Costs and Returns Analysis Associated with Egg Production among Backyard Poultry Keepers in Kaduna North Local Government Area of Kaduna State, Nigeria

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***Abstract*: The costs and returns analysis associated with egg production among backyard poultry keepers in Kaduna North local government area of Kaduna State, Nigeria was evaluated. Primary data were collected from 30 farmers drawn from the study area using multi stage, purposive and random sampling techniques. Analysis of data was carried out with the use of descriptive statistics, net income analysis (budgeting) and profitability ratios. The result revealed that majority of the farmers are male (76.67 %) and 83.33 % were married. Majority of the farmers 83.33 % of the farmers had post primary education. 96.67 % of the poultry keepers are in their active working age of between 21 and 60 years with most of them 90 % having over 5years experience in egg production with an average bird size of 268. The net income analysis indicated that an average farmer invested annually ₦ 1,931,634.50 in poultry egg production with a total return of ₦ 2,325,573.13. The gross margin and net income were ₦ 491,557.63 and N 393, 938.63 respectively. These figures suggest that egg production in the study area is a profitable venture. The result also revealed that disease outbreak, high cost of feed, high cost of vaccine/drugs high mortality rate, egg spoilage and poor power supply were identified as the problems hindering egg production in the study area. The study therefore recommends that extension agents should intensify effort to educate poultry farmers about improved management practices that will lead to reduction of disease outbreak and affordable drugs / vaccine should be made available to the farmers at a substituted price by government and government should develop and enforce livestock feeds standards in order to protect farmers from dubious feed millers.**

***Keywords*: Costs, Returns, Egg Production, Net Farm Income, Backyard Poultry Keepers,**

I. INTRODUCTION

The term poultry simply mean birds that are domesticated that reared at home for provision of food such as egg and meat for human consumption. Other products such as their feather and poultry droppings are also of economic importance to man. Poultry birds also provide income to the farmers. The poultry industry is important to the Nigerian economy because it provides a good source of meat and eggs which gives animal protein. Proteins play key roles in the formation of a balanced human diet that is essential for better health, vigor, and productive capacity of the people (Abedullah *et.al.*, 2007). Protein builds and repairs body tissues; a low intake or deficiency of protein reduces the skillfulness of the young, hinders the development of the brain, retards rate of growth and increases rate of susceptibility to infections by animals (Ogidan, 2002). The Food and Agricultural Organization of the United Nations (FAO) stipulates a daily requirement of 65gm-75gm total protein, out of which 40% should be derived from animal protein. The average level of animal protein consumption in Nigeria is 15g/head/day which is grossly below the Food and Agricultural Organization recommended level of 35g/head/day (FAO, 1998). Protein from livestock is said to be nutritionally superior to that of vegetable origin because it contains a complete range of amino acids that are essential from maintenance of health. Thus protein from livestock is required to supplement those from vegetable origin to correct the serious imbalances in the nutritive value of the Nigerian diet which are dominated by foodstuffs rich in carbohydrate (Evbuomwan, 2006). The poultry sector is one of the most organized and vibrant segments of the agriculture industry in Nigeria . This sector generates direct and indirect employment and income for many people. The daily increased in population as make the demand so high. According to FAO report compiled by Pagani *et.al.*(2008) the Nigerian poultry sector, despite many problems such as a rise in the price of feed, avian influenza, the global financial crisis and inadequate credit, is still in expansion. This will lead to an increase in backyard and small-scale producers, particularly in urban and peri-urban zones, increasing the concentration of poultry and raising concern about human and poultry health. In Nigeria good number of the citizen practice what is called backyard poultry system. In the FAO scheme, "backyard" identifies a low-level input/output production sector, comparable to the village or scavenging system. In Nigeria, however, “backyard” is interpreted literally as “at the back of the yard” and is often used to describe a small-scale commercial production system that is characterized by improved flock management and with a primarily commercial objective. In practice, therefore, it appears to be more the

location than the management system that differentiates "farm" and "backyard" systems in Nigeria (Pagani et.al., 2008). The poultry egg industry, apart from providing employment and a livelihood to thousands of people in Nigeria, also provides high quality, nutritious food. The egg is a complete protein with excellent quality; one egg will give 6g of protein and egg-white protein has a biological value of 100, the highest biological value of any single protein (FAO , 2005). Tijani *et.al.*(2006) reported that eggs have many uses apart from domestic consumption in households; eggs are used in confectionery, bakery products, ice cream, and cosmetics. Egg shell is a good source of calcium. Nutritionally, eating an egg per day is a good way of putting proteins, fats, vitamins and minerals in human diet. According to Binuomote *et. al.* (2008) a medium sized egg supplies about 80 calories of energy to our body. The author further asserted that egg contains not only a trace of carbohydrate, but it was also adjudged to be a replacement for meat as it contains all essential amino-acids in adequate proportion required by the body for general growth and repair. Anyanwuocho (2000) define costs as the monetary value of inputs used in production and returns as the income realized from the sale of outputs. Hassan (2002) estimated the gross margin of poultry egg production for three local government areas in Kaduna State as ₦70, 688.57. Ekunwe *et al.* (2006) in their study reported an estimate of total fixed cost less depreciation per layer bird of ₦208.88, total variable cost per bird of ₦331.62, total revenue from sales of egg and other sources per bird of ₦3,749.22 with gross margin per bird of ₦3,417.6 and net profit of ₦3,208.72. However egg production in Nigeria is troubled with unstable trends in the economy. These problems make it very difficult to expand the scale of production and new egg producers find it hard to start the business. Other problems that hinder egg production in Nigeria agricultural sector includes high cost of feed, outbreak of diseases, and marketing problems (Nmadu *et al.,* 2014). This situation has forced many scale poultry farms to close down and those still managing to survive are producing at very high cost with very serious input limitation. In view of the above importance of egg this study is aimed at investigating the costs and returns associated with egg production among backyard poultry keeper in Kaduna North local government area of Kaduna state, Nigeria.

II. METHODOLOGY

A. Study Area

The study was conducted in Kaduna North local government area, Kaduna state. The local government area is located between areas of latitude 10^0 35" N North 10^o 40" North and longitude 7^0 20" and 7^0 25" East. It is bounded in the North by Igabi local government area and west by both Kaduna South and Igabi local government areas, and also in the east it is bounded by Igabi and Chikun local government areas. The state has a population of 6.066.512 people according to 2006 population census (NPC 2006). Kaduna state share boundaries with Abuja in south- east, Kano, Katsina and Zamfara states in the north - east and also with Niger in the north -west.

B. Sampling Techniques and Size

A multi- stage sampling procedure was used to select thirty backyard poultry keepers from the study area. Purposive sampling procedure was used to select Kaduna North local government area in Kaduna metropolis due to domiciliation of most of the researchers in this area. Similarly of three communities namely Kawo, Hayan-Banki and Faringida were also purposively selected from the local government area due to high level of concentration of backyard poultry keepers in these communities. The final stage is the use of random sampling to select ten backyard poultry farmers from each of the selected communities making a total sample of 30 respondents that were employed for this study.

C. Data Collection

Data for the study was collected through the use of structured questionnaires. The questionnaires were distributed to the backyard poultry keepers by the researchers and with the assistance of some agric field officers who helped in interpreting the questionnaires to the farmers. The data that were collected include demographic information such as age of farmers, farm size, sex, educational qualification, marital status, farming experience; production information such as number of birds, crates of eggs produced, feeding costs, vaccination costs, drug costs and the revenue from eggs, spent layer and manure, land rent, house rent, cost of nest, egg tray, construction of wells or boreholes and marketing information such as mode of sale, prices of inputs and outputs.

D. Analytical Techniques

The following analytical techniques were used to achieve the stated objectives of this study.

I. Descriptive statistics.
II. Net farm income analysis
III. Profitability ratios

*1). Descriptive Statistics***:** Simple descriptive statistics such as mean, percentage and frequency distribution was used to describe the socio economic characteristics of the farmers and problems encountered by them in egg production.

2). Net Farm Income Analysis: According to Olukosi and Erhabor (1988), Net farm income is defined as the difference between the gross margins (GM) the total fixed cost (TFC). This tool was used to achieve the profitability of egg production in the study area. The formula is expressed mathematically as:-

NFI= GM =TFC

Where,

NFI = Net Farm Income of Egg Production in the study area (₦)

GM = Gross Margin value of egg production in the study area (₦)

TFC = Total fixed cost of egg production in the study area. (₦)

The Gross Margin is expressed mathematically as:

GM = TR = TVC

Where,

TR =Total revenue obtained by the egg producers in the study area. (₦)

TVC = Total variable costs associated with egg production in the study area. (₦)

3). Depreciation of Fixed Asset: Fixed assets were depreciated using the formulae below.

$$Ds = \frac{Oi - Sv}{N}$$

D = depreciation

Oi = original cost if fixed asset

S_V = salvage value

N = No of expected useful year.

4). *Profitability Ratios*: The gross, operating, return per capital invested, rate of return on investment and capital turnover ratios were employed to analysed the performance of the backyard poultry keepers in the study area.

The Gross Ratio (GR) is given as Total Cost (TC) divided by Total Revenue (TR). That is GR=TC ÷ TR. This shows the proportion of the TR that goes into the total farm costs during the production period.

Operating Ratio (OR) is given as Total Variable Cost (TVC) divided by Total Revenue (TR). That is OR=TVC÷TR. The ratio indicates the proportion of the TR that goes to pay for the operating cost. It is directly related to the farm variable input usage.

Return Per Capital Invested (RPCI) is given as Net Farm Income (NFI) divided by Total Revenue (TR). That is RPCI = NFI÷ TR. This indicates the amount of money return to the investor for every Naira invested on a business.

Capital Turnover (CTO): = TR/TC

Where: TR= Total Revenue

CTO is defined as the total revenue divided by total cost of production. It describes roughly how much naira in revenue the farm can generate for each naira invested over a given period. That is, it is used to analyze the relationship between the money used to fund operations on the farm and the sales generated from the operations. This ratio should be greater than 1 for the investment to be profitable.

III. RESULTS AND DISCUSSION

A. Socio- Economic Characteristics of the Respondents

1). Age of the Respondents: The result of age of the respondents is presented in Table 1. The result showed that 40% of the backyard poultry farmers fall between the age levels of 41-50 years, 26.67 % are between the age of 51-60years.16.67% fall between 31-40 years, 13.33% fall between 21-30 years and 3.33% are in the range of 11-20 years. The result shows that the majority of backyard poultry farmers (96.67%) are in their active working age of between 21 -60 years. hence age may likely have positive impact on egg production in the study area. Abubakar (2004) reported that the age of a farmer is a very important factor in agriculture because it can be used to determine the type of agricultural activities performed by the farmers.

Table 1: Distribution of respondents according to their age group

Age(years)	Frequency	Percentage
< 21	1	3.33
1-30	4	13.33
31-40	5	16.67
41-50	12	40.00
51-60 > 60	8 0	26.67 0
Total	30	100

Source: Field Survey, 2018.

2). Gender of the Respondents: The result of the gender distribution of the respondents is presented in Table 2. The result reveals that 76.67% of the backyard poultry keepers in the study area are female while 23.33% are male. These shows that female are more than male in keeping poultry birds at backyard.

Table2: Distribution of respondents according to their gender

Sex	Frequency	Percentage
Male	7	23.33
Female	23	76.67
Total	30	100

Source: Field survey, 2018

3). Marital Status of the Respondents: The result of marital status of the respondents is presented in Table 3. The result indicates that 83.33% of the farmers are married while about 16.67% of them are single. This revealed that majority of the backyard poultry keepers are married. This their marital status is expected since majority of the backyard poultry keepers are within the age range of 31 – 60 years which under African culture they are expected to be married and have family of their own.

Table 3: Distribution of respondents according to their marital status

Marital status	Frequency	Percentage
Married	25	83.33
Single	5	16.67
Total	30	100

Source: Field survey, 2018

4). Educational Level of the Respondents: The result of the educational level of the respondents is presented in Table 4. The result showed that 63.33% of the backyard poultry keepers have secondary level of education, 20% have tertiary certificate while 16.67% of them have primary school certificate. This showed that majority of the poultry farmers are educated. This implied that most of the famers can read and write which will help them in interpreting recommended dosage of any drugs and vaccines, plus other feed supplements that need to be administered to the birds and can also follow standard feeding guide lines. The high level of education may also leads to better management especially in the area of record keeping. Amaza and Maurice, (2005) observed that farmer's efficiency in using information on new production technique increases with education and thus, their productivity.

Table 4: Distribution of respondents according to their educational level

Educational level	Frequency	Percentage
Primary	5	16.67
Secondary	19	63.33
Tertiary	6	20.00
Total	30	100

5). Years of Experience of the Respondents: The result of years of experience of respondents is presented in Table 5. The result revealed that 50% of the respondents have 5-10 years poultry production experience, 16.67% have 11-15 and 16-20 years of experience respectively, 10 % have 1-5years experience and 6.66 % of them have 21- 25 years poultry production experience respectively. This showed that about 90 % of the backyard poultry keepers have good knowledge of rearing a layer birds which had span for over 6 years and above.

Table 5: Distribution of respondents according to years of experience

Years of Experience	Frequency	Percentage
1-5	3	10.00
6-10	15	50.00
11-15	5	16.67
16-20	5	16.67
21-25	2	6.66
Total	30	100

Source: Field survey, 2018

6). Occupation of the Respondents: The result of occupation of the respondents is presented in Table 6. The result indicated that 40 % of the respondents are civil servants, 20 % are artisans, 16.67% are traders, 23.33 % of them practiced crop farming along with keeping poultry at their backyard. This showed that 100 % of the backyard poultry farmers in the study area have other source of income along with the poultry farming which makes them a better risk taker. This signifies that the farmers have what to fall back on when there are outbreak of epidemic of birds such as disease infestation which might result into loss of capital.

Table 6: Distribution of respondents according to their occupation

Occupation	Frequency	Percentage
Crop farmers	7	23.33
Traders	5	16.67
Artisans	6	20.00
Civil servant	12	40.00
Total	30	100

Source: Field survey, 2018

7). Sources of Capital to the Respondents: The result of sources of capital to the respondents is showed in Table 7. The result reveals that about 90% of the egg producers sourced their capital through personal saving, 6.67% took loan from banks and 3.33% obtained loans from cooperatives. The implication of this result is that majority of farmers may not be able to go on large scale production since their sources of capital is majorly through personal savings. The result also revealed that most of the poultry keepers do not need to panic in term of financial losses since the initial capital was obtained from personal saving rather from taking credit facility.

Table 7: Distribution of the respondents according to sources of capital

Source of Capital	Frequency	Percentage
Personal Savings	27	90.00
Loan from Bank	2	6.67
Loan From Cooperative	1	3.33
Total	30	100

Source: Field survey, 2018.

8). Size of Birds: The result of distribution of the respondents based on number of layer birds they possessed is presented in Table.8. The result showed that about 30 % of the backyard poultry keepers have birds that ranged between 301- 400 in number, 226.67 % have 201 – 300 layer birds, 20 % have 101-200 birds, 10 % of the keepers have 1- 100 and 401 -500 layer birds respectively while only 3.33% of them have layer birds that are higher than 500. This clearly showed that the backyard poultry keepers are mainly small scale producers. According to FAO report written by Pagani et.al.(2008) classify backyard poultry keepers as small scale commercial

producers who have few to 1500 birds in their farm. The average number of birds owned by backyard poultry keeper in the study area is about 268.

Table 8: Distribution of respondents according to size of Birds

Number of Birds	Frequency	Percentage
1 – 100	3	10.00
101 - 200	6	20.00
201 - 300	8	26.67
301 - 400	9	30.00
401 – 500 >500	3 1	10.00 3.33
Total	30	100

Source: Field Survey, 2018.

B. Estimated Mean Values of Costs and Returns Associated with Backyard Egg Production in the Study Area.

The mean costs and returns associated with backyard egg production is presented in Table 9. The result showed that a mean revenue of **₦2,325,573.13** was estimated from an average of **268** birds. Mean total production cost of **₦1,931,634.50** was also estimated made up of mean fixed and variable costs of **₦ 97,619.00** and **₦1,834,015.50** respectively given a mean gross margin and mean annual net farm income of **₦491,557.63 and ₦393,938.63** respectively for the thirty backyard egg producers in the study area. The result therefore revealed that egg production is profitable among the backyard poultry keepers in the study area. The result is in conformity with the findings of Ekunwe *et al.* (2006) who reported that egg production is profitable in Edo state, Nigeria with an average net farm income of **₦3,208.72** per bird which was higher than the net farm income value (**₦1,469.92)** per bird estimated in this present study.

C. Profitability Ratios.

In order to have a clearer picture of the performance of any enterprise, it is necessary to examine other measures of financial analysis such as, returns to the various factors of production inputs and other financial ratios. So this study therefore considered some profitability ratios namely, gross, operating cost, return per capital invested, rate of returns on investment and capital turnover ratios which were also computed in Table 9

Gross ratio generally helps in measuring the overall financial success or otherwise of a farm. The gross ratio (GR) from the table is obtained by dividing the total farm costs (TFC) by the gross income (GI) and this was computed to be 0.83. The ratio reveals that the total farm costs was about 83% of the gross income. Therefore, as a rule, a less than one ratio is always desirable for any investment. This means that the lower the ratio, the higher the return per Naira invested.

Table 9 also captured the operating cost ratio (OCR) for the respondents in the study area and it was calculated by dividing the total variable cost (TVC) by the gross income (GI) and from the analysis it was found to be 0.79(79%). This established the proportion of the gross income that goes to service the operating expense of the respondents and this is directly related to the farm variable input usage. As a rule, an operating ratio of one means that the gross income just defray the expenses incurred on the variable inputs used on the farm.

The return per capital invested in this study was computed to be 0.17. This shows that for every one naira invested on egg production a return of 17 kobo is obtained which an indication that the investment is a worth one.

The Capital turnover for the backyard poultry keepers was ₦1.20. The capital turnover values imply that for every naira invested in small scale backyard poultry-egg production, N1.20 was returned to the farm as revenue.

All the estimated values for the profitability ratio signifies that backyard egg production in Kaduna North local government area is a profitable venture

Table 9: Estimated means value of costs and returns associated with egg production in the study area

Parameters	**Value (₦)**	**% of TC**
Depreciated Fixed Items Land	22,975.00	1.19
Building	55,000.00	2.85
Nest	3,500.00	0.18
Drinkers	2,422.50	0.12
Feeders	11,221.50	0.58
Egg trays	2,500.00	0.13
Total Fixed Cost (TFC)	**97,619.00**	**5.05**
Variable Items		
Day Old birds	56,280.00	2.91
Feed	1,526,073.00	79.00
Drug/vaccine	40,040.00	2.07
Wood shavings	8,567.50	0.44
Disinfectants	6,450.00	0.33
Water	6,990.00	0.36
Labour	180,000.00	9.32
Transport	9,615.00	0.50
Total Variable Cost (TVC)	**1,834,015.50**	**94.95**
Total Costs (TC)	**1,931,634.50**	**100.00**
Revenue Items		
Egg	1,940,096.67	
Spent Layer	302,400.00	
Manure	83,076.46	
Total Revenue (TR)	**2,325,573.13**	
Gross Margin (GM) (TR – TFC)	**491,557.63**	
Net Farm Income (GM – TFC)	**393,938.63**	

Net Farm Income per Bird	**1,469.92**	
Gross Ratio (GR)	0.83	
Operating Cost Ratio (OCR)	0.79	
Return Per Capital Invested (RPCI)	0.17	
Capital Turnover (CTO)	1.20	

Source: Field survey, 2018.

D. Problems Militating Against Egg Production of Respondents

The result of the problem militating against egg production in the study area is presented in table 10. The result revealed that 43.33 % of the backyard poultry keepers identified diseases outbreak as a problem. Other problems affecting egg production in the study area are high cost of vaccine/drugs (20 %), high cost of feeds (13.33 %),while high mortality rate were identified as problems by 10 % of the farmers and 6.67% of the keepers identified poor power supply and egg spoilage as problem they encountered in egg production This study revealed that diseases outbreak is the major significant factor that militates against egg production in the study area. The result of this study corroborates the findings of Hassan *et. al.* (2005) that identified high cost of feed, high cost of vaccine and drugs as problems facing poultry egg production in Kaduna State. Similarly the result was in line with Nmadu *et. al.* (2014) that identified high cost of feed and outbreak of diseases as problems that hinder egg production in Nigeria agricultural sector.

Table 10: Distribution of respondents according to problems militating against egg Production in the study area

Problem	Frequency	Percentage
Diseases outbreak	13	43.33
High mortality rate	3	10.00
Poor power supply	2	6.67
High cost of feed	4	13.33
High cost of vaccine/drugs	6	20.00
Egg spoilage	2	6.67

Source: Field Survey, 2018. Multiple Response

IV. CONCLUSION

This study revealed that backyard egg production is profitable in the study area with a net farm income of **₦1,469.92** per bird. However, disease outbreak, high cost of feed, high cost of vaccine/drugs high mortality rate, egg spoilage and poor power supply were identified as the problems hindering egg production in the study area. The study therefore recommends that extension agents should intensify effort to educate poultry farmers about improved management practices that will lead to reduction of disease outbreak and affordable drugs / vaccine should be made available to the farmers at a substituted price by government and government should develop and enforce livestock feeds standards in order to protect farmers from dubious feed millers.

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