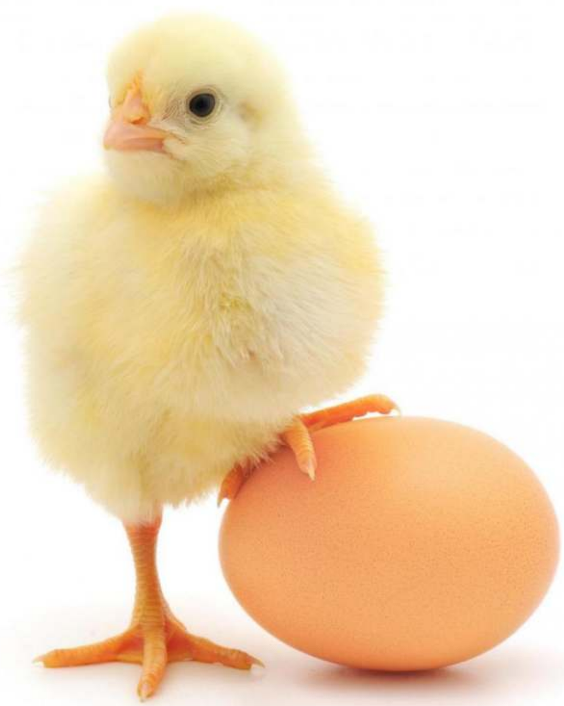
ISSN 1682-8356
ansinet.org/ijps



INTERNATIONAL JOURNAL OF POULTRY SCIENCE

ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

International Journal of Poultry Science 6 (9): 622-629, 2007
ISSN 1682-8356

Technical Efficiency of Poultry Egg Production in Ogun State: A Data Envelopment Analysis (DEA) Approach

S.A. Yusuf and O. Malomo
Department of Agricultural Economics, University of Ibadan, Ibadan, Nigeria

Abstract: The study examines the technical efficiency of poultry egg production in Ogun state using Data Envelopment Analysis (DEA) and OLS regression. The data for the study were collected with the use of well-structured questionnaires from poultry farmers. Average number of birds for small farm size is 301, for medium farm size is 740, while that of large size is 2288. The corresponding net returns were ₦589, ₦464.46 and ₦739.56 per bird per farm respectively. Majority of the farmers are relatively technical efficient in their use of resources, with mean technical efficient being 0.873. Farmers with large farm size are most technical efficient with a mean of 0.8877 followed by medium farm size with a mean of 0.8687 while small farm size has the least mean of 0.8638. The mean input slack for stock, labour and feed are 3.032, 8.942, 0.482 respectively, while the output slack is zero. Years of experience and education have positive effect on technical efficiency at 1 percent while household size negatively affects efficiency at 1 percent. The study concluded that poultry egg production is profitable in the study area and that majority of the farmers are relatively efficient.

Key words: Technical efficiency, profitability, poultry egg farmers, DEA

Introduction

In Nigeria, the production of food has not increased at the rate that can meet the increasing population. While food production increases at the rate of 2.5%, food demand increases at a rate of more than 3.5% due to high rate of population growth of 2.83% (CBN, 2004). The apparent disparity between the rate of food production and demand for food in Nigeria has led to increasing resort to food importation and high rates of increase in food prices.

The demand and supply gap for animal protein intake is so high. The FAO recommends that the minimum intake of protein by an average person should be 65gm per day; of this, 36gm (i.e. 40%) should come from animal sources. Nigeria is presently unable to meet this requirement. The animal protein consumption in Nigeria is less than 8gm per person per day, which is a far cry from the FAO minimum recommendation (Niang and Jubrin, 2001). As a result of the above, widespread hunger and malnutrition are evident in the country. Poultry meat and egg offer considerable potential for bridging the nutritional gap in view of the fact that high yielding exotic poultry are easily adaptable to our environment and the technology of production is relatively simple with returns on investment appreciably high. Animal scientists, economists and policy makers are of the opinion that the development of the livestock industry is the only option for bridging the generally known protein deficiency gap in a Nigerian's diets (Mbanassor and Nwosu, 1998). Apart from its contribution to the Gross Domestic product and provision of employment opportunities, poultry production is a major source of protein in the country (Ajibefun and Daramola, 1999). The need to meet animal protein requirements from domestic sources demands intensification of production of meat and eggs derived from prolific animals like poultry birds.

Poultry production has long been recognized as one of the quickest ways for a rapid increase in protein supply in the shortest run. Of recent, there has been a recorded improvement in poultry production sub-sector in Nigeria with its share of the Gross Domestic Product [GDP] increasing in absolute terms. Poultry eggs and meat contribution of the Livestock share of the GDP increased from 26% in 1995 to 27% in 1999 (CBN, 1999). This significant improvement in poultry production has been sustained by availability and use of improved vaccines which curtailed mortality rates in birds, reduction in the tariffs on imported day-old chicks and parent stock (CBN, 1999) and the relative ease of compounding efficient food using easily available local feedstuffs (Afolabi and Ojo, 2000).

This improvement could further be sustained with a proper analysis of the factors affecting technical efficiency of the poultry farmers. Determining the efficiency status of farmers is very important for policy purposes. In an economy where technologies are lacking, efficiency studies show the possibility of raising productivity by improving efficiency without increasing the resource base or developing new technology. It also helps to determine the under utilization or over utilization of factor inputs.

Most of the empirical literature dealing with farm efficiency, at least in Nigeria have been concerned with measurement of efficiency by using production function, profit function or stochastic production frontier model as analytical techniques. The application of DEA is till uncommon. This study intends to depart from the more common analytical approaches by using the DEA analysis of efficiency in poultry egg production in Ogun state. In this way it is hoped that the study will constitute a unique contribution to available literature on the empirical measurement of efficiency in poultry egg production in Ogun state. The study will identify factors at the farm level that affect framer's technical efficiency and determine the opportunities for increasing farm output; it will help in providing information for the formulation of appropriate policies.

Within this contextual problem statement, this study aims to examine the technical efficiency of poultry egg farmers in Ogun state, due to the fact that poultry is a popular venture in the state and is also a good source of protein. The study will therefore address the following research questions:

Is poultry egg production a profitable investment in Ogun state?

Are poultry egg farmers in Ogun state technical efficient?

What are the factors affecting technical efficiency of poultry egg farmers in the area?

What are the constraints facing poultry egg production in the area?

The rest of the paper is structured as follows. Section 2 provides the theoretical underpinning for the study while section three is on the methodology. Section four focuses on results and discussion and the last section concludes the paper.

Theoretical framework: The first analyses of efficiency measure started with Farell (1957) who, drawing inspiration from Debreu (1951) and Koopmans (1951) proposed a division of efficiency into two components: technical efficiency which represents a firm's ability to produce a maximum level of output from a given level of inputs and allocative efficiency which is the ability of a firm to use inputs in optimal proportions, given their respective prices and available technology. The combination of these two measures yields the level of economic efficiency.

Concept of Data Envelopment Analysis [DEA]: Data Envelopment Analysis [DEA] is an alternative non-parametric method of measuring efficiency that uses mathematical programming rather than regression. Here, one circumvents the problem of specifying an explicit form of the production function and makes only a minimum number of assumptions about the underlying technology. Farell (1957) formulated a linear programming model to measure the technical efficiency of a firm with reference to a benchmark technology characterized by constant returns to scale. This efficiency measure corresponds to the coefficient of resource utilization defined by Debreu (1951).

Charnes *et al.* (1981) introduced the method of Data Envelopment Analysis (DEA) to address the problem of efficiency measurement for Decision Making Units (DMUs) with multiple inputs and multiple outputs in the absence of market prices. They coined the phrase decision making units in order to include non-market agencies like schools, hospitals and courts, which produce identifiable and measurable outputs from measurable inputs but generally lack market prices of outputs (and often of some inputs as well). A DMU is regarded as a firm.

Assume there is a sample of N firms where each firm utilizes K inputs and M outputs. For the ith firm these are represented by the vector xi and yi respectively. Within the non-parametric approach, multiple inputs and multiple outputs are reduced to single virtual outputs, which are represented in ratio form. For each firm, a measure of the ratio of all outputs over all inputs such as, UiYi/ViXi where U is an M x 1 vector of output weight and V is a K x 1 vector of input weight, is a measure of efficiency. Hence, for firm 1, the following mathematical programming model must be solved.

$$\text{Max } u.v\ (U_iY_i/V_iX_i),$$
$$\text{Subject to:}$$
$$U_iY_i/V_iX_i = 1,\ I = 1, 2 \ldots N$$
$$U, V = 0 \qquad (1)$$

Where, U and V are vectors of variable weights to be estimated and yin and xi are output and inputs vectors of the ith firm respectively. As the ratio is maximized it would be constrained to be no greater than one, thus, all firms in the sample are forced to be on or below the frontier.

However, to avoid the problem of infinite number of solutions (that is, if U*, V*), is a solution variable then [αU*, αV*] is another solution e.t.c, a constraint $Vx_i = 1$ is imposed on the fractional programming model in equation (1) and this is formulated as the following linear program

$$\text{Min}_{\theta\lambda}\ \theta$$
$$\text{Subject to}$$
$$-Y, + Y_\lambda \geq 0$$
$$\theta X_i - X_\lambda \geq 0$$
$$\theta = \text{free},\ \lambda \geq 0 \qquad (2)$$

Where θ is scalar and is a N x 1 vector of constraints.

The above exposition is based on input orientation and assumed constant returns to scale [CRS]. But Banker *et al.* (1988), proposed a variable returns to scale (VRS) model to be used in a situation where the industries are not perfectly competitive. Extending the CRS linear programming and adding the convexity constraints did this:

$N 1^1 \lambda = 1$ to equation (2) to provide
Min, θ
Subject to:
$-Y_i + Y_\lambda \geq 0$
$\theta X_i - X_\lambda \geq 0$
$N 1^1 \lambda - 1$
$\lambda \geq 0$ (3)

Where N1 is an N x 1 vector of ones

This approach based on the work of Farell (1957) and Fare *et al.* (1994) has since been improved upon and extended by Battesse (1992) and Coelli (1995). Charnes *et al.* (1987) have also developed the fractional linear programming method of DEA, which compares inefficient firms with the 'best practice' ones within the same group. In Nigeria, Ajibefun (1998) in the use of non-parametric frontier production functions on the small-scale food crop farmers in Ondo state found that the current level of efficiency was not optimal, it could be improved upon (simply or raised).
However, the DEA approach suffers from criticisms that it takes no account of the possible influence of measurement errors and other noise data that are common in agriculture, since all observed deviations from estimated frontier are assumed to be the result of technical inefficiency (Coelli and Battese, 1996).

Materials and Methods

Study area: The study was conducted in Ogun state, Nigeria. Ogun state was created out of the former Western state of Nigeria on 3rd February 1976. Ogun state lies within latitudes 6^oN and 8^oN and longitudes $2^1/2$ ^oE and 5^oE. It is situated within the tropics and it covers about 16,400 square kilometers [approximately 1.9% of the area of Nigeria]. Agriculture remains the major occupation of the inhabitants, the people engage in such activities such as crop and livestock farming, poultry keeping, pottery and textile dyeing.

Sampling procedure: The sampling procedure involves multistage sampling. The first stage involved division of the state into three on the basis of agricultural zones; the second stage involved random selection of a farm settlement in each of the agricultural zones These are Ikenne from Ogun East, Ado-Odo from Yewa region and Ajegunle from Ogun Central. The last stage involved random selection of poultry farm households in each of the farm settlements. About 60 questionnaires were administered but only 49 were fully filled and used for the study.

Types of data collected: The primary data were collected by means of structured questionnaires from the sampled farm households. On the other hand the secondary data were obtained from relevant publications. The questionnaires were administered with the assistance of trained enumerators. Primary data on socio-economic characteristics collected include those on age, primary occupation, gender, years of schooling and family sized. Primary data were also collected on the farm inputs and outputs. These inputs include birds, drugs, feeds, family labour and hired labour. Data were also collected on their farm sizes, number of birds, method of rearing and quantity of sales as well those on the prices of the inputs and outputs.

Methods of data analysis: To determine the profitability of poultry egg production, the gross margin was carried out. Gross margin is the difference between the gross income and the total variable cost.
The mathematical notation for the analysis is presented below:

$$GM = \sum P_i Y_i - \sum r_i c_i \ (I = 1, 2 \ldots n)$$

Where
GM = Gross Margin
P_i = the farm gate price of the ith egg in crate
Y_i = Output of the ith farm producing ith egg
r_i = market price of variable cost
c_i = variable cost
N = Number of the ith farm

The net revenue was also calculated using the formula below:

Net revenue = Total income-Total cost
Total cost = Fixed cost + Variable cost.

To obtain the worth of each of the fixed cost items the straight line method of depreciation was used and it was assumed that the salvage value of the fixed items used in the business is zero. The formula for depreciation using straight line method is given as:

$$\text{Depreciation} = \frac{\text{Purchase price}}{\text{No of years of useful life of the asset}}$$

To analyze the technical efficiency of poultry egg farmers in the study area, Data Envelopment Analysis (DEA) was used. The key construct of a DEA model is the envelopment surface and the efficient projection path to the envelopment surface (Charnes *et al.*, 1995). The envelopment surface will differ depending on the scale assumptions that underline the model. The efficiency projection path to the envelopment/surface will differ depending on if the model is output-oriented or input-oriented. The choice of model depends upon optimization production process characterizing the firm. Input oriented DEA determines how much the mix for a firm would have to change to achieve the output level that coincides with the best practice frontier. Output-oriented DEA is used to determine a firm's potential output given its inputs mix if operated as efficiently as firms along the best practice frontier. For this study input-Oriented DEA was used to determine how much input mix the farmers would have to change to achieve the output level that coincides with the best practice frontier.

DEA is a relative measure of efficiency where the general problem is given as:

$$\text{Max TE} = \frac{\sum_{r=1}^{s} \alpha_r y_{ro}}{\sum_{r=1}^{m} \beta_i X_{io}} = \frac{q}{q^*} \qquad (4)$$

Subject to:

$$\frac{\sum_{r=1}^{s} \alpha_r y_{rj}}{\sum_{r=1}^{m} \beta_i x_{ij}} \leq 1, j = 1,\ldots,n$$

α_r, β_i = 0, r = 1,…,s; I = 1,…,m

Where x_{ij} and y_{ij} respectively are quantities of the i^{th} input and r^{th} output of the j^{th} firm.

Inputs = Number of birds, Labour, Feed.
Output = crates of egg
Firm = 1…49.

β_i and α_r are input and output weights respectively.
The variables of Data Envelopment model are further elucidated upon below

Y_{ij} = output
X_{ij}'s are:

Farm size: The output of a poultry farm is partly dependent on the number of birds in the farm.

Labour: Family and hired labour plays an important role in agricultural production especially in developing economies where capital is less significant. In countries where there is rapid population growth, there is often an excess population on land (Meier, 1989). Labour is expressed as adult male-equivalent man-day and is the summation of family labour and hired labour. Female equivalent man-day is 0.75 while that of children equivalent man-day is 0.50 (Norman, 1970). This is done to take into consideration different capacity of labour categorization.

Feed: This is the compounded feedstuff given to the bird. It is one of the major determinants of productivity in poultry egg production. It is measures in 25kg bag.

Regression analysis: The farmers' specific characteristics were modeled as determinants of efficiency to understand how these characteristics influence the level of efficiency of the poultry farmers.

Y = f (X_1,X_2,X_3,X_4,X_5)
Y = Technical Efficiency (derived from DEA model)
Where X_1 = Farming Experience (yrs)
X_2 = Dummy variable for Gender (male=1, otherwise =0)
X_3 = Education {yrs}
X_4 = Dummy variable for Main Profession (farming =1, otherwise = 0)
X_5 = Household Size

Descriptions of variables and their expected signs: To explain the influence of some variables on efficiency level of farmers, their expected signs in their coefficients were predicted 'a priori'.

Farming experience: Literature reviews on farming experience on efficiency have given mixed results. Farming experience could have negative or positive effect on the efficiency of the farmer. Parikh *et al.* (1995) reported a positive relationship between the age of the farmers (which is positively correlated with farming experience) and the efficiency of farmers in Pakistan and Ethiopia respectively. This findings stem from the fact that farmers with more years of experience and are older are likely to be more conservative and, therefore less willing to adopt new practices, thus leading to low efficiencies in production. Coelli and Battese (1996) reported negative production elasticity with respect to farming experience for farmers in two villages in India, thus suggesting that older farmers are relatively more efficient and vice-versa.

Gender: Dummy variable was used to represent sex taking on the value of 1 if the farmer is a male and 0, if otherwise. This could have either a negative or positive influence as the case may be. Ajani (2000) reported a negative coefficient for gender in her normalized profit function analysis for maize and yam enterprises. While Awoyemi (2000) in his gender analysis of economic efficiency reported a positive coefficient in cassava-based farm holdings.

Education: Studies have shown that farmers with formal education have a great ability to adopt new technology and innovation. This is expected to have a positive influence on their level of efficiency. Coelli and Battese

Table 1: Descriptive Statistics of Farm size

Farm size	Mean	Median	Mode	Standard Deviation	Min. Value	Max. Value
Small farm size	301.6	300	200	107.5	140	488
Medium farm size	740.9	759	800	159.9	512	1000
Large farm size	2304.2	1960	N/A	950.8	1200	3900

Source: Field Survey, 2005

Table 2: Cost and Revenue of Poultry Egg Farmers per Bird

	Farm size categories					
Cost item	Small	%	Medium	%	Large	%
Feeding	2876.09	78.09	2944.24	81.04	2998.24	83.86
Labour	266.70	7.24	252.76	6.96	189.64	5.30
Medication	78.45	2.13	55.92	1.54	49.89	1.40
Vet. services	64.97	1.76	54.38	1.50	31.4	0.88
Transportation	99.99	2.71	73.78	2.03	64.60	1.81
Stocking	155.42	4.22	147.24	4.05	148.33	4.15
Other costs	36.37	0.99	17.31	0.48	23.73	0.66
Total variable cost	3577.99	97.14	3545.63	97.57	3505.83	93.03
Fixed cost	105.23	2.86	87.59	2.41	69.34	1.94
Total cost	3683.22	100	3633.22	100	3575.17	100
Revenue						
Egg	3853	90.19	3656.98	89.25	3867	89.63
Spent layer	419.20	9.8	440.70	10.75	447.31	10.37
Total revenue	4272.37	100	4097.68	100	4314.73	100
Gross margin	694.38		552		808.90	
Net revenue	589		464.46		739.56	

Source: Field Survey, 2005

Table 3: Summary of Technical Efficiency of Production

Interval	Frequency	Percentage
0.501-0.6	_	_
0.601-0.7	1	2.04
0.701-0.8	7	14.29
0.801-0.9	23	46.94
0.901-1.000	18	36.73
Total	49	100

Source: Field survey, 2005

(1996) have confirmed the positive influence of education on farmers' production efficiency.

Household size: This is the total number of people living together in a house, feeding from the same pot. It is expected to have a negative influence on efficiency. Okike (2000) confirmed the negative influence of household size on farmers' efficiency. Large family size having economic inefficiency is plausible considering the value of farm products that could have be sold but are consumed directly by the household. In a situation where the family size is large and only a small proportion of farm labour is derived from it, then the inefficiency effects are expected to be greater.

Main profession: It is common for some farm households to engage in other non-farming activities to complement their earnings from the farming occupation for their livelihood. It could be positive or negative (Amaza, 2000).

Results and Discussion

The distribution of the poultry farmers indicates that about 51.0 percent operate small scale, 36.7 percent medium scale and the rest operate large scale. Table 1 shows the features of the different scales of operation.
About 81.6 percent of the farmers in the study area used battery cage system, 2.1 percent used deep litter system, while 16.3 percent used both. It is obvious that battery cage system is commonly used in the study area this may be due to the fact it is easy to manage and it also reduces the number of cracks.
Most (89.80 percent) of the farmers started with day-old chicks, 8.16 percent with point of lay and 2.04 percent with both. A larger proportion of the respondents prefer to raise their birds from day old to make sure they are given adequate attention in terms of administration of drugs and vaccination, which determines their levels of performance, rather than getting point of lay that they are not sure of their drugs and vaccination regime.

Profitability analysis of poultry egg farms

Gross margin and farm income analysis: Gross margin analysis is done in this section to determine the profitability of poultry egg production in Ogun state. Table 2 shows the profitability of poultry farms by farm sizes. From the table, over 90 percent of the cost of production is on the variable inputs. The result also shows that large farm size has the lowest cost of production per bird. As the farm size increases the total cost of

Table 4: Distributions of technical efficiency according to farm size

	Small farm size		Medium farm size		Large farm size	
Interval	Freq.	%	Freq.	%	Freq.	%
0.501-0.6	-	-	-	-	-	-
0.601-0.7	1	4	-	-	-	-
0.701-0.8	2	8	5	27.78	-	-
0.801-0.9	16	64	6	33.33	1	16.67
0.901-1.0	6	24	7	38.89	5	83.73
Total	25	100	18	100	6	100
Statistics	Small farm size		Medium farm size		Large farm size	
Mean	0.8638		0.8687		0.8877	
Median	0.868		0.857		0.94	
Mode	0.819		0.905		1	
Minimum	0.662		0.754		0.882	
Maximum	1		1		1	
Std. deviation	0.0796		0.072		0.048	

Source: Field survey, 2005

Table 5: Determinants of Farmers' Efficiency in Poultry Egg Production

Variable	Double-log
Constant	-0.396091 (-5.158246)**
Farming Experience (X_1)	0.117447 (7.902470)**
Gender (X_2)	-0.039362 (-1.444058)
Education (X_3)	0.049020 (2.828702)**
Main Profession (X_4)	-0.035490 (-1.852015)
Household Size (X_5)	-0.034250 (-2.647856)*
R- squared	0.667786
Adjusted	0.627272
F-statistic	16.48287

**Significant at 1%, *Significant at 5%

production decreases. This could be attributed to the fact that large farm size enjoys the benefit of rebate on bulk purchases. Feeds constitute the highest percentage of 78.09 percent, 81.04 percent and 83.86 percent of the cost for the different farm sizes. This is followed by labour, cost of stock, transportation cost, medication, veterinary cost, while miscellaneous cost constitutes the least cost in the cost of production.

The gross margin and net revenue per bird from the business for small farm size are ₦694.38 and ₦589 respectively. On the other hand medium farm size have ₦552 and ₦464.46 respectively, while that of large farm size are ₦808.90 and ₦739.56 respectively. The result shows that large farm size has the highest average gross margin of ₦808.90 per bird per farm. This may be due to economies of scale and other benefits that go with large farm. Medium farm size made the least profit of ₦464.46. Many factors are responsible for the profit made by the different farm sizes, which are cost of bird, price of eggs, transportation among others. All these differ depending on farm location.

Technical efficiency analysis

Technical efficiency distribution of respondents: The distribution of the efficiency score among the farms is uniform, i.e. it's about the mean. On the top of the efficiency table is the 0.801-0.901-interval class with about 46.94 percent of the farmers falling into this class. This rather high degree of technical efficiency suggests that very little marketable outputs is sacrificed to resource-waste. The distribution of the efficiency estimates agrees with previous works carried out in other peasant settings. (Ali and Byerlee, 1991; Coelli and Battese, 1996) Only 10.20 percent with an index of 1 are operating at 100 percent technical efficiency. The mean technical efficiency is 0.873, implying that on an average poultry farms, the observed output is 12.7 percent less than the maximum output, which can potentially be achieved from the existing level of inputs. It accounts for the level of inefficiency for an average farm.

The observed efficiency can be attributed to various factors ranging from technical production constraints, socio-economic and environmental factors. Furthermore it has been contended that non physical inputs like experience, information asymmetry and other socio-economic factors might Influence the ability of a farmer to use the available technology efficiently.

Large farm size has majority of its farmer in efficiency interval 0.901-1.0 followed by medium farm size, while small farm size has the least number of farmers in that interval. This presumably may be because large farm size farmers may have more capital available at their disposal which may enable them to purchase technologies that enables them to effectively utilize their resources efficiently.

The average technical efficiency of the poultry egg farmers increases as the farm size increases, likewise for the median and mode respectively. The maximum technical efficiency for all the farm size is 1 while the minimum technical efficiency also increases with farm size. Small farm size has 0.662 followed by medium farm size 0.754; large farm size has the highest 0.882.

Slacks: This problem arises when it is questionable as to whether a farm is on efficient point on the frontier, if one could reduce the amount of any of the input used and still produce the same output. This is known as the input slack which is also referred to as input excess by some authors. The DEAP reports both the radial Farrell technical efficiency score and the residual slacks to provide an accurate indication of technical efficiency of a farm in a DEA analysis.

On the average, number of birds, labour and feed have slacks of 3.032, 8.942 and 0.462 respectively. This implied that the inputs could be decreased by those units and still produce the same level of output. Thus, the farms are said to be radially inefficient in input usage by the said factor. The farmers are under utilizing their resources. With input slack it means more output could be produced with the same quantity of inputs than what is being produced. The farmers are not optimizing their outputs. From the result feed has least input slack this mean that feed is more effectively utilized than other inputs while Labour is the most under-utilized input.

Output Slacks: The values for the output are all zeros, revealing that there are no slacks in the output. The outputs are optimized.

Factors affecting technical efficiency of the poultry egg farmers: The result shows that the coefficients of farming experience, years of education and household size have significant impact on the farmers' Efficiency. The coefficients of years of experience and years of education are positively signed as expected. The implication is that farmers with more years of experience/education tend to be more efficient in poultry 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 coefficient of household size is negative and statistically significant. This negative relationship signifies that as the household size increases farmers technical efficiency reduces. This agrees with Okike (2000) who reported that family size have negative influence on the farmers productivity. In a situation where the family size is large and only a small proportion of farm labour is derived from it, then the inefficiency effect are expected to be greater.

The dummy coefficient for gender is significant at 10 percent level and has a negative sign. This implies that more men are found in poultry production in the study area because it is a labour intensive enterprise which is highly gender biased. Weir (1999) reported that those households headed by women suffer a productive disadvantage. This may be because female-headed household have fewer adults available for farm production. This implies that the poultry farmers' technical efficiency increases with more participation of men.

Conclusion: The study has highlighted the technical efficiency of poultry farms and its profitability. It was found that poultry farms in Ogun state on the average are relatively technical efficient and profitable. The study further revealed that years of experience has positive influence on the technical efficiency of the farmers, while household size and gender has negative influence. However, the level of efficiency and profitability could be increased as the farmers gain more experience and has smaller household size, couple with reduction in mortality, use of labour and the price of feed which constitute a greater percentage of cost of production.

References

Adeoti, A.I., 2004. Impact of HIV/AIDS and Related Sicknesses on the technical Efficiencies of Farms in Benue State, Nigeia. Issues in African Rural Development Monograph Series. Monograph #34.

Afolabi and S.O. Ojo, 2000. Economic Analysis of Replacing the Fish meal component in Broiler starter Mash with *Gliricidia Sepium*. Animal Options Book of Proceeding. Ed. By S.N. Ukachuwku *et al.* Af. Farming J. Jan/Feb (1998), pp: 4.

Ajani, O.I.Y., 2000. Resource productivity in food crop farming in the Northern Area of Oyo state Nigeria. Unpublished Ph.D Thesis, Department of Agricultural Economics, University of Ibadan, Nigeria.

Ajibefun, I.A., 1998. "Efficiency of small-scale Food crop Farmers in Ondo State Nigeria. An Application of Parametric and Non-parametric frontier Production Functions". Unpublished Ph.D Thesis Department of Agric. Econs. And Ext. FUTA Akure.

Ajibefun, I.A. and A.G. Daramola, 1999. Measuring and sources of Technical Inefficiency in Poultry Egg Production in Ondo State. J. Rural Econom. Develop., pp: 85-94.

Ali, M. and D. Byerlee, 1991. Economic Efficiency of Small Farmes in a Changing World: A Survey of Recent Evidence J. Int. Develop. Cultural Change, 3: 1-27.

Amaza, P.S., 2000. "Resource-Use Efficiency in food crop Production in Gombe State Nigeria. Unpublished" Ph.D Thesis, Department of Agricultural Economics, University of Ibadan, Nigeria.

Awoyemi, T.T., 2000. A gender analysis of economic efficiency in cassava-based farm holdings in Southern Nigeria. Unpublished Ph.D Thesis, Department of Agricultural Economics, University of Ibadan, Nigeria.

Banker, R., A. Charnes, W. Cooper and A. Maindratta, 1988. "A Comparison ofDEA and Translog estimates of production frontier Using simulated Observation from a Known Technology" In Application of modern Production theory efficiency and productivity. Ed. By A. Dogramaci and R. Fare, Boston: Kluwer.

Battesse, G.E., 1992. Frontier production Functions and technical efficiency: a survey of empirical applications in agricultural economics, Agri. Econom., 7: 185-208.

Central Bank of Nigeria, 1999. Annual Report and statement of Accounts. CBN Publications.

Central Bank of Nigeria, 2004. Annual Report and statement of Accounts. CBN Publications.

Charnes, A.W., W. Cooper and E. Rhodes, 1981. "Evaluating Program and Efficiency an Application of DEA to program follows through" Management Science, 27: 668-697.

Charnes, A., W.W. Cooper and E. Rhodes, 1987. Measuring the efficiency of Decision Making Units, Eu. J. Operations Res., 2: 429-444.

Charnes, A., W.W. Cooper, A.Y. Lewin and L.M. Seiford, 1995. "Data Envelopment Analysis Theory, Methodology and Applications". Kluwers.

Coelli, T.J., 1995. Recent Development in frontier modeling and efficiency Measurement. Australian J. Agri. Econs., 3: 219-245.

Coelli, T. and G. Battese, 1996. Identification of factors which influence the Technical inefficiency of Indian farmers, Australian J. Agri. Econs., 40: 103-128.

Debreu, G., 1951. "The coefficient of resource utilization" dans Econometrica, pp: 273-292.

Färe, R., S. Grosskopf, M. Norris and Z. Zhang, 1994. Productivity Growth, Technical Progress and Efficiency Change in Industrialized Countries. Am. Economic Rev., pp: 66-83.

Farell, M.J., 1957. "Measurement of Productive Efficiency" J. Royal statistical Soc. Series, 3: 253-290.

Koopmans, T.C., 1951. "An Analysis of Production, an efficient combination Activities" Dans T.C. Koopmans Ed. Acitivity Analysis of production and allocation,Cowles commission for Research in economics, Monograph No:13, Wiley, New York.

Mbanassor, J.A. and A.C. Nwosu, 1998. Economic Revival and Sustenance in Nigeria. The Analysis of Livestock Industry. Proceeding of Silver Anniversary conference of NASP/WASAP Inaugural conference March 21-26, Nigeria paper No 223, pp: 442.

Meier, G., 1989. Leading issues in Economic Development 5th edition, Oxford University Press.

Niang, T. and S. Jubrin, 2001. Quarterly Newsletter of the Nigeria Agriculture Question and Answer Service Vol.1 No. 3.

Norman, D.W., 1970. "Initiating Change in Traditional Agriculture" Proceedings of the Agricultural society of Nigeria, pp: 6-14.

Okike, I., 2000. Crop-livestock interactions and economic efficiency of farmers in the savannah zones of Nigeria. Unpublished PhD thesis, University of Ibadan, Ibadan, Nigeria, pp: 155.

Parikh, Ashok, Farman Ali and Mirkalanshah, 1995. "Measurement of Economic Efficiency in Pakistani Agric." Am. J. Agri. Econs., 77: 675-685.

Weir, S., 1999. The effects of Education on farmers' productivity in Rural Ethiopia. Centre for the study of African Economies. Department of Economics University of Oxford.