Technical Efficiency of Poultry Production in Afijio Local Government Area of Oyo state, Nigeria

Adesiyan, Olusegun Israel.
Ladoke Akintola University of Technology Ogbomoso.
Oyo State, Nigeria. Email: segun.adesiyan@yahoo.com.

Abstract
The study was designed to examine the technical efficiency of poultry farmers in the Afijio local government area of Oyo state using stochastic frontier production function analysis. Data were collected using a set of structured questionnaire. The study is interested in how feed, veterinary, stocking of birds, labour and drugs variables are efficiently allocated and used. The technical efficiencies of the farmers varied between 0.45 and 1.00 with a mean efficiency of 0.78. The result showed that 38.75 per cent of the farmers were technically efficient. The study further revealed that veterinary cost and drugs positively affected technical efficiency, while the increase in the socioeconomic variables such as family size and years of farming led to decrease in technical efficiency.
Keywords: Technical, efficiency, Poultry, Production.

1.0 Introduction
Poultry refers to a wide variety of winged animal species that are nutritionally and economically useful to man. Poultry includes chickens, turkeys, ducks, geese, guinea fowl, quails and pigeons. Poultry farming in Nigeria contributes to the national economy and supply much needed poultry products for healthy living. Afolabi (2002), opined that apart from its contribute to the farm family income, it also contributes a substantial amount to the nation's gross domestic product (GDP). According to FAO (1992), poultry intake in developing countries, Nigeria inclusive is below the required 75g per capita per day. Specifically, in Nigeria, poultry product consumption is relatively low, this was notably asserted by Ogunniyi et al.(2012),   they argued that household demand for chicken and eggs is dis-prop ornately with the increase in the household budget. In corroboration with the later authors, Tonye et al. (1997) observed that this deficiency could be traced to lack of efficient supply of animal protein, inadequate purchasing power of the populace and population explosive. Evidently, Nigeria's poultry Subsector contributes about 58.72 per cent of all livestock production (Oni et al. 2005). He further stressed that family poultry production make up to 84 per cent, while commercial poultry share 16 per cent of the total production (FDLPC, 2003).Thus, Poultry production is exclusively shoulder by the rural settlers, such as household poultry keepers in villages and backyards. In line with the foregoing discussion, Ojo (2003) submitted that the rate of production of poultry products, could not meet up the demand of the consumer, hence its consumption is at variance with the expected intake per head per day.

The study conducted by Ojo (2003) where technical efficiency of poultry egg production was determined using the stochastic frontier production function analysis. The result revealed that poultry production was a rational stage of production, as depicted by the Returns To Scale (RTS) of 0.771. The technical efficiency of the farmers varied widely between 0.239 and 0.933 with a mean of 0.763 and about 79 per cent of farmers have technical efficiency exceeding 0.7. He noted with dismay that only location of farm (nearness to urban centers) positively affected technical efficiency, while the increase in social, economic variables such as age, experience and education led to decrease in technical efficiency of the farmers. Yusuf and Malomo (2007) examined technical efficiency of poultry production in Ogun state, Nigeria. They employed the use of Data Envelopment Analysis (DEA) and Ordinary Least Square (OLS) regression. It was deduced that farmers with large farm size are most technically efficient, with means of 0.8638. The study concludes that poultry production is profitable in the study area, and that most of the respondents are relatively efficient technically.

The theory of efficiency proposed by Farrell (1957) states that when a firm is operating within the bound of production function all else being equal, such a firm is said to be technically efficient otherwise is not efficient technically. Strictly production efficiency of a firm is of two components-i. technical and ii. Allocative efficiency, these two constitute economic efficiency. It could therefore be said that poultry product producers can maximize the given set of input resources to optimized output. Kumbhakar(2004),also argued that when there is efficiency in producing the output will be higher, and when there is inefficiency in production the output reduces.

For a poultry farmer to reach maximum production and maximize profit, a proper analysis of productivity and technical efficiency of the factors involved in the production is highly essential. Unfortunately, most poultry producers tend to ignore the management aspect with regards to resource allocation of the business as long as they made profits. This laxity invariably prevents farmers from earning the maximum return on their investment (Omotosho et al. 1988). It is on this note the following research questions will be answered

in this study.
    i.   What are the socio- economic characteristic of poultry farmers in the study area?
    ii.   What are the levels of technical efficiency of the respondents?
    iii.   Are the poultry farmers technically efficient?

The main objective of this study is to determine the technical efficiency level of poultry farmers in the study area. Specifically the study intends to:
i. Examine the social-economic characteristics of poultry farmers in the study area.
ii. Establish the   technical efficiency level of respondents in the study area, and
iii. Ascertain whether respondents are technically efficient or not.

2.0. Research methodology
2.1. Study area description
The study area for this study is Afijio local government area of Oyo state, Nigeria. Out of the major towns that constitute the local government, Awe, Akinmorin and Ilora are known for poultry production. The local government shares boundaries with Oyo east local government in the North, Iseyin local government in the East, Iwo local government in the South-West and Ejigbo local government area in the North West. The majority of the inhabitants of the local government engaged mainly in farming as well as trading in farm produce.

2.2. Source of data collection
This study employed the use of both primary and secondary information. The source of primary data was obtained through a well-structured questionnaire, and interview schedule, where the respondents are non-literates. Journal articles, textbooks are the major sources of secondary data for the study.

2.3. Method of data collection
A well-structured questionnaire was administered to 80 respondents. The questions were prepared in English but translated into the local language where and when necessary during administration.

2.4. Sampling technique
A multistage technique was used for this study. The first stage involved the purposive selection of three (3) major towns like Awe, Akinmorin and Ilora, where poultry production is predominately practiced. The second stage involved simple random selection of 25 each of the first two towns and 30 poultry farmers for Ilora, this was based on the population of the poultry farmers in each of the town. This made the total number of poultry farmers to be 80.

2.5. Method of data analysis
Descriptive analysis, statistics such as, frequencies and percentages, were used to describe socioeconomic characteristics of the respondents. The stochastic frontier model was used as the inferential statistics for the analysis of technical efficiency. A stochastic production frontier model is specified below.
Model specification: The production stochastic frontier is specified thus;

$$Y=f(X_i,\beta_i)* Exp(e_i) \qquad\qquad (1)$$

Where
Y= Poultry products output in i^{th} farm (number)
X_i = Inputs vector used in the production
β_i = Unknown parameter vector
$e_i = V_i - U_i$ (error term in composite form).
V_i = Random parameter assumed to be identical, normally distributed with zero means and constant $N (0, S_v^2)$.
U_i = Random variable of the technical inefficiency.
X_{i_S} is:
X_1= veterinary (Nigerian currency)
X_2 = feed(kg)
X_3= labor (man days)
X_4 = birds, stocking (number)
X_5 = Quantity of livestock drugs used (no of sachets/ bottles)
Model specification for the technical inefficiency is :

$$L =   \alpha_1 + \alpha_1z_1 + \alpha_2z_2 + \alpha_3z_3 + \alpha_4z_4 + \alpha_5z_5 + e \qquad\qquad (2)$$

Where
L = Technical inefficiency
Z_1 = Farmer, age (years)
Z_2 = Family, size (number)
Z_3 = Level of education(years)
Z_4 = Years of Experience(years)
Z_5 = Association membership

3.0.   Discussion of Results

3.1. Socio- economic characteristics of respondents

The major characteristics discussed were the distribution of respondents by sex, age, marital status, family sizes, educational status, main occupation, land acquisition, years of experience and type of labour.

ii.   Sex distribution of respondents

Table 1 presented below, depict male to female ratio of the poultry farmers in the study area, the male has 78.8 percent while the female has 21.2 per cent. The implication of this result is that poultry production is more tasking and energy consuming, thus poultry production in this study area is done mostly by males .This result agreed with Adesiyan et al (2007).

iii.   Age distribution of respondents

The findings of this study indicated that more of respondents fall between age ranges of 31-50years (i.e. 32.5 per cent) .This is followed by age range 51-60 years, this translated to about 23.75 per cent of the poultry production farmers and respondents that are less or equal to 30 years were 11.5 per cent. From the outcome of the age ranges, it was observed that those respondents between ages 31- 50 years are mostly married and also in their active ages. Hence, they can afford to withstand the rigors demanded by poultry production. This result was corroborated by Muhammad et al.(2013).

 Age between 51-60 years, mostly in African setting are saddled with more financial responsibilities, hence for them to fulfill this task, they need to involve in an enterprise, aside their main business. It was not surprising for the low percentage of the youth poultry farmers (i.e. Between 0-30 years). This is because most of them are not married (meaning fewer financial responsibilities) and also have flair for white collar jobs than those that demand rigorous task and energy.

iv.   Marital status distribution of respondents

As presented in table 1 below, most of the respondents are married about 86 per cent are in this category, while only about 14 per cent are unmarried. This could be so because, it is expected that married individual should have more responsibilities than unmarried person.

v.   Family size distribution of respondents

Findings showed that 92.5 per cent of the poultry farmers in the study area, have a household size of less than or equal 10 members. This is true since poultry is labor intensive in nature, it's therefore required a sizeable number of families. This is obtainable in the rural settings where household labour is used for poultry production processes.

vi.   Distribution of respondents according to number of years in formal school

Statistics showed that 65 per cent of the poultry farmers had between 11-12 years of formal education. This is a moderately high level of literacy among the poultry farmers. As expected, most of the farmers were able to adopt better innovation techniques and a worthwhile farming decision making as well as efficient use of inputs, Amao et al. (2007).

vii.   Distribution of respondents according to number of years of experience

From table 1 below, 78.7 per cent of the respondents are in poultry production business for less than or equal to 10 years.

Farmers having 11-15 years of experience constitute 17.5 per cent; those with 16-20 years of experience are 3.7 per cent. It is expected that the more the number of years, farmers spent on their farm operations, the more experience they should have. But contrary to this, the findings revealed that not many of the respondents have well experienced in the poultry farming. This could mean that most of the farmers are in the business due to economic circumstances, as they are probably not into poultry production from the beginning

viii.   Distribution of respondents according to their main occupation

The study showed that 57.5 per cent in the study area had other occupations, while 42.5 per cent of them had poultry production as their main occupation. This implies that most of the poultry farmers in the study area have another source of income; this could go a long way to augment poultry business financially.

ix.   Distribution of respondents based on the mode of land acquisition

 From the statistics presented in table1, 55 per cent of the poultry farmers acquired their land through purchase, 30 per cent of them leased it, and 10 per cent rented it a while 5 per cent of them acquired the land by gift / inheritance. All things being equal, more profits are expected as most of the farmers own their land.

x.   Distribution of respondents according to their labour type

Findings showed that 25 per cent of the poultry farmers used hired labour, 22.5 per cent of the farmers used both of them. This implies that most of the poultry farmers in the study area do minimized cost as to maximize their output, since family labour will not attract any wage.

Table 1: socioeconomic characteristics of the respondents

Sex	Frequency	Percent (%)
Male	63	78.8
Female	17	21.2
Total	80	100.00
Age		
≤ 30	9	11.5
31-40	26	32.5
41-50	26	32.5
51-60	19	23.75
Total	80	100.00
Marital Status		
Single	11	13.75
Married	69	86.25
Total	80	100.00
Family Size		
≤ 10	74	92.5
11-15	4	5.0
≥20	2	2.5
Total	80	100.00
Years of schooling		
≤10	23	28.75
11-20	52	65
21-25	5	6.25
Total	80	100.00
Years of experience		
≤10	63	78.75
11-15	14	17.5
16-20	3	3.75
Total	80	100.00

Main Occupation	Frequency	Percent (%)
Poultry	34	48.5
Others	46	57.5
Total	80	100.00
Mode of land acquisition		
Hired	44	55
Family	24	30
Both	8	10
Gift/Inheritance	4	5
Total	80	100.00
Type of Labour		
Hired	20	25
Family	18	22.5
Both	42	52.5
Total	80	100.00

3.2 Ordinary Least Square Estimation

Result in table 2 showed that only the cost of medication/veterinary and drugs are significant at 10 per cent and 1per cent level of significant respectively. The costs of feed and labour are not significant. The costs of drug and veterinary are significant because most of the drugs for poultry are on the higher side in term of price, while some are not easy to come by, hence it said to be expensive in the market. The insignificant outcome for the cost of feed is surprising; it could be that most of the farmers made use of other types of feeds, which was unaccounted for in their expenses. Also the non-significant of the cost of labour is expected as most of the poultry farmers employed the use of family members as their labors, which its cost didn't account for.

Table 2: OLS estimates of average performance

Variable	Parameter	Coefficient	T-Value
Constant	βo	5.77	19.61
Cost of veterinary	β1	9.02	1.71*
Cost of feed	β2	-4.66	-0.93
Cost of labour	β3	-2.01	-0.44
Cost of stocking of birds	β4	6.48	1.50
Cost of drugs	β5	0.12	2.40***

Note *** T- value significant at 1% and * T- value significant at 10%

3.3. Maximum Likelihood Estimates of Parameters of the Stochastic Frontier Production

Presentation of statistics in table 3, revealed that veterinary parameter has the highest coefficient value as in the ordinary least square estimates. The costs of feed and labour have negative signs, this means that any additional increase in these two variables would lead to a decrease in the poultry output. This result could mean that, there is an excessive utilization of these two variables, as they were employed in the process of production at low price or at no price at all. For instance, there is no cost attached to family labour used in the course of production. The estimated parameters of the inefficiency model in the stochastic frontier models of the respondents showed that the coefficients of age, level of education and associated membership were negative, while family size and years of experience were positive. Over all, it implies that these variables increase the technical efficiency or decrease the technical efficiency of the poultry farmers. Those variables with negative coefficients lead to decrease in technical inefficiency or increase the farmers' technical efficiency; this finding is in line with Ajibefun and Daramola (2004).The negative signs obtained for variables such as age, level of education and associated membership of the poultry farmers, conformed to a priori expectation and were similar to the findings of Ojo (2003). The positive signs obtained for variables such as family size and years of experience were against the a priori expectation. The implication of this is that the larger the household size and with a good number of years of experience, the more inefficiency the poultry farmers will be. The reason may be due to the inefficient family labor input, lack of proper application of past experiences and inadequate supervision. The estimated gamma parameter of poultry farm is 0.105. This means that there is a 10.5% variation in the poultry output among the farmers in the study area; this is due to the differences in their technical efficiencies.

Table 3:   Maximum Likelihood Estimates of Parameters

Variable	Parameter	Coefficient	T-Value
Constant	β_o	5.92	10.78
Cost of veterinary	β_1	0.10	1.78*
Cost of feed	β_2	-4.96	-0.91
Cost of labour	β_3	-1.14	-0.26
Cost of stocking bird	β_4	5.68	0.80
Cost of drugs	β_5	0.10	1.85*
Inefficiency model			
Constant			
Age of farmers	δ_0	-0.36	-0.86
Family size	δ_1	-2.15	0.86
Level of education	δ_2	3.68	-0.68
Years of experience	δ_3	-3.34	1.75*
Association membership	δ_4	5.26	2.74***
Sigma squared	δ_5	-0.13	-0.68
Gamma	δ^2	0.49	3.88
Log likelihood Function	γ	10.50	1.39
		85.13	

3.4. Efficiency Level of the Respondents

Also table 4 below showed that a high percentage (i.e. 38.7%) of respondents operates with an efficiency level between the ranges of 0.86-1.00, while 31.25% of the respondents operate with an efficiency level between the range of 0.45- 0.65 and 30% of the respondent have an efficiency level between the ranges of 0.66-0.85. However the mean technical efficiency of the farmers in the study area is 0.78, showing that they are technically efficient.

Table 4: Decile range of frequency distribution of technical efficiency of respondent.

Decile range of T.E	Frequency	Percentage
0.45-0.65	25	31.25
0.66-0.85	24	30.0
0.86-100	31	38.75
Total	80	100

Mean efficiency =0.78.

4.0.   Summary, Conclusion and Recommendation

The study employed the use of descriptive statistic such as frequency distribution and percentages for the description of the socioeconomic characteristics of poultry farmers, while inferential statistics such as the stochastic frontier production function was used to determine the technical efficiencies of the poultry farmers.

It was observed that technical efficiency of poultry farmers varied due to the elements of technical inefficiency in poultry production in the study area. Family size and years of farming experience decrease the family technical efficiency. Also level of education, age and associated membership of the poultry farmers increases the farmers' technical efficiency.

From the findings, it could be recommended that poultry production in this study area, should be manned by young educated farmers. They will be able to adopt new and improved technologies that are both labour and cost effective, bearing in mind the goal of maximizing the use of endowed, but scarce resources of factor of production.

Poultry farmers should be encouraged to create time to supervise their production activities, as to improve their technical efficiencies. Government should endeavour to make adequate provision for production of inputs and raw materials, subsidies as to boost poultry production.

References

Adesiyan, O.I.,Adeleke, O.A. & Salako, B.A. (2007). Economic Analysis of Poultry Marketing in Ido Local Government Area of Oyo State, Nigeria. Research Journal of Poultry Sciences 1(3-4):23-25

Ajibefun, I.A., Daramola, A.G. (2004), Determinant of technical and allocative efficiency of micro-enterprises: firm-level evidence from Nigeria, *African Development Review*, 15:353-95.

Amao, J.O.,Adesiyan, O.I, Salako ,B.A.(2007). Economic Analysis of Cassava Processing into Gari in Ogo Oluwa Local Government Area of Oyo State Nigeria. Pakistan Journal of Social Sciences, 4(2): 266-270.

Afolabi, J.A. (2002). An introduction of factors Affecting Productivity of Livestock Farmers in Ondo State, Nigeria, a paper delivered at the 27th Annual Conference in Nigeria Society of Animal Production. FUTA, Akure.

Federal Department of Livestock and Pest Control Services (2003). Nigeria's Poultry Population. Federal Ministry of Agriculture and Rural Development.Abuja.

Muhammad-Lawal, O.A. Omotesho, and F.A. Oyedemi (2013). An Assessment of the Economics of Cassava Processing in Kwara State, Nigeria. Invited paper presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia.

Kumbhakar, S.C. (2004), "Productivity and Efficiency measurement using Parametric econometric methods"
Working paper, State University of New York, Binghamton, New York, pp. 2.

Ojo, S.O. (2003)."Productivity and Technical Efficiency of Poultry Egg Production in Nigeria". International Journal of Poultry Sciences 2 (6): 456-464.

Ogunniyi, A. Ajiboye and W.A. Sanusi(2012). Analysis of Urban Household Demand for Poultry Products in Ogbomoso North and South Local Government Area Oyo state, Nigeria. Tropical and Subtropical Agroecosystems 15 (2012): 125-130.

Omotosho, O.A and Ladele, A.A. (1988): Management Problems in Large Scale Poultry Business in Nigeria FAMAN journal 3:27-35.

Oni,O.A.,Oladele,O.I. & Oyewole, I.k. (2005). Analysis of Factors Influencing Loan Default Among Poultry Farmers in Ogun State.Journal of central European Agriculture 6(4): 619-624.

Tonye, A.,Ikpi,J.A. & Adeleye,D.(1977). Poultry Industry in Nigeria. Journal of Economics and Development. 11 (2): 81–90.

Yusuf,S.A, Malomo,O.(2007). Technical Efficiency of Poultry Production in Ogun State, Using Data Envelopment Analysis. International Journal of Poultry Science 6 (9): 622-629.

The IISTE is a pioneer in the Open-Access hosting service and academic event management. The aim of the firm is Accelerating Global Knowledge Sharing.

More information about the firm can be found on the homepage:
http://www.iiste.org

CALL FOR JOURNAL PAPERS

There are more than 30 peer-reviewed academic journals hosted under the hosting platform.

Prospective authors of journals can find the submission instruction on the following page: http://www.iiste.org/journals/ All the journals articles are available online to the readers all over the world without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. Paper version of the journals is also available upon request of readers and authors.

MORE RESOURCES

Book publication information: http://www.iiste.org/book/

IISTE Knowledge Sharing Partners

EBSCO, Index Copernicus, Ulrich's Periodicals Directory, JournalTOCS, PKP Open Archives Harvester, Bielefeld Academic Search Engine, Elektronische Zeitschriftenbibliothek EZB, Open J-Gate, OCLC WorldCat, Universe Digtial Library , NewJour, Google Scholar