1.03 (3.1)***	3113 (1.2)
Transportation Charges	1922 (2.3)*	-0.50 (-0.01)	-1.64 (-2.6)**	7147 (0.9)
Age of Farm	-4857 (-2.1)*	-5.16 (-1.3)	-0.79 (-2.4)**	-1136 (-1.2)
Cost of Feed Consumed	1950 (2.4)**	0.130 (1.3)	-1.77 (-2.6)**	-5036 (-3.2)***
Mode of production	-2.980(-0.28)	0.406 (0.969)	0.053 (0.478)	99904 (2.56)**
Borrowed fund Invested	23669 (1.93)*	-2.229 (2.5)**	1.104 (2.56)**	45302 (1.4)
Interest paid on loan	-1.92(-2.5)**	-6.94 (2.2)**	-1.2 (-3.1)***	-1944 (-1.44)
Location of farm	17.84 (0.9)	0.04 (0.83)	0.311 (4.9)***	2066 (6.6)***
Asset Depreciation	0.891 (1.5)	-0.41 (-1.35)	0.001 (0.23)	190.8 (1.11)
R <sup>2</sup>	0.814	0.840	0.908	0.784
Adjusted R <sup>2</sup>	0.790	0.826	0.872	0.766
F-Ratio	60.13***	63.08***	67.92***	55.82***

Source: Own Calculation, 2016. § = Lead Equation  
 \*\*\*, \*\*, \* , represent Significance at 1.0%, 5.0%, and 10.0% alpha levels of probabilities. Figures in Brackets are t-values.

### Policy Issues and Recommendations

Issue of high cost of feeds was common with all the poultry farms. This challenge can locally be managed by finding alternative cheap feed stuff blended with other ingredients as locally available and used to supplement the regular commercial chicken feeds. Cooperative societies and contact farmers in the area can go into experimentation to identify good local feed stuff that are readily within their easy reach, edible and nutritious to egg laying chickens.

Chicken egg farms are better located within suburban areas to ensure high profitability.

We recommended strict enforcement of disbursement of low interest livestock loans, and setting up of chicken egg production clusters managed by educated and experienced managers by farmers and the Abia State Government.

## CONCLUSIONS

Chicken egg farms produce profitably in Abia State, Nigeria. Their production is largely in small scale under deep litter poultry system with few of them producing as medium scale farms both in deep litter and battery cage poultry systems. Chicken eggs are produced as Table eggs and this constitutes the primary product of this enterprise with culled birds and poultry droppings produced as secondary products. All products are marketed for income by the producing farms.

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