# ECONOMIC ANALYSIS OF POULTRY-EGG PRODUCTION IN BAUCHI LOCAL GOVERNMENT AREA, BAUCHI STATE, NIGERIA.

**BY**
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## DECLARATION

I hereby declare that this thesis titled "**Economic Analysis of Poultry-Egg Production in Bauchi Local Government Area of Bauchi State, Nigeria"** has been written by me and it is the record of my own research work. No part of this work has been presented in any previous application for another degree or diploma at any institution. All borrowed ideas have been acknowledged in the text and a list of references provided

..... …….

**Umar Mukhtar** **Date**

## CERTIFICATION

This thesis titled **"Economic Analysis of Poultry-Egg Production in Bauchi State, Nigeria"** by Umar **Mukhtar**, meets the regulations governing the award of the degree of Masters of Science (Agricultural Economics) of Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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## DEDICATION

This thesis is dedicated to the memory of my late brother Rabiu Mukhtar and daughter Zainab, senior. May their gentle and loving souls rest in peace.

**ACKNOWLEDGEMENTS**

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## ABSTRACT

This study is an Economic analysis of poultry-egg production in Bauchi LGA of Bauchi State. It examines, specifically, the socio-economic characteristics of the poultry-egg owners, profitability, technical efficiency (T.E.) as well as the scale of operations of poultry-egg production in the study area. Primary data were collected from the 32 poultry-egg producers in the study LGA. The data collected were subjected to descriptive statistics, farm budget technique and stochastic frontier production function. The findings indicated that most of the respondents (66%) were males and between 40-49 years of age and with an average of 8 years experience in the business. Furthermore, Poultry-egg business in the area was found to be dominated by small scale poultry-egg farms which accounted for about 53% of the total farms. It was found that over 90% of the cost of production was on the variable inputs. The result also revealed that large farm had the lowest cost of production per bird (₦3,453.21) and as the farm size decreases the total cost of production increases. Net Farm Income per bird was N1,360 for the small farm sizes ₦1,474 for the medium farm sizes and ₦1,463 for the large farm size. The small farm sizes made Rate of Return on Investment (RRI), Capital Turnover (CTO) and Profitability Index (PI) per bird of about 35%, ₦1.35 and ₦0.26. The RRI, CTO and PI obtained from the medium farm sizes were about 39%, ₦1.39 and ₦0.28. While RRI, CTO and PI for the large farm sizes were 42%, ₦1.42 and ₦0.30. These values imply that poultry-egg production was a profitable business in the area and large farm sizes were most profitable. Maximum Likelihood Estimate of coefficients of the stochastic frontier model for poultry-egg production in the study area shows that the estimated parameters were all positive. Only the parameters estimates of farm size, veterinary services, feed intake and labour were of statistically significant, indicating that they contributed incrementally to the total value of poultry-egg output in the study area. Productivity analysis showed a return to scale (RTS) of 0.89 indicating that the sampled poultry-egg farms operated in the rational stage II of the production surface. The large poultry-egg farms were most technically efficient with T.E. indices ranged from 56% to 95%. Analysis of inefficiency model shows that factors influencing T.E. were years of experience, access to credit, cooperative membership and extension contact. The study identified limited finance and high cost of inputs as the most serious constraints to the poultry-egg business in the area. It is recommended in the study that a modern feed mill should be established in the state by all stakeholders in the poultry sub-sector; extension agents should be encouraged; credit and inputs should be made available and affordable to poultry farm owners.

## Chapter 1

# INTRODUCTION

### 1.1 Background to the Study

Poultry refers to all birds of economic value to man as source of meat, egg and fibre. Egg production involves the use of good layer birds for the purpose of table egg production (Ogunlade and Adebayo, 2007). Eggs are major sources of animal protein in human diet. According to Oji and Chukwuma (2007) the poultry goes a long way in providing animal protein for the populace because it yields quickest returns and provides for meat and eggs in a very short time. Esingmer (1991) and Banerjee (1992) added that poultry eggs nearly approach a perfect balance of all food nutrients. The yolk and albumen contain 17.5% and 10% respectively protein by weight. It was also found by the Food and Agricultural Organization of the United Nations (FAO, 1990) that eggs rank second to cow milk in terms of nutritive value and are the most economically produced animal protein.

Animal protein is an essential part of human nutrition because of its biological significance. Iwena (2007) reported that proteins are required for the growth of young ones, formation of gametes in reproduction, formation of digestive juices, repair of worn-out tissues or cells, production of anti-bodies as well as enzymes and hormones in the body. Tijjani *et al*. (2006) reaffirmed that animal proteins are more "biologically complete" than vegetable proteins with regards to their amino-acids composition.

The dearth in the quantity and quality of protein supply in Nigeria is a challenge that is beyond dependence on plant protein alone. According to Fasasi (2006), Nigeria has a total land area of 98.3 million hectares out of which 71.3 million hectares are cultivable,

while 34.2 million hectares representing 48% of the cultivable area are actually being cultivated and less than 10% of the arable land is irrigated. It suffices therefore, to explore quality protein of animal origin of which poultry egg is of prime importance.

Globally, egg production is growing rapidly (39% over 10 years) with Asian countries in particular having the high rates of increase; China and India with increase of 42% and 67% respectively (Scanes, 2007). Nigeria hosts more than 45% of the poultry in the West African sub region (WHO, 2006) and its poultry population is estimated at 140 – 160 million comprising of 72.4 million chicken, 11.8 million ducks, 4.7million guinea fowl, 15.2 million pigeon and 0.2 million turkeys (FAO, 2006). This figure accounts for 71.38% of the total livestock kept in the country and supplies 17% of animal protein need of the population (Oji and Chukwuma, 2007).

The Ministry of Agriculture and National Resource (1998) and Eduvie (2002) stated that Nigerian poultry industry is dominated by small-holder farmers who on the aggregate raise bulk of the birds for egg production and meat, but individually rear less than 1000 birds using different production strategies in consonance with little resources available to them. Farming in general, has to use available inputs as efficiently as possible to achieve optimum production (Udoh and Akintola, 2001) and (Etim *et al.*, 2005). This study intends to evaluate how the poultry egg farmers manage resources for optimal profit and sustainable egg production.

## 1.2 Problem Statement

Hunger and malnutrition remain among the most devastating problems facing the world poor. The Food Insecurity Report by FAO (2002) estimated that 799 million people in

98 developing nations are not getting enough food to live a normal, healthy and active live. The supply of agricultural products from any nation to satisfy human wants and resources used in their production are very vital, due to their limited supply and stiff competition for them by many enterprises (Fasasi, 2006).

Most developing countries, including Nigeria have the problem of insufficient food production and protein deficiency. Nigerian agriculture belongs to the real sector of the economy and it is characterized by multitude of small-scale farmers scattered over wide expanse of land area, with small holdings ranging from 0.05 – 3.0 hectares per farm land, rudimentary farm systems, low capitalization and low yield per hectare (Fasasi, 2006). This may be one of the reasons why the production of food in the country has not increased at the rate that can meet the increasing population. The Central Bank of Nigeria (2004) confirmed that while food production increases at a rate of 2.5%, food demand increases at a rate of more than 3.5% due to high rate of population growth (2.83%) leaving a food deficient of 1% currently experienced in the country. In another study by the Federal Ministry of Agriculture Water Resources and Rural Development (1988), it was revealed that Nigeria's agriculture, not only failed to meet up in its food production in order to meet the food requirement of the increasing population, its greatest problem is that of inadequate animal protein in the diets of a large proportion of the population especially in the rural areas which constitute over 70% of the Nigerian population. This is supported by Ikhatua (2000) who said that in a nutrition profile on Nigeria, it was reported that the protein supply per caput was 44grams out of which animal protein constituted less than 2%. He added that average value for Nigerian is estimated to be 7.5g/head/day.

The aforementioned reasons made it very difficult to ensure the attainment of FAO recommendation of thirty-five grams (35gm) per caput of animal protein per day (Ojo, 2003). The current level of food insecurity calls for well defined approaches in meeting the desired objectives. One of the generally adopted approaches is through increased production and productivity of the poultry sub-sector. Increasing productivity and efficiency within the agricultural sector particularly among small-scale poultry egg producers require a good knowledge of the current efficiency or inefficiency inherent in the subsector as well as factors responsible for this level of efficiency or inefficiency. This is because despite the growth in the egg production industry since year 2000 in Nigeria (Tijjani *et al*., 2006), local demand has not been matched by local supply. It is against this background that this study examines economics of poultry egg production in Bauchi Local Government Area (LGA) of Bauchi State.

In view of the above, this study attempted to provide answers to the following research questions:

i. What are the socio-economic characteristics of poultry-egg farms owners in the study area?

ii. What is the scale of operation of poultry-egg enterprise in the study area?

iii. Is poultry-egg enterprise profitable in the study area?

iv. What is the technical efficiency of poultry-egg production in the study area?

v. What are the factors influencing technical efficiency in the poultry-egg production?

vi. What are the constraints faced by poultry-egg farm owners in the study area?

## 1.3 Objectives of the Study

The broad objective of this study was to carry out the economic analysis of poultry egg production in Bauchi LGA of Bauchi State.

The specific objectives were to:

i. describe the socio-economic characteristics of poultry-egg farms owners in the study area

ii. determine the scale of operations of poultry-egg production in the study area

iii. determine cost, returns and profitability of poultry-egg production in the study area

iv. determine the technical efficiency of poultry-egg production in the study area

v. identify the factors influencing technical efficiency in poultry-egg production

vi. identify the constraints faced by poultry-egg farms owners in the study area

## 1.4 Justification of the Study

Poverty, inefficiency and unemployment have been suggested by many empirical evidences as the areas of great concerns to policy planners as well as policy makers in developing countries. Nigeria has a great potential for better economic growth both in the short and long run than current experiences. The need to efficiently allocate productive resources as well as analyze profitability for development purposes cannot be over emphasized. Therefore, any attempt at studying efficient allocation of resources and measuring profitability on the farm represents an important source of achieving growth in the economy.

Another major motivation of this study stems from the belief that understanding the levels of inefficiency or efficiency can help address productivity gains in poultry egg production. The findings of the study will therefore help in identifying the most efficient means of combining increasingly scarce resources so as to maximize output from poultry-egg production, which will assist in bridging the gap between poultry products (protein) demand and supply in the study area in particular and the country in general.

The ability to quantify efficiency and profitability will help decision-makers to monitor the performance of the units under study. The study will serve as a means of providing information on the cost and returns structure for prospective investors in poultry egg production in the area. The knowledge of the scale of farming that is more technically efficient and profitable will help the farmers in decision making. To policy makers, the work will serve as a guide towards appropriate policy formulation. When the sources of inefficiency are identified, policy formulations to improve farmers' performance can be

effectively done. Finally, the results of the study will serve as a reference material to students and researchers for future studies.

## 1.5 Hypotheses

i. Poultry egg producers are not technically efficient.

ii. Poultry egg production is not profitable.

iii. There is no difference among the technical efficiency of the different structures operated by the poultry-egg producers.

## Chapter 2

# LITERATURE REVIEW

### 2.1 Economic Importance of Poultry Production

Over the last decade, the consumption of poultry products in developing countries has grown by 5.8% per annum, faster than that of human population growth, and has created a great increase in demand (FAO, 2004).

Poultry keeping is making an important contribution to the livelihood of the most vulnerable rural households in developing countries. In a study on income generation in transmigrant farming systems in East-Kalimantan, Indonesia, family poultry generated about 53% of the total income, which was used for food, school fees and expected expanses such as medicines (FAO, 2004). Poultry production is no doubt one of the most important ways of alleviating the scourge of protein deficiency in Nigeria and other developing countries. This is true because poultry can be set up under different climatic settings and its products are acceptable to all races and religious group (Okon, 1983).

Modern commercial poultry egg production started in Nigeria in the early 1960s. Ever since, it has assumed relatively important position in the Nations livestock economy. The contribution of poultry products (meat and eggs) to total livestock output increased from 26% in 1995 to 27% in 1999 while increase in production of eggs alone accounted for about 13% during the same period (Ojo, 2002).

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. It is also a source of vitamin A which protects against night blindness and prevents skin infections. In addition to meat and eggs, the poultry industry provides raw materials for the production of vaccines, mattresses and offer employment to many people (Bank, 1979). It has been described as the source of income to the poultry egg producers and serves as major ingredients in some food industries such as confectionaries and cocoa powder (Adetimirin, 2000).

The production cost per unit of poultry keeping is low relative to other types of livestock and returns to investment is high, thus farmers need just a small amount of capital to start a poultry farm. It has a short production cycle (pay back period), as such capital is not tied down over a long period (Ojo, 2003). In a related study by Okitoil *et al*. (2007) it was revealed that poultry raising is a popular activity among rural women in most countries. In fact, women have been reported to be predominant owners of rural poultry which indicates its role towards poverty alleviation among rural women.

Poultry waste is a good source of organic manure which is important for improving soil fertility and thereby increasing its productivity. Poultry excreta have become a considerable source of fertilizer to farmers in recent times owing to the fact that fertilizers and manure prices have gone up (Singh, 1981). Traditional curing, use for

rituals, gift, for cementing marriage and friendship and supplement of meals or to honour a guest are other roles of poultry (Nwagu, 2002).

## 2.2 Economies of Size in Poultry Production.

Ronald *et al.* (2008) conceptualized the economies of size as a production relation in which average total cost per unit of output decreases as output increases.

Profitability problem can exist in any single year due to low selling prices or low yields. If the problem persists even in years with above-average prices and yields, it may be caused by insufficient farm (flock) size. This is because; net farm income has been highly correlated with farm size (Ronald *et al*., 2008). Omotosho and Ladele (1988) classified poultry egg farms based on size as; small-scale poultry farm which contains less than 1000 birds, medium-scale farms had between 1000 to less than 5000 birds and large-scale poultry farms starts from 5000 birds. But according to Adesimi (1976), farm categorization is justified only in the context of the particular environment. As such, the measure of size to be used depends on the objective of the farm size comparison needed. Borrowing this idea, Fumure (1986) and Ajibefun *et al.*(2001) classified poultry farm as follows: 50-500 birds to be considered as small poultry farms, 501-1000 birds as medium-scale farms and above 1000 birds large-scale poultry farms.

In their research Damal *et al.* (2002) discovered that average flocks size of the poultry-egg producers in Plateau state was 711 birds per individual small scale category and the result suggests that with all other factors held constant, a unit increase in the number of birds would increase output by ₦ 817.8. Also, the ratio of Marginal Value Product

(MVP) and Marginal Factor Cost (MFC) for the farm size was 8.18 which indicate under utilization of this resource under current price situation.

In Ogun state, poultry-egg farmers with large farm size were found to be most technically efficient with a mean of 0.8877 while small farm size has the least mean of 0.8638 (Yusuf and Malomo, 2007). Their result further shows that a large farm has the lowest cost of production per bird. As the farm size increases the total cost of production decreases which means that large farm size has the highest average gross margin of ₦ 808.90 per bird per farm.

Analysis on poultry egg production in Oyo state by Binuomote *et al. (*2008) shows that stock of bird is the most important determinant of poultry egg production and the mean number of birds kept by the producers was 1571. This implies that average egg production in the state was largely in the medium-scale category. The coefficient of the stock of birds is 0.671 and significant at 1% level.

Ojo (2002 and 2003) asserted that mean farm size (stock of birds) kept by poultry-egg farmers in Osun state, was 2746 birds which indicates that egg production was in the medium scale category in the state. He added that stock of birds was one of the variables of interest and was effectively allocated and used as confirmed by its estimated coefficient value of 0.525.

### 2.3 Empirical Studies on Profitability of Poultry-Egg Production

The basis for profitability analysis is cost and returns analysis. It forms the basis of the whole decision-making process under resources constraints, which are put into

alternative uses. According to Anyanwuocho (2000), cost refers to monetary value of inputs used in production, while returns refer to income realized from the sale of output.

Ojo (2003), found that the mean value of egg produced in Nigeria was ₦6, 263,105.9 per farmer, when compared with a mean total cost of ₦2, 158,162.53 showing that egg production was very profitable in Nigeria. This was further confirmed by a net return of ₦1,498.88 per bird. Similarly, Hassan (2002) estimated the gross margin of poultry egg production for three local government areas in Kaduna State as ₦70, 688.57 and gross income was ₦201,609.38, where determined feed cost was ₦113,203.67, labour cost ₦68,001.13, chick cost ₦7, 980.08 and medication cost were ₦2 439.29 per 100 layers. Egg sales was ₦179, 772.38 and sales of spent layers was ₦21, 836.99.

Yusuf and Malomo (2007) highlighted that over 90% of the cost of production in poultry egg production is on the variable inputs. Large farm size has the lowest cost of production per bird because as the farm size increases the cost of production decreases. The feeds constitute the highest percentage of 78.09%, 81.04% and 83.86% of the cost for the different farm sizes (large, medium and small farms). This is followed by labour, cost of stock, transportation cost, medication, veterinary cost, while miscellaneous cost constitute the least cost in the cost of productions. They added that the gross margin and net revenue per bird from the business for small farm size were ₦694 and ₦589 respectively.

Charles (2006) gathered that the average variable cost per bird for Chick's Multiplication and Production System (CMPS) for farmers in Plateau State was ₦ 43.45 and average fixed cost was ₦6.64. The variable cost items he investigated were

supplementary feed, purchase of stock, labour and vaccines and these accounted for 24%, 27%, 33% and 2.8% respectively of total cost of production. His analysis shows that net farm income (NFI) per bird was ₦544.62, and the profitability index was ₦10.87 which means that when you invest one Naira in CMPS you get N10.87 return on the investment.

## 2.4 Conceptual Framework

### 2.4.1 Concept of technical efficiency

The modern theory of efficiency dates back to the pioneering work of Farell (1957) who got inspiration from Debreu (1951) and Koopmans (1951) proposed that the efficiency of a firm consist of technical and allocative components and the combination of these two components provide a measure of total economic efficiency (Overall efficiency). The author defined technical efficiency (TE), which is the main focus of this study, as the firm's ability to produce a maximum level of output from a given level of inputs and allocative efficiency (AE) as the ability of a firm to use inputs in optimal proportions, given their respective prices and available technology. Odii (1998) further added that, a firm is considered to be more technically efficient than another if when given the same quantities of measurable inputs; it consistently produces a larger output.

Technical Efficiency (TE) can be measured either as input-conserving oriented TE or output – expanding oriented TE. Input-conserving oriented measures of TE tend to address the question, "by how much can input quantities be proportionally reduced without changing the output quantities produced"? While the output – expanding oriented TE measures address the question "by how much can output quantities be

proportionally expanded without altering the input quantities used"? (Jondrow *et al.*, 1982; Ali, 1996; Coelli, 1998)

A technically efficient firm operates on the production frontier. A technically inefficient firm, that is one that operates below the frontier, could operate on the frontier either by increasing output with the same input bundle or using less input to produce the same output. The closer a firm gets to the frontier, the more technically efficient it becomes.

A graphical illustration of a production efficiency frontier is presented using the figure 1 below:

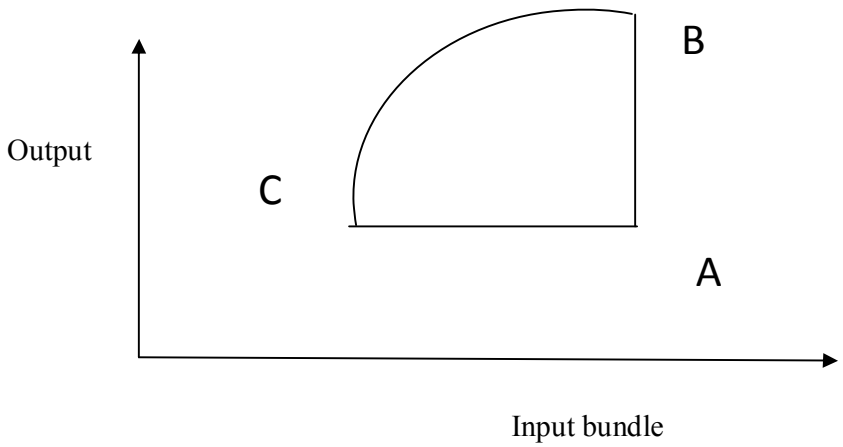


Fig. 1: Production frontier

A firm for example, at point A refers to the inefficient firm, while points B and C are both efficient because they are on the frontier. The firm at point A should therefore move upward to point B or backward to point C in order to be efficient. If the firm moves toward B, more output is obtained with the same amount of inputs (output-expanding) or if its movement is toward C, fewer amounts of inputs yield the same output (input-conserving). Both cases describe more technical efficiency than the former position A. Hoppe *et al.* (2001) have the view that the position of individual firm relative to the frontier, i.e. whether on the frontier or below it, could be influenced by factors such as environmental, structural and firm characteristics.

### 2.4.2 Factors influencing technical efficiency

A number of factors influencing technical efficiency have been identified by different researchers. Education, family size, access to credit, extension service and health status were identified as the factors affecting technical efficiency of tobacco farmers in Uganda (Obwona, 2000). Similarly, Coelli and Battese (1996) highlighted the number of years of schooling, farm size and age of farmer as the factors that are positively related to technical efficiency. Farming experience and education were both significant variables for improving technical efficiency. In addition, credit was found to be a very important variable that should be taken into account in trying to measure the level of technical efficiency (Kebede, 2001). Halfand and Levine (2004) explored the determinants of technical efficiency and relationship between farm size and efficiency in the central-west of Brazil. Type of land tenure, access to institutions and markets and modern inputs were found to be important factors causing differences in efficiency across the farms. Ahmad *et al.* (2002) investigated farm size, credit and location of market as the factors causing decline in technical inefficiency. In their study, Ajibefun and Daramola (2003) found that the age of farmer, level of education and level of investment are the most significant determinants of technical efficiency. It was also discovered that the more experienced a farmer is, the more technically efficient he is in livestock development project, poultry inclusive (Karki, 2004).

With reference to poultry egg production in Nigeria, it was advocated by Alabi and Aruna (2006) that on the average, the farmers in family poultry are 22% efficient in the use of combination of their inputs and they conclude that the output and technical efficiency can be increased by the use of more feed, capital, medicine and adoption of innovation. Similarly, Oji and Chukwuma (2007) stated that feed intake, drugs, labour

input, farm size, extension contact, credit, education and farming experience as the factors which influence the technical efficiency of poultry egg production. It is observed that the variables of years of schooling, experience and age of the poultry egg producers decrease the farmers' technical efficiency while the location of the poultry farms increases their technical efficiency (Ojo, 2003). According to Binuomote *et al*. (2008), stock of birds is the most important determinant of technical efficiency in poultry egg production while years of experience, management system, educational level and family size are the variables influencing the farmers' technical efficiency. They therefore concluded that a close attention should be paid to educational level and family size and always harness them towards increasing technical efficiency. Yusuf and Malomo (2007) highlighted years of experience and education have positive effect on TE at 1% while household size negatively affects efficiency at 1%.

## 2.5 Stochastic Frontier Production Function

Econometric modeling of stochastic frontier methodology associated with efficiency estimation has been an important aspect of economic research in the recent times. The major motivation for the study of frontiers is the need to measure inefficiency effects. Stochastic frontier is parametric in nature which imposes a functional form on the production and makes assumptions about the data. Cobb-Douglas, constant elasticity of substitution and trans-log production functions are the most common functional forms (Bhasin, 2002).

The main feature of the stochastic production frontier is that the disturbance term is a composite error consisting of two parts: a symmetric and a one-sided component. The symmetric component, $V_i$, captures the random effects due to measurement error,

statistical noise and other influences outside the control of the firm and it is assumed to be normally distributed (Udoh and Etim, 2007). They added that the one-sided (non-negative) component $U_i$, with $U_i \geq 0$ captures the technical inefficiency relative to the stochastic frontier. This randomness is under the control of the firm; its distribution is assumed to be half – normally distributed or exponential. The $V_i$, is assumed to be independently and identically distributed as; N $(0,\delta^2 V)$ random variables, independent of $U_i$s. The $U_i$s are also assumed to be independently and identically distributed as exponential (Meeusen and Vanden-Broeck, 1977), half normal (Aigner *et al*., 1977), truncated and gamma (Greene, 1990).

The stochastic frontier function model is estimated using the Maximum Likelihood Estimation procedure (MLE) (Olowofeso and Ajibefun, 1999; Amos, 2007).

### 2.5.1 The stochastic production frontier function

By definition, stochastic frontier production function is:

$$Y_i = f(X_i, \beta) \exp (V_I - U_i) \quad i = 1, 2 \text{ ---n} \quad \text{---------- (1)}$$

Where:

$Y_i$ = Output of the $i^{th}$ firm

$X_i$ = Vector of the quantities of input used by the ith firm

$\beta$ = Vector of unknown parameters to be estimated

F(.) = denotes an appropriate functional form

exp = Exponential base of natural logarithms

$V_i$ = Error term associated with random factors outside the Control of firm or management

$U_i$ = non-negative (one-sided) error term which captures the effects of technical inefficiency (Bhasin, 2002).

In the context of stochastic frontier production function, the technical efficiency (TE) of the individual firm is defined as the ratio of the observed output to the corresponding frontier output, conditional on the levels of inputs used by the firm. Therefore, technical efficiency of an individual firm can be obtained as:

$$TE = \exp(-U_i) \text{ ---------- (2)}$$

i.e

$$TE_i = \frac{Y_i}{Y_i^*} = \frac{F(X_i\beta)\exp(V_i - U_i)}{F(X_i\beta)\exp(V_i)} = \exp(-U_i) \text{ ---------- (3)}$$

Where:

TE = Technical efficiency of $i^{th}$ firm

$Y_i$ = Observed output from $i^{th}$ firm

$Y_i^*$ = Frontier output

This is such that $0 \leq TE \leq 1$ (Farell, 1957)

Maximum efficiency has a value of 1.0, lower value represents less than maximum efficiency in production. According to Idiong (2006), the difference between $Y_i$ and $Y_i^*$ is embedded in $U_i$ when U = 0, then production is in the frontier (i.e. $Y = Y^*$) and the firm is technically efficient. However, if $V_i > 0$, the firm is inefficient since production will be below the frontier.

### 2.5.2 Application of the stochastic frontier model

Several studies based mostly on Cobb-Douglas function and transcendental (translog) functions that are specified either as production function or cost function to estimate individual firm efficiency have been used in which both time varying and cross-sectional data were applied. Bakhshoodeh and Thomson (2001) determined input and output TE of wheat production in Kerman, Iran. They used a Cobb-Douglas frontier production function where the respective average efficiencies were estimated at 0.93

and 0.91. Wilson *et al*. (2001) also estimated TE of wheat farms in Eastern England using stochastic production frontier on panel data for the 1993 – 1997 crop years. The mean TE ranged from 62-98%.

Demir and Mahmud (2002) applied translog frontier production function to estimate the technical inefficiency model for Turkey with agro-climatic variables such as rainfall and land quality and it was found that the agro-climatic variables were statistically significant and their omission substantially affected mean output elasticities and relative TEs. A study by Mochebelele and Winter-Nelson (2002) on small-holder farmers in Lesotho used a stochastic production frontier to compare technical inefficiencies of farmer who sent migrant labour to the South African Mines and those who did not. A study on the production system of peasant farmers in two districts in Tigray region, northern Ethiopia employing stochastic frontier production function and simultaneously determined farmer-specific TE as well as determinants of inefficiency was conducted by (Gebreegziabher *et al*., (2006).

In Nigeria, the application of stochastic frontier method in Agricultural researches is a recent development. Ojo (2003) and Ohajianja (2005) applied the tool in poultry production in Nigeria and their estimated mean TEs were 0.76 and 0.45 respectively. Ajibefun (2006) used the approach to analyze the determinants of TE in traditional agricultural production and got the mean TE of 0.76. Also Amos (2007) used the method in his analysis of productivity and TE of small holder cocoa farmers in Nigeria where he arrived at average TE of 0.72. Few other notable studies recently include those of Okezie and Okoye (2006), Idiong *et al*. (2007), Effiong and Onuekwusi (2007), Amaza and Ogundari (2008) and Iheke (2008).

## 2.6 Problems Associated with Poultry Production

It was observed by Akeeb (1997) that limited finance, high cost of input and labour coupled with unfriendly government policies are the major hurdles to the overall performance of poultry producers. In the same vein, Oji and Chukwuma (2007) stated that the major problems associated with raising of layers commercially are their susceptibility to diseases and sensitivity to feeding and other environmental factors such as temperature, relative humidity, ventilation, light and sound. As noted by Fumure (1988), high capital investment cost resulting from scarcity of raw materials for plants, fixtures, buildings, equipments as well as feeds, are the bottleneck to small-scale poultry production.

High cost of feeds, poor quality of day-old chick, inadequate extension and training facilities are viewed as the bane to industrial poultry production in Nigeria (Alabi and Aruna, 2006). Closely linked to these, are inadequate information, inadequate input supply, marketing of products and access to capital as the constraints to poultry egg production (Olaniyi *et al*., 2008). In another opinion by Dama *et al.* (2002) apart from high cost of production inputs and poor extension services, other problems facing poultry egg producers in Nigeria include inadequate or difficulty in sourcing loans from commercial banks, price fluctuations and lack of storage facilities. Other researchers who have attributed the downward trend in poultry egg production in the country to increasing cost of feeds, poor quality feeds, inefficiencies in production and distribution of drugs/vaccines and other related inputs include (Olanloye, 1998; Adepoju, 1999; Hassan, 2002; Polycarp *et al.,* 2004).

## Chapter 3

# METHODOLOGY

### 3.1 The Study Area

This study was carried out in Bauchi LGA of Bauchi State, Nigeria. Bauchi LGA is one of the 20 LGAs of the state located in the North-eastern part of the country. Bauchi city is the capital of Bauchi State, of the Bauchi LGA within the state, and the traditional Bauchi emirate. The LGA had a population of 493,810 and annual growth rate of 3.1% (NPC, 2006). The projected population is estimated to be about 593,073 people by the end of 2012. Bauchi LGA occupies a total land area of 3,687sq.km representing about 7.5% of the state's total land mass and is located between latitude $10.18^{o}$ and $57.00^{o}$ N of the Equator. Longitudinally, the LGA lies between longitude $9.50^{o}$ and $39.00^{o}$ E of the Greenwich Meridian (Bauchi State Diary, 2010).

Bauchi LGA is covered by Sahel Savannah (semi-desert) vegetation zone. This type of vegetation comprises isolated stand 0f thorny shrubs. (Ibrahim *et al.,* 2005). The climatic condition of the area is characterized by two distinct seasons, dry and wet. It receives rains late, usually around May or June and records the highest amount of 700mm per annum. The mean daily maximum temperatures of the LGA range from $29.2^{o}$ C in July and August to $37.6^{o}$ C in March and April, While the LGA has a mean daily minimum temperature ranges from about $11.7^{o}$ C in December and January to about $24.7^{o}$ C in April and May (Ibrahim, *et al.,* 2005). The soil type of the area varies from sandy, clay loam and clay soil. The sunshine hours in the LGA range from about 5.1 hours in July to about 8.9 hours in November. Indeed, October to February usually records the longest sunshine hours (BASADP,2007). The agricultural practices in the

area can be categorized into three viz: arable, tree crops and livestock farming. Arable farming is the main agricultural practice in the area. Millet, sorghum, water melon, sweet potato and legumes are produced in commercial quantities as principal crops. The farmers in the study area also embark on small, medium and large-scale livestock production such as rearing of goats, sheep, cattle and poultry as well as marketing of their products. The major tribes in the LGA include Fulani, Hausa, and Kanuri.

### 3.2 Sampling Procedure and Sample Size

The total population was used as the respondents for the study. Bauchi Local Government (L.G.A.) has the largest concentration of poultry eggs farms (37) in the state based on the information provided by Avian Influenza Control Project (2010). All the 37 poultry farms in the L.G.A. formed the sample size for the study. These farms were scattered all over the 12 wards in the L.G.A. with more concentration in Hardo Dan'iya, Majidadi , Birshi miri, and Kangere Tirwun wards. The farms interviewed were structured into small, medium and large scale farms. This is because of the differences in their scales of production and there is need to have a true representation. The study considered farms with less than 1000 birds as small poultry farms, 1000-4999 birds as medium poultry farms and those farms that have 5000 and above birds as large farms based on the classification of Omotosho and Ladele (1988). This classification was adopted because it is the most widely used in the country.

### 3.3 Method of Data Collection

The study made use of both primary and secondary data. The primary data was collected by interview method using structured questionnaire. Information on egg output, inputs, inputs prices, output prices and socio-economic characteristics of the

poultry egg farms owners as well as constraints faced by the farms owners in the study area were collected.

### 3.4 Analytical Techniques

The tools used in analyzing collected data include; Descriptive statistics, farm budgeting techniques and stochastic frontier production function.

#### 3.4.1 Descriptive statistics

Simple descriptive statistics like means, percentages, frequency distribution and 5-point likert scale were used to achieve objectives (i), (ii) and (vi).

#### 3.4.2 Farm budgeting techniques

Olukosi and Erhabor (1988) described a farm budget as the detailed physical and financial plan for the operation of a farm for a certain period. They defined the Net Farm Income (NFI) as the difference between the Gross Income (GI) and total (fixed and variable) cost of production. They further added that NFI measures the strength and weakness of the farm. This technique was used to satisfy objective (iii) of the study. The model for estimating the NFI is represented by the following equation:

NFI = GI – TVC – TFC ---------- (4)

Where:

NFI = Net Farm Income (₦)

GI = Gross Income (₦)

TVC = Total Variable Cost (₦)

TFC = Total Fixed Cost (₦)

Components of the Total Variable Cost equation (4) were used in calculating the NFI for small, medium and large scale poultry-egg farms.

The fixed costs are those costs that do not vary with the levels of output in the short run (Olukosi and Erhabor, 1988). They are the costs that must be met whether the production is good or bad. The fixed assets (like buildings and machinery) were depreciated because they are not normally used up in a production cycle. The fixed inputs were depreciated using straight line method. Depreciation is the difference between the purchase value (P) and the salvage value (S) divided by the number of years of life of the asset. It is given by the formula:

$$D = \frac{P-S}{N} \quad \text{---------- (5)}$$

Where:

D = Depreciation (₦)

P = Purchase value (₦)

S = Salvage value (₦)

N = Number of years of the asset (No.)

According to Ronald *et al.* (2008), NFI should be considered more as a starting point for analyzing profitability than as a good measure of profitability itself. Because profitability is concerned with the size of the profit relative to the size of the business. Size is measured by the value of the resources used to produce the profit. A business can show a profit but have a poor profitability rating if this profit is small relative to the size of the farm business. Two farms with the same NFI, for example, are not equally

profitable if one used twice as much land, labour and capital as the other to produce that profit. Therefore, profitability is a measure of the efficiency of the business in using its resources to produce profit or net farm income. So, in order to conclude whether the enterprise is profitable or not, there is need to compute the profitability index as follows;

Profitability Index (PI) – This is the Net Farm Income (NFI) per unit of Gross Revenue (GR). That is;

$$PI = \frac{NFI}{GR} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (6)$$

Equation (6) shows the level of return per naira gross income. For a farm to be profitable, the PI should be greater than zero. If PI is negative, it implies that the farm is losing money

The following profitability measures were calculated:

i. Rate of Returns on Investment (%)

$$RRI = \frac{NFI}{TC} \times 100\% \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (7)$$

Where : TC = total cost, hence (TVC + TFC)

Equation (7) shows the ratio of the accounting profit to the investment in the farm, expressed as a percentage. The RRI should be greater than the cost of capital for the investment to be worthwhile. The RRI should also be greater than or equal to the interest/hurdle rate on fixed deposit.

ii Capital Turnover (CTO): = TR/TC..... (8)

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.

### 3.4.3 Stochastic frontier production function

This analytical tool was used to achieve objectives (iv) and (v). Drawing from equation (1), the production technology of poultry-egg producers was assumed to be specified by the Cobb-Douglas Frontier production function (Tadesse and Krishnamoorthy, 1997), which was defined as:

$$InY=\beta_o +\beta_I InX_1 + \beta_2 InX_2 + \beta_3 InX_3 + \beta_4 InX_4 + \beta_5 InX_5 + \beta_6 InX_6 + (V_i - U_i) \text{ -----} \quad (9)$$

Where:

| | | |
|---|---|---|
| In | = | Natural logarithms |
| Y | = | Value of poultry outputs (value for eggs, poultry manure and spent/culled layers) (₦) |
| $X_1$ | = | Farm size (number of birds) |
| $X_2$ | = | Veterinary service (₦) |
| $X_3$ | = | Feed (₦) |
| $X_4$ | = | Labour (₦) |
| $X_5$ | = | Capital input (Depreciation of farm equipment and poultry House valued in Naira) |
| $X_6$ | = | Utilities and other expenses (made up of electricity, water Supply, kerosene/gas, transportation in Naira) |
| $\beta_1 - \beta_6$ | = | coefficients of parameters estimated. |

$\beta_0$ = intercept.

$V_i$ and $U_i$ are as defined in equation (1). Based on equation (9), equation (10) was specified as below to enable the identification of the factors which influence TE.

$$U_i = \alpha_o + \alpha_1 Z_1 + \alpha_2 Z_2 + \alpha_3 Z_3 + \alpha_4 Z_4 + \alpha_5 Z_5 + \alpha_6 Z_6 + \alpha_7 Z_7 + \alpha_8 Z_8 + \alpha_9 Z_9 + \alpha_{10} Z_{10} \quad (10)$$

Where:

$U_i$ = Technical inefficiency as previously defined

$Z_1$ = Age of Farmers (years)

$Z_2$ = Marital status (MS = 1 for married and MS = 0 for single)

$Z_3$ = Gender of farmer (sex = 1 for male and sex = 0 for Female)

$Z_4$ = Family size (number)

$Z_5$ = Education Level (Number of years of schooling)

$Z_6$ = Years of experience (Years of poultry egg farming)

$Z_7$ = Number of extension contact in a production cycle.

$Z_8$ = Access to credit (CA = 1 for access to credit and CA = 0 Otherwise).

$Z_9$ = Membership of poultry association (1= member & 0 = Not member)

$Z_{10}$ = Market outlets (number)

These were included in the model to indicate their possible influence on the TE of the poultry egg farmers in the study area.

The $\alpha$s are coefficients of parameters estimated together with the variance parameters of $\sigma^2$ and □. The variance of the random errors, $\sigma^2 v$ and that of the technical inefficiency effects $\sigma^2 u$ and overall variance of the model are related as follows

$\sigma^2 = \sigma u^2 + \sigma v^2$ and the ratio $\gamma = \sigma u^2 / \sigma^2$, measures the total variation of output of poultry-eggs from the frontier which can be attributed to technical inefficiency (Battese

and Corra, 1997). The estimates for the parameters were obtained using the programme FRONTIER 4.1(Coelli, 1996).

### 3.4.4 5-Point likert scale

Sampled poultry-egg producers were asked to rate the constraints to poultry-egg production on a 5 point numerical rating scale of very important problem = 5, important problem = 4, less important problem = 3, not important problem = 2 and not a problem at all = 1. Respondents were expected to circle number between 1 and 5 against each constraint area, indicating the constraint area in poultry egg production. The total scores of respondents for the number of constraint area were articulated as follows;

i. Compute Weighted Average

$$X_w = \frac{5(N_1)+4(N_2)+3(N_3)+2(N_4)+1(N_5)}{F} \quad \text{----------11}$$

Where:

$X_w$ = Weighted average

$N_1 + N_5$= Rating scale

F = Frequency of respondents = 32

ii. The calculate mean score of respondents

$$\bar{X} = \frac{5+4+3+2+1}{5}$$

$$\bar{X} = \frac{15}{5} = 3$$

## 3.5 Definition and Measurement of Variables

1. **Age:** This refers to the number of years of the poultry-egg farm owner at the time of the survey. It was measured in years.

2. **Marital Status:** This refers to whether the poultry-egg farm owner is married or single at the time of data collection. It was measured as dummy (MS = 1 for married and MS = 0 for single).

3. **Gender:** This refers to the sex of the poultry-egg farm owner and was measured as dummy (Male = 1 and Female = 0).

4. **Family size:** This is the total number of people depending on the farm owner for their living and was measured in number of people.

5. **Years of Schooling:** This is the number of years the poultry-egg farm owner spent in acquisition of formal education and was measured in years.

6. **Years of Experience:** This refers to the number of years that the poultry egg farm owner has actively undertaken poultry farming. It was measured in years.

7. **Number of Extension Contacts:** This refers to the number of visits by extension agent to a particular poultry farm in a production cycle. It was measured in counts.

8. **Access to Credit:** This refers to whether or not a poultry-egg farm owner has access to credit. It was measured as dummy (CA = 1 for access to credit and CA = 0 for otherwise)

9. **Farm size:** This means the total number of layers kept by the farm owner during the year 2009 production cycle. It was measured in counts.

10. **Feed:** This is the value of compounded feed stuff fed to the birds. It was measured in Naira.

## Chapter 4

# RESULTS AND DISCUSSION

## 4.1 Socio-Economic Characteristics of Poultry-Egg Farms Owners.

Out of the 37 farms used for the study, only 32 (about 87%) farms provided usable data used for the analysis. The results of the analysis of socio-economic characteristics of the poultry-egg farms owners in the study area are presented as follows:

### 4.1.1 Age

As indicated in table 1, the results of the study revealed that, the average age of the decision makers of poultry egg enterprise was 41 years. This implies that poultry egg production in the area was embarked upon by men and women who were physically strong and mentally alert to face challenges which poultry farming in the developing countries like Nigeria requires. Majority of the respondents were in the age range of (40-49) represented by 53% which in turn suggests high level of vitality for agricultural activities.

Table 1: The Age Structure of Respondents in the Study Area.

| Age Group (years) | Frequency | Percentage |
|---|---|---|
| 20-29 | 4 | 13 |
| 30-39 | 7 | 22 |
| 40-49 | 17 | 53 |
| 50-59 | 3 | 9 |
| 60-69 | 1 | 3 |
| **Total** | **32** | **100** |

### 4.1.2 Educational status

Table 2 showed the level of education of the respondents in the study area. All the respondents attended at least primary school. It can be deduced that majority of (63%) them had tertiary education, while those who had only secondary and primary education were 28% and 9% respectively. This indicated that about 99% of the farms owners were literates. Educational level of farms owners is very important in the management of poultry and it is known to affect their farming activities. The high literacy level of the respondents would afford them the opportunity to understand and adopt modern farm practices thereby enhancing productivity and profitability. This agrees with the findings of Ikheola and Inedia (2005) which indicated a high literacy level of about 85% among poultry farms owners in Edo State

Table 2: Distribution of Respondents by Educational Status.

| **Level of Education** | **Frequency** | **Percentage** |
|---|---|---|
| Primary Education | 3 | 9 |
| Secondary Education | 9 | 28 |
| Tertiary Education | 20 | 63 |
| **Total** | **32** | **100** |

### 4.1.3 Farming experience of the respondents

According to the result presented in Table 3, only 16% of the respondents had between 11-20 years of experience in poultry-egg enterprise and a total of 56% had between 6-10 years. The mean years of experience was found to be 8 years. This suggests that majority of the poultry-egg farms owners in the area were fairly new entrants into the business. It is generally expected that productivity increases with years of experienced.

Farmers master the techniques of production and avoid previous mistakes. Experienced poultry-egg farms owners are likely to make better decisions to enhance productivity and income, because it is expected that experience in poultry-egg production usually determines the effectiveness of farmers' decision with respect to inputs combinations or resource allocation.

Table 3: Distribution of Respondents According to Years of Experience in Poultry-Egg Production.

| **Years of experience** | **Frequency** | **Percentage** |
|---|---|---|
| 1-5 | 9 | 28 |
| 6-10 | 18 | 56 |
| 11-20 | 5 | 16 |
| **Total** | **32** | **100** |
| **Mean** | **8** | |

### 4.1.4 Gender

The results in Table 4 revealed that 21 of the respondents were males while 11 were females which account for about 66% and 34% respectively. This indicates that poultry egg production is basically male dominated. This is expected given the drudgery nature, physical and energy demand as well capital intensive nature of investment required to establish poultry-egg farm enterprise.

Table 4: Distribution of Respondents Based on Gender

| **Gender** | **Frequency** | **Percentage** |
|---|---|---|
| Male | 21 | 66 |
| Female | 11 | 34 |
| **Total** | **32** | **100** |

### 4.1.5 Household size

Table 5 showed that poultry-egg farms owners in the study area had a mean household size of about 7 persons. This result was in conformity with opinion by Nwaru (2004) who reported that large household sizes enhance family labour availability, since it reduces labour constraints in poultry-egg production.

Table 5: Distribution of Respondents by Household Size.

| Household Size | Frequency | Percentage |
|---|---|---|
| 1-5 | 14 | 44 |
| 6-10 | 9 | 28 |
| 11-15 | 6 | 19 |
| >15 | 3 | 9 |
| **Total** | **32** | **100** |
| **Mean** | **7** | |

### 4.1.6 Marital status of the respondents

The results in Table 6 show that about three quarter (75%) of the respondents were married. The finding is almost in consonance with that of Ajala *et al*. (2007) who reported 86% (married) and 14% (single).The implication of this finding is that majority of the respondents can be considered to be responsible in taking rational decision that can improve productivity and income.

Table 6: Distribution of Respondents by Marital Status.

| Marital Status | Frequency | Percentage |
|---|---|---|
| Single | 8 | 25 |
| Married | 24 | 75 |
| **Total** | **32** | **100** |

### 4.1.7 Membership of cooperative society.

Table 7 showed that majority of the respondents (69%) did not belong to any cooperative society, while the remaining (31%) belong to one or more cooperative societies. Membership of cooperative societies is believed to enhance the sharing of information on improved technologies through interactions as well as easing inputs acquisition and utilization constraints faced by decision makers (Effiong, 2005; Kebede, 2001). The outcome of this research evidently showed that sizable percentage of the respondents were co-operatives member of society which means that they stand some benefit from collective actions of co-operative groupings.

Table 7: Distribution of Respondents by Cooperative Membership in the Study Area.

| Cooperative Membership | Frequency | Percentage |
|---|---|---|
| Member | 10 | 31 |
| Non-Member | 22 | 69 |
| **Total** | **32** | **100** |

## 4.2 Scale of Operation of Poultry-Egg Production in the Study Area.

The study revealed that about 53% of the respondents keep less than 1000 birds, 31% keep between 1000-4999 birds while only 16% of the respondents keep 5000 birds and above (Table 8). This result implies that poultry- egg enterprise in the LGA was

dominated by small scale farms category based on the classification of Omotosho and Ladele (1988) and as adopted in this work.

Table 8 showed the feature of the different scales of operation in the study area. It can be seen that the mean flock size for the three categories (small, medium and large farms) were found to be 444, 2360 and 5980 birds, respectively. The minimum size and maximum size for small farms in the study area were 200 and 800 birds respectively, for medium farms minimum and maximum stock size were 1000 and 3900 birds, while in the case of large scale 5000 and 7400 birds were obtained respectively.

Table 8: The Structure of Poultry Egg Farms in the L.G.A

| **Farm size (No of Birds)** | **Freq** | **%** | **Min No** | **Max No** | **Average No** |
|---|---|---|---|---|---|
| Small farm (<1000) | 17 | 53 | 200 | 800 | 444 |
| Medium farm (1000<5000) | 10 | 31 | 1000 | 3900 | 2360 |
| Large farm (5000 & above) | 5 | 16 | 5000 | 7400 | 5980 |
| **Total** | **32** | **100** | | | |

**4.3 Cost, Returns and Profitability of Poultry-Egg Enterprise in the Study Area**

The result of costs, returns and profitability of poultry-egg enterprise by farm sizes was presented in table 9. It was found that over 90% of the cost of production was on the variable inputs. The result also revealed that large farm had the lowest cost of production per bird and as the farm size decreases the total cost of production increases. This could be due to the fact that large farm size enjoys the benefit of pecuniary economies. Feeds constituted the highest percentage of the costs, accounting for 79.21%, 77.04% and 78.81% for the small, medium and large flock sizes respectively.

This is followed by cost of labour, cost of stock, veterinary services, while utility and other costs constituted the least in the cost of production. This validates the claims by Oluyemi and Roberts (1998), Ubosi and Sekoni (2000) that cost of feed is the largest single variable cost in animal production (including poultry).

The Net Farm Income (NFI) per bird from the enterprise for small farm was ₦1,359.59 and that of medium and large farm sizes were ₦1,474.03 and ₦1,463.27 respectively. This indicated that medium farm size had the highest NFI per bird; whereas the small farm size made the least NFI of ₦1, 359.59. This may be as a result of the fact that medium scale farms are more efficient in marketing than the small and large scale farms. On the other hand, large scale farms when oversupplied may be ready to dispose eggs at lower prices due to the fear of losing them overtime. This confirmed the statement by Scherer (1980) that profitability is not solely a function of largeness. Profitability reflects the overall suitability of firm's size in relation to its market environment and not just production and cost. These results were very close to the ₦1,494.88 reported by Adepoju (2008).. Dama *et al.* (2002) in their analysis on poultry reported much lower NFI ₦440.22. Rate of return to investment per bird from small farm size, medium farm size and large farm size were found to be 34.94%, 38.88% and 42.39% respectively. Musa *et al.* (2004) and Ajala *et al.* (2007) found higher results of 59% and 54% respectively.

Table 9: Cost and Returns of Poultry Egg Farmers (₦ per Bird).

| Cost Item | Small | % | Medium | % | Large | % |
|---|---|---|---|---|---|---|
| **Variable Cost** | | | | | | |
| Stocking | 222.19 | 5.71 | 191.25 | 5.04 | 175.42 | 5.05 |
| Feeding | 3,082.27 | 79.21 | 2,920.74 | 77.04 | 2,721.48 | 78.81 |
| Labour | 205.07 | 5.26 | 244.73 | 6.46 | 199.25 | 5.77 |
| Vet. Service | 192.23 | 4.94 | 186.40 | 4.92 | 180.60 | 5.23 |
| Utility and other costs | 100.39 | 2.58 | 202.41 | 5.34 | 136.75 | 3.96 |
| **Total variable cost** | 3,802.15 | 97.71 | 3,745.53 | 98.79 | 3,413.50 | 98.85 |
| **Total fixed cost** | 89.11 | 2.29 | 45.56 | 1.21 | 39.71 | 1.15 |
| **Total cost** | **3,891.26** | **100** | **3,791.09** | **100** | **3,453.21** | **100** |
| **Revenue** | | | | | | |
| Egg | 4,528.89 | 86.25 | 4,631.37 | 87.96 | 4,226.58 | 85.96 |
| Spent layer | 593.06 | 11.2 | 500.89 | 9.51 | 522.17 | 10.62 |
| Manure | 110.35 | 2.10 | 108.22 | 2.06 | 151.93 | 3.09 |
| Empty bags | 18.55 | 0.36 | 24.64 | 0.48 | 6.25 | 0.33 |
| **Total revenue** | **5,250.85** | **100** | **5,265.12** | **100** | **4,916.48** | **100** |
| **Net farm income** | 1,359.59 | | 1,474.03 | | 1,463.27 | |
| Rate of return on investment (%) | 34.94 | | 38.88 | | 42.37 | |
| Capital turnover | 1.35 | | 1.39 | | 1.42 | |
| Profitability index | 0.26 | | 0.28 | | 3.0 | |

The Capital turnover per bird was ₦1.35 for the small farm size, ₦1.39 for the medium farm size and ₦1.42 for the large farm size respectively. The capital turnover values imply that for every naira invested in small scale poultry-egg production, ₦1.349 was returned to the farm as revenue. For every naira spent on medium scale poultry production, ₦1.389 was generated as revenue. Also, ₦1.424 was obtained as revenue for every naira invested in large scale poultry-egg business in the area.

Also, the profitability indices for the small farm size, medium farm size and large farm size were ₦ 0.26, ₦0.28 and ₦0.30 respectively. This implies that for every naira earned as revenue from each of the different categories of farms, 26kobo, 28kobo and 30kobo returned to the three categories of farmers as net income respectively. The figure was found to be statistically different from the Least Square Difference test carried out. The profit made by the different farm may be as a result of many factors, such as cost of bird, and volume of sales among others. All these differ depending on farm size.

With these values of capital turnover and profitability index, improvement in poultry egg production is likely to increase the returns of poultry egg farmers in the study area. The higher RRI, CTO and PI of 42.37%, ₦1.42 and ₦ 0.30 respectively obtained by the large scale poultry farmers in the study area revealed that poultry- egg production, in general, was profitable and the large farm size had the highest profit, followed by medium farm size and then small farm size.

### 4.4 Test of Differences in Profitability between the Different Farm Sizes.

Analysis of Variance (ANOVA) and Least Square Difference (LSD) tests were carried out to establish whether significant difference exists among the 3 categories of farms in terms of NFI as proxy for profit. The result presented in table 10 showed the average NFI/Bird of the small, medium and large scale poultry farm in the study area. The F-value (198.00) revealed that there were significant differences among the profit obtained by the three sizes of the poultry farm under consideration. The LSD value (23.67) further proved that the profit obtained were statistically different from one another. Average NFI (₦1474.03) of the medium scale poultry -farmers was significantly higher than other two groups. The higher RRI, CTO and PI of 42.37%, ₦1.42 and ₦0.30 respectively obtained by the large scale poultry-egg farms in the study area was not a surprise because it was revealed in the technical efficiency results that large scale farms were more technically efficient. Also, bulk purchases of inputs and large operation may lead to reduction in their cost and allow them to enjoy economic of scale. The profit of the small scale poultry-egg producers was lower compared to the medium and large scale in the study area.

Table 10: Test of differences in profitability between the different farm sizes.

| | **Small Scale** | **Medium Scale** | **Large Scale** |
|---|---|---|---|
| Total cost | 3,891.26 | 3,791.09 | 3,453.21 |
| Total Revenue | 5,250.85 | 5,265.12 | 4,916.48 |
| N F I | 1,359.59[a] | 1,474.03[b] | 1,463.29[c] |
| | (6.264) | (1.637) | (2.744) |
| P I | 0.26 | 0.28 | 0.30 |

a,b,c NFI bearing different superscripts are different (P<0.01).
F – Value: 198.00***, LSD – 23.67
Figures in parenthesis are standard error
***P<0.01

## 4.5 Technical Efficiency Analysis

### 4.5.1 Estimates of the stochastic production function

The estimates of the Cobb-Douglass stochastic production function in equation 9 concurrently with the technical inefficiency effects in Equation 10 yields the results presented Table 11. The value of gamma ($\gamma$) = 0.99 is statistically significant at the 5% level, which implies that 99% of the residual variation egg output was due to the inefficiency effect. This was further confirmed by a test of hypothesis for the presence of inefficiency effects using the generalized likelihood ratio test. The chi-square computed was 15.73, while the critical value of the chi-square at 95% confidence level and 7 degree of freedom, $\chi^2(0.95, 7)= 14.07$. The null hypothesis of no inefficiency effects in poultry-egg production $\gamma = 0$, was strongly rejected. Thus, the Cobb-Douglas functional form is an adequate representation of the data. It also confirms the presence of the one-sided error component in the model; rendering the use of Ordinary Least Square (OLS) estimation techniques inadequate in representing the data. The sigma ($\delta^2$) on the other hand was 0.213 and significant, indicating the correctness of the specified assumption of the distribution of the composite error term.

The major factors affecting the output of poultry eggs were farm size, veterinary services, feed intake and labour (Table 11). The coefficient of farm size had a positive and significant association with output at 1% level. This implies that poultry egg production increased with increase in number of birds kept. Similarly, the coefficient of veterinary services was positive and significant at 1% level which implies that proper management involving the provision of adequate, qualitative and timely veterinary services to the birds will improve the technical efficiency of the farmers. The coefficient

of feed cost was also positive and significant at 5% level. This indicates that the higher the feed intake by the birds, the greater the technical efficiency of the farmers. The positive and significant sign of the coefficient is in line with the findings of Oji and Chukwuma ( 2007) and Binuomote *et al.(* 2007). The result is also supported by Olayide and Heady (1982), who said that feed intake has constant marginal efficiency until a maximum egg output per hen is attained. With constant feed-egg transformation rate, the limit of a hen's capacity to produce eggs economically lies in her ability to assimilate feed. Furthermore, coefficient of labour variable is positive and significant at 1% level. That is an increase in labour input leads increase in the output of poultry eggs

Table 11: Estimates of the stochastic production function and inefficiency parameters of poultry egg farms.

| Variables | Coefficients | Std error | t-ratios |
|---|---|---|---|
| **General model** | | | |
| Constant | 1.513* | 0.522 | 2.900 |
| In flock size | 0.195* | 0.077 | 2.536 |
| In veterinary services | 0.240* | 0.069 | 3.499 |
| In feed intake | 0.107** | 0.054 | 1.997 |
| In labour | 0.288* | 0.035 | 8.197 |
| In capital inputs | 0.039 | 0.058 | 0.666 |
| In utilities & other expenses | 0.023 | 0.042 | 0.562 |
| **Inefficiency model** | | | |
| Constant | 0.623 | 0.823 | 0.769 |
| Marital status | 2.583 | 3.096 | 0.834 |
| Gender | 0.146 | 0.505 | 0.288 |
| Family size | -0.005 | 0.003 | -1.484 |
| Educational level | -0.001 | 0.008 | -0.075 |
| Years of experience | -0.018* | 0.006 | -2.985 |
| Extension constant | -0.011** | 0.005 | -2.240 |
| Credit | -0.363* | 0.103 | -3.536 |
| Membership of cooperative | -0.341* | 0.119 | -2.871 |
| Market outlets | -0.023 | 0.042 | -0.562 |
| **Variance parameters** | | | |
| Sigma | 0.213* | 0.004 | 6.043 |
| Gamma | 0.999** | 0.466 | 2.145 |
| Log likelihood | 15.731 | | |
| Mean Technical Efficiency | 0.56 | | |
| Number of Observation (N) | 32 | | |

Note: *P<0.01,**P<0.05, ln= natural logarithm

### 4.5.2 Technical efficiency of the poultry-egg producers according to farm size

The result in Table 12 showed the distribution of technical efficiency according to farm size. Evidently The technical efficiency (T.E.) indices range from 0.41 to 0.67 (41%-67%) for the small farm size, with an average of 0.49 (49%). This means that if the average poultry-egg producer in the category was to achieve the T.E. level of its most efficient counterpart, then the average producer could realize a 27% cost savings (i.e. 1-0.49/0.67x100). Similar calculation for the most technical inefficient farm in this group reveals cost savings of 39% (i.e. 1- 0.41/0.67x100).

The average T.E. of the medium farm size was 0.53 (53%), with a minimum of 0.41 (41%) and maximum of 0.68 (68%). Also, for the average performing farm in this category to operate at 100%, it needs 22% (i.e. 1-0.53/0.68x100). Similarly, for the least efficient farm in the same class to attain the most efficient level, it needs 40% (i.e. 1-0.41/068x100).

The average T.E. of the sampled farms in the large farm size group was found to be 0.80 (80%), with minimum T.E. of 0.56 (56%) and a maximum of 0.95 (95%). These figures indicate that if the average farm in the sample were to reach the T.E. level of its most efficient counterpart, then the average farm could experience a cost savings of 16% (i.e. 1-0.80/0.95x100). The same computation for the most technically inefficient farm suggests a gain in T.E. of 39% (i.e. 1-0.59/0.95x100).

It is evident from the above discussion that large farm size had the majority (100%) of its farmer in efficiency intervals of 0.50-1.0; followed by medium farm size with most

of its producers in efficiency intervals of 0.50-0.69. The small farm size also had the greater percentage of its owners in efficiency interval of 0.30-0.69. This trend may be so due to the fact that farmers with large farm holdings may have more capital available at their disposal which may enable them to acquire technologies that made them to effectively utilize their productive resource efficiently. Table 12 also indicated that the mean technical efficiency of the poultry egg producers increases as the farm size increases.

Table 12 Distribution of technical efficiency according to farm size

| | Small farm size | | medium farm size | | large farm size | |
|---|---|---|---|---|---|---|
| **Interval** | **F** | **%** | **F** | **%** | **F** | **%** |
| 0.30-0.49 | 8 | 47 | 4 | 40 | - | - |
| 0.50-0.69 | 9 | 53 | 6 | 60 | 2 | 40 |
| 0.70-0.89 | - | - | - | - | 1 | 20 |
| 0.90-1.00 | - | - | - | - | 2 | 40 |
| **Total** | **17** | **100** | **10** | **100** | **5** | **100** |
| **Statistics** | | | | | | |
| Minimum | 0.405 | | 0.410 | | 0.585 | |
| Maximum | 0.671 | | 0.682 | | 0.951 | |
| Mean | 0.494 | | 0.531 | | 0.803 | |
| Median | 0.491 | | 0 .541 | | 0.873 | |
| Std. Deviation | 0.073 | | 0.098 | | 0.148 | |

F = Frequency

### 4.6 Factors Influencing Technical Efficiency of Poultry-Egg Producers.

The factors which influence the technical efficiency of the sampled farms were years of experience, credit, membership of cooperative and extension contact. However, family size, education level and market outlets were found to have the expected negative but insignificant coefficients. This implies that these factors do not contribute to farm inefficiency. Since these variables were not significant, they do not deserve further discussion. Similar results were gotten by (Umoh, 2006).

The year of experience is negatively signed and highly significant at 1% level of probability which implies that farmers with more years of experience tend to be more technically efficient in poultry egg production. Continuous practice of an occupation for a long period presumably makes a person more experienced and more productive in practice. This agrees with (Adeoti, 2004), who reported that years of experience reduce farmers inefficiency. The estimated coefficient of access to credit is significant at 1% level. This suggests that poultry-egg producers who have greater access to credit tend to be more efficient in poultry egg production. This is because poultry-egg production is highly labour intensive, substantial part of available credit is used to hire labour, especially for sanitation, feeding and medication operations. Also, the availability of credits helps to finance the purchase of feed and some expensive fixed inputs which have a positive effect on poultry-egg production. The findings are consistent with earlier results of Bravo-urata and Evenson (1994) and Ajibefun and Aderinola (2003).

Furthermore, the coefficient of membership of cooperative is negative and statistically significant at1% level. The implication is that inefficiency of poultry egg production will reduce with membership of cooperative. That is, poultry-egg producers that belong

to one or more cooperative societies tend to be more technically efficient in their production. This is because membership of organisation affords the operators the opportunity of sharing information on modern poultry egg production practices by interacting with other farmers. This assertion seems to be in consonance with the findings of Idiong *et al.(* 2005).

The coefficient associated with extension in the inefficiency function was negative and statistically significant at 5% level, implying that the variable reduced farm's technical inefficiency. Poultry-egg producers access to extension in this model clearly illustrate that those who had been regularly trained and visited by extension agent, trained and participated in some demonstration trials were more technically efficient. This is probably because extension agents frequently introduce packages and information which enhance the productivity of the farms and promote their efficiency. Similar result was gotten by (Amaza, 2002).

### 4.7. Elasticity of production and Returns to Scale

The return to scale (RTS) analysis which stands for a measure of total resource productivity is presented in table 13. The RTS parameter of 0.892 is obtained from the summation of the coefficients of the estimated inputs involved in production process (farm size, veterinary Service, feed intake, labour, capital inputs and utilities & other costs) which indicated that poultry-egg production in the study area was in the stage II of the production surface which by implication is within the rational zone for actors to operate.

Table 13 Elasticity of poultry egg production and Return to Scale (RTS)

| Variables | Elasticity |
|---|---|
| Farm Size | 0.195 |
| Vet. Services | 0.240 |
| Feed intake | 0.107 |
| Labour | 0.288 |
| Capital inputs | 0.039 |
| Utilities & other costs | 0.023 |
| **RTS** | **0.892** |

Stage II is the stage of decreasing positive return-to-scale, where resources and production were believed to be efficient. That is, increasing input use will result in the output increasing but at a decreasing rate until the optimum level is attained. Hence, it is advisable that the production units should maintain the level of input utilization at this stage as this will ensure maximum output from a given level of input *ceteris paribus,* that is all things being equal.

### 4.8. Constraints to Poultry-Egg Production in the Study Area.

The result of the analysis presented in table 14 revealed the constraints to poultry egg production in declining order of importance in terms of severity of the challenges.

#### 4.8.1. Limited finance

Respondents rated limited finance as the most important problem. This could be the reason why farmers could not acquire the necessary inputs especially fixed inputs for large scale production which attracts higher profit and efficiency. Supporting this assertion, Liu (2006), in his work found that Technical Efficiency was highly influenced

by financial constraints. This is because in addition to the quantity of inputs used, the timing of input usage also affects farm output.

### 4.8.2 High cost of inputs

This was the next most important constraints identified by the respondents. High cost of inputs makes it very difficult for existing firms to expand their scale of operation making a large number of them to stagnate in the small scale class, while new ones are reluctant to go into the business. .

### 4.8.3 Poor quality day old chicks

Stocking of poor breeds of poultry is tantamount to waste of effort because such breeds are positioned to get infected with diseases than good breeds. Poor quality day old chicks make the farms' investment less profitable if not a complete loss. This confirms the findings of Saleque (2000) who identified inappropriate breeds as one of the major constraints affecting poultry industry.

### 4.8.4 Scarcity of raw materials

Scarcity of raw materials for plants, fixtures, buildings and equipment coupled with their high cost were identified by the respondents as the $4^{th}$ most pressing constraint. It can be inferred that many small-scale poultry farms probably have been compelled to close down and those still managing to survive are producing at very high cost and contending with serious inputs limitations.

### 4.8.5 Inadequate storage facilities

The respondents in the study area pointed inadequate storage facilities as 5th most important problem to their business. The decision makers found it very difficult to purchase enough inputs especially feed which at harvest periods usually considerably cheap and available. The eggs can only be stored for few days in which case must be disposed even when the price is not favourable in order to avoid complete loss.

### 4.8.6 Other problems

Marketing of products and lack of extension services were of minor problems to the poultry industry in the study area because marketing of poultry products was not a problem among the farmers and most of the poultry farm owners enjoyed considerable services rendered by the extension agents.

Table 14 Ranking of Constraints to Poultry Egg Production

| Constraint | Highly important problem | Important Problem | Less important problem | Not Important problem | Not a problem at all | Rank |
|---|---|---|---|---|---|---|
| Limited finance | 19 | 11 | 2 | - | - | 1st |
| High cost of inputs | 17 | 12 | 3 | 1 | - | 2nd |
| Poor quality of day old chick | 8 | 18 | 4 | 2 | - | 3rd |
| Scarcity of raw materials for chicks, farmers, building equipment | 9 | 16 | 5 | 1 | 1 | 4th |
| Lack of storage facilities | 6 | 5 | 7 | 11 | 3 | 5th |
| Marketing of products | 4 | 9 | 3 | 10 | 6 | 6th |
| Lack of extension services | 6 | 3 | 4 | 10 | 9 | 7th |

Source: Field survey, 2010

# Chapter 5

## SUMMARY, CONLUSION AND RECOMMENDATIONS

### 5.1 Summary

The study "Economic Analysis of Poultry Egg Production in Bauchi LGA of Bauchi State, Nigeria" focused mainly on determining the T.E. and profitability of poultry-egg production as well as the factors influencing the poultry-egg production in the study area. The primary data were collected from 37 poultry-egg producers identified with aid of structured questionnaires but only 32 of the questionnaires from 32 farms were found useful. The data collected were analyzed using descriptive statistics, farm budget and stochastic frontier production function. The study revealed that the average egg production in the state was largely in small scale category with about 53% of the respondents keeping less than 1000 birds. The average flock sizes for the three categories (small, medium and large farm sizes) were 444, 2360 and 5980 respectively.

The farm budget analysis revealed that variable inputs constituted over 90% of the cost of production, with large farm size having the lowest cost of production per bird. This was followed by medium farm size and small farm size. Feed was identified as the highest among variable inputs; it made up 79.21% for the small farm size, 77.04% for the medium farm size and 78.81% for the large size.

The NFI per bird were found to be N1, 359.59 and ₦ 1,474.03 for small farm size and medium farm size respectively, while that for large farm size was ₦1, 463.27. This

indicated that the medium farm size had the highest average NFI followed by large farm size and small farm size respectively. In contrast, rate of return to investment, capital turnover and profitability index were all found to be highest in large farm size (42.37%, ₦1.42 and ₦0.30) per bird, followed by medium farm size (38.88%, ₦1.39 and ₦ 0.28). Poultry egg production was found to be in stage II of production with RTS of 0.892 and there was significance difference among the 3 farm sizes in terms of profit.

The distribution of Technical Efficiency according to farm size showed that large farm sizes were more technically efficient (mean=0.80), followed by medium farm (mean=0.53) and small scale farms (mean=0.49) respectively. An attempt was also made to ascertain the factors affecting Technical Efficiency in poultry-egg production. The result showed that year of experience, credits, membership of cooperative and extension contact had a positive relationship with technical efficiency. Limited finance was identified by majority of the farms owners as the most highly important problem facing poultry-egg production in the study area.

## 5.2 Conclusion

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 assessment of Technical Efficiency indicated that the resources were inefficiency exploited. The large farm sizes were however the most technically efficient, followed by medium scale farm sizes. Years of experience, access to credit, membership of cooperative organisation and extension contact were found

to have positive influence on Technical Efficiency. The implication of the study therefore is that the level of efficiency among poultry-egg producers in the study area could be increased by 44% through better utilization of available resources, given current state of technology and addressing those factors that are constraints to efficiency.

### 5.3 Recommendations

In line with the findings of the study, the following recommendations are put forward.

i. It is recommended that poultry-egg producers be encouraged to increase their scale of production for increased profitability. This could be achieved if small scale farmers can come together and pooling their resources together in cooperatives.

ii. Any measure adopted to reduce the cost of feed will lead to increased profitability. Therefore, there is need for the poultry-egg producers associations and corporate bodies to establish at least a modern feed mill in the state to provide feeds to the farms at cheaper rates. Research should focus on developing feed using local materials available in the country so as to make feed available and affordable to the poultry-egg producers.

iii It is also recommended that stakeholders in the sector should encourage extension agents through the provision of incentives such as in-services training, scholarship and better salaries. This will enhance efficiency of the extension service provides and in the long run, a better profit margin for producers.

iv. 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 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

v. It was found that membership of cooperative was also positively related to Technical Efficiency the implication is that the making and implementing policies that would encourage farms owners to form cooperative/organisation or join the existing ones will be a step in the right direction. This could also reduce the cost of inputs through bulk purchase as against individual procurement of inputs thereby reducing the cost of production.

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Appendix 1

ANOVA
TABLE

| *Source of Variation* | *SS* | *Df* | *MS* | *F* | *P-value* | *F crit* |
|---|---|---|---|---|---|---|
| Between Groups | 15870.03 | 2 | 7935.015 | 19837539 | 2.08E-11 | 9.552094 |
| Within Groups | 0.0012 | 3 | 0.0004 | | | |
| Total | 15870.03 | 5 | | | | |

## Appendix II
## ECONOMIC ANALYSIS OF POULTRY-EGG PRODUCTION IN BAUCHI STATE, NIGERIA: A CASE STUDY OF BAUCHI LOCAL GOVT. AREA

Dear respondent,

This questionnaire will be used by a student of the department of agricultural economics, Ahmadu Bello University, Zaria. Please fill as appropriate. All information will be treated with utmost confidentiality and strictly used for the purpose of research.

Thanks for your cooperation.

**LOCATION OF FARM…….....QUESTIONNAIRE**

**NO…….....DATE**.....

### A. SOCIO-ECONOMIC CHARACTERISTICS

**1.** Name of the farm ……..Respondent

Name.....

2. Sex: Male ( ) Female ( )

3 .Age (years) …….

4. Marital status: Married ( ) Single ( ) Widow ( ) Divorced ( )

5.Highest level of education

(a)No formal Education ( )

(b)Qur'anic Education ( )

(c)Primary School Education( )

(d)Secondary School Education ( )

(e)Tertiary education ( )

6. Family size (all the number of people depending on you for a living ) …….

7. How long have you been in a poultry egg production? (Years) …….

8. Do you belong to any co-operative/association? Yes ( ) No ( )

9. If yes, what are the major activities of the cooperation or association?

……

……

10. What benefits did you derive as a member?

……

……

11. Do you have access to credits? Yes ( ) No ( )

12. What are the sources of the credit?

(a) Commercial banks ( )

(b) Nigeria agricultural cooperative and rural development bank ( )

(c) Cooperative societies ( )

(d) Money lenders ( )

(e) Friends and family ( )

(f) Personal savings

(g) Others ( )……..

13. How much did you borrow from each source to finance last production?

| **SOURCE OF LOAN** | **AMOUNT (N)** | **INTEREST RATE (%)** |
|---|---|---|
| Commercial banks | | |
| Nigerian agricultural cooperative and rural development bank | | |
| Cooperative societies | | |
| Money lenders | | |
| Friends and family | | |
| Personal savings | | |
| Others (specify) | | |

14. Have you ever been visited by an extension agent? Yes ( ) No ( )

15. If yes, how many times in the last one year?.....

16. What advice did the agent give you?.....

……

17. How useful were the techniques learnt to the success of your farm?

(a) Very useful ( )

(b) Useful ( )

(c) Not useful ( )

**B. INFORMATION ON INPUTS**. How many cycles of production per year?

**(i) Flock size (last production cycle)**

| | **No of birds** | **Cost per bird (N)** | **Total cost ( N)** |
|---|---|---|---|
| No of birds (stock of bird) | | | |
| Mortality | | | |

**(ii) Variable Inputs (Last Production Cycle)**

| **Items** | **Quantity** | **Price per unit (N)** | **Total cost (N)** |
|---|---|---|---|
| Feed | | | |
| Drug | | | |
| Vaccines | | | |
| Water | | | |
| Electricity | | | |
| Kerosene | | | |
| Litter material | | | |
| Disinfectant | | | |
| Petrol/diesel | | | |
| Crates | | | |
| Others transport | | | |

**(iii) Fixed Inputs**

| Items | Quantity | Duration of use or cycles of production | Salvage value | Cost/unit | Total cost (N) |
|---|---|---|---|---|---|
| Cages | | | | | |
| Pens | | | | | |
| Drinkers | | | | | |
| Feeders | | | | | |
| Lantern | | | | | |
| Wheelbarrow | | | | | |
| Building/rents | | | | | |
| Generator | | | | | |
| Stoves | | | | | |
| Jerry cans | | | | | |
| Shovels | | | | | |
| Buckets | | | | | |
| Rakes | | | | | |
| Bowls | | | | | |
| Tanks | | | | | |
| (iv) Borehole | | | | | |
| Others | | | | | |

**(iv) Labour Used**

**Hired Labour (Last Production Cycle)**

| | ADULT MALE | | | ADULT FEMALE | | | CHILDREN | | |
|---|---|---|---|---|---|---|---|---|---|
| **OPERATION** | No of persons | Mode of payment | Cost (N) | No of person | Mode of payment | Cost (N) | No of persons | Mode of payment | Cost (N) |
| Drugs admiration | | | | | | | | | |
| Vaccination | | | | | | | | | |
| Sweeping/ cleaning | | | | | | | | | |
| Feeding | | | | | | | | | |
| Egg collection | | | | | | | | | |
| Record keeping | | | | | | | | | |
| Others | | | | | | | | | |

## Family Labour (Last Production Cycle)

| | **Adult Male** | | | **Adult Female** | | | **Children** | | |
|---|---|---|---|---|---|---|---|---|---|
| **Operation** | No of persons | Mode of payment | Cost (N) | No of person | Mode of payment | Cost (N) | No of persons | Mode of payment | Cost (N) |
| Drugs admiration | | | | | | | | | |
| Vaccination | | | | | | | | | |
| Sweeping/ cleaning | | | | | | | | | |
| Feeding | | | | | | | | | |
| Egg collection | | | | | | | | | |
| Record keeping | | | | | | | | | |
| Others | | | | | | | | | |

v. Do you have a permanent staff? Yes ( ) No ( )

If yes, state the category (Type) and their salary in table below.

| | **Category of worker** | | **Salary (N)/Month** | **Pay per production cycle (N)** |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |

**. INFORMATION ON OUTPUT (last production cycle)**

**i. Revenue from Egg Sales.**

| Egg Sizes | No of crates sold | No of crates consumed | No crates given as gift | Total Quantity produced | Average Price Per creat | Total sales (N) | Who are the buyers? If more than one buyer indicate |
|---|---|---|---|---|---|---|---|
| Large | | | | | | | |
| Medium | | | | | | | |
| Small | | | | | | | |

**ii. Value Of Spent/Culled Layers**

| Spent/culled layers | Number | Cost of Bird | Total sale(N) | Who are the buyers? |
|---|---|---|---|---|
| Sold | | | | |
| Consumed | | | | |
| Gift | | | | |

**iii. Revenue from Sales of Poultry By-Products**

| By-products | Quantity sold | Price per unit (N) | Total sale (N) | Who are the buyers? |
|---|---|---|---|---|
| Poultry manure | | | | |
| Empty bags of feed | | | | |
| Empty containers of disinfectants | | | | |
| Empty containers of drugs/vaccines | | | | |

## D. CONSTRAINT OF POULTRY-EGG PRODUCTION

| | Constraints | Ratings | Coping strategies |
|---|---|---|---|
| 2 | Limited | | |
| 3 | <u>High cost of Inputs</u><br>Feed<br>Drugs and vaccine<br>Labour<br>Water | | |
| 4 | Scarcity of raw materials for plants, fixtures, buildings and equipment | | |
| 5 | Susceptibility to diseases and sensitivity to environmental factors | | |
| 6 | Poor quality of day old chicks | | |
| 7 | Marketing of products | | |
| 8 | Lack of storage facilities | | |

Very important problem = 5 , important problem = 4, less important problem = 3, not important problem = 2, not a problem at all = 1

Suggest some possible solutions to the constraints you have identified above

……

……

**Thank you for your attention**.