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Technical Efficiency of Family Poultry Production In Igabi Local Government Area of Kaduna State

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Abstract
This study examined the Technical Efficiency of Family Poultry Farmers in Igabi Local Government Area of Kaduna State. The Study used multistage random sampling technique. A structured questionnaire was used to obtain information from family poultry farmers in Igabi L.G.A of Kaduna State, Nigeria. Descriptive Statistics and stochastic frontier production function were used in analyzing the data. Among the findings 37% were aged between 34 and 43 years. 60% were male head households. 56% were married, 56% had tertiary education, 42% had 6 – 10 years farming experience, 42% are civil servant which is their primary occupation, 54% had an average household size of 6, 55% belong to cooperative society. The stochastic frontier analysis showed that value of feed, poultry size and labour had positive sign and highly significant at 1%, 5% and 10% level respectively. The technical efficiency estimate showed that the best family poultry farmer had a technical efficiency of 94% while the worst family poultry farmer had a technical efficiency of 56%, and the mean technical efficiency was 81%. The study also showed that pest and disease outbreak 40%, high cost of feed 29% and lack of capital17% constitute the major constraint affecting family poultry production in study area. The results revealed that feed and poultry size influenced the technical efficiency of family poultry farmers. Government should develop and implement policies aimed at subsidizing cost of production inputs like feed, drugs/medicine, day old chicks and target such policies at experienced family poultry farmers to help increase production and efficiency.
Keywords: Family poultry, production, technical efficiency, Igabi

INTRODUCTION

Poultry refers to all birds of economic value to man. Examples include chickens, pigeon duck, quail, guinea-fowl, and ostrich all which belong to the zoological class aves. Atteh (2004) stated that poultry have been on earth for over 150 million years, dating back to the original wild jungle fowl. Poultry offered a range of uses to human which include provision of meat and egg, research and medicinal purpose, production of manure which helped to improve the soil fertility, feathers from poultry birds provide human with aesthetic value (Atteh,2004).

Poultry production has great potentials for increasing protein supply in Nigeria. Poultry production in the past was not recognized as an important occupation but it has developed and occupied a place of pride among the livestock enterprises due to its rapid monetary turnover (Laseinde, 1994). 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 contribution to the family income, it also contributes a substantial amount to the nation's gross domestic product (GDP). Poultry also offer short-term investment opportunities and thus helps to increase meat availability. Thereby improving living standard of the people (Onyenweaku and Awuja, 1991). Many people in developing countries keep small numbers of poultry for home consumption, to sell and for various socio-cultural uses, it contributes subsidiary rural family income (Sonaiya, 2007) especially for the landless and women who are very active in family poultry husbandry. "Family Poultry" encompasses the wide variety of small-scale poultry

production system found in rural, urban, peri-urban areas, it is practiced by individual families as a means of obtaining food security, income and gainful employment. According to (Besbes, Thieme, Rota, Guèye, &. Alders, 2012) smallholder family poultry is an integral component of the livelihoods of poor rural households, and is likely to play this role for the foreseeable future (FAO,2008a). It makes a substantial contribution to food security and poverty alleviation in many countries around the world (Dolberg, 2008). The main outputs from family poultry production are food for home consumption, either in the form of poultry meat or eggs, and income from the sale of these products. Although the output may not be high, a great advantage of family poultry egg production is the frequent, if not daily, provision of nutrients of high biological value, which are ideally consumed by the vulnerable members of the household. The crucial role of efficiency in increasing poultry production output has been widely recognized by researchers and policy makers alike. Thiam *et al* (2001) highlighted the importance of efficiency as a means of fostering production which has led to proliferation of studies in poultry on technical efficiency around the globe. Measurement of production efficiency in agricultural production more especially in developing countries is an important tool of measurement, because in developing countries it is assumed that resources are scarce and efficiency also gives useful information for making policies towards agricultural production. Technical efficiency is defined as the ability of the farmer to produce at maximum output (frontier production) giving quantities of inputs and production technology (Aigner *et al,*1977). Production efficiency is usually concerned with the performance of the processes used in transforming giving inputs into output.

Problem Statement

The major problem of the poultry production in Nigeria is that of low productivity and inefficiency in resource allocation and utilization (Onyenweaku and Effiong, 2006). This implies that the present production and supply chain is inadequate (Olaofe 2004); hence the need to provide present and intending family poultry farmers with useful information that will assist and sustain poultry industry in Nigeria. Family poultry production in Nigeria is largely in the hands of our local producers who produce mainly for home consumption with little for sale to other consumers. In 2002, the Federal Government banned the importation of poultry products into the country. This posed a greater pressure and challenge to our local farmers to produce commercially so as to meet the ever-increasing demand of poultry products in our diet. Protein obtained from poultry products (meat and egg) is needed for the growth and development of the entire populace, thus increasing the standard of living and income of the poultry farmer.

Study by Ojo (2003) revealed that, the industry falls short of its aim of self-sufficiency in animal protein production in the country. Animal protein consumption is put at 5gm/capita per day which is a far cry from FAO recommended level of 35gm/capita per day. Also, in the past years, many family poultry production have been forced out of business due to problems ranging from shortage and high cost of feed, high cost and inadequate veterinary services and drugs, poor quality of equipment and other inputs. Lack of proper management in terms of feeding, housing, health care and traditional methods used by family poultry farmers among other factors are responsible for the low productivity. Ajibefun, (2006) says that inefficiency is a problem in raising production and productivity in Nigerian Agriculture. Other problems include rising cost of the major inputs such as feeds, drugs, and equipment (Sekoni, 2002) which is a constant set back among family poultry farmers. Also, the storage of poultry products is another problem, which is largely due to epileptic power supply and as such farmers incur

extra cost of hiring generators in order to avoid the spoilage of these products. Although available literature shows that many studies have been done on poultry production, but the attention was more on the economic analysis of poultry farming (e.g Ugbome, 2006; Amos, 2006, Bamiro, 2008; Adebiyi, 2000; 2003; Adebayo and Adeola, 2005). Some others looked at the Profit Efficiency in Broiler Production (Effiong and Onyenweaku. 2006, Emeyonu & Obih 2006). Little or nothing has been done to look at the technical efficiency and factors influencing technical efficiency of family poultry farmers in Kaduna State. Therefore, this study seeks to address the following objectives (i) describe the socio-economic characteristics of family poultry farmers in the study area, (ii)determine the factors influencing technical efficiency in family poultry production in the study area and (iii) estimate the technical efficiency of family poultry production in the study area.

Methodology

Study Area

The study was conducted in Igabi Local Government Area of Kaduna State. It is located within the Guinea Savannah region of Nigeria on the latitude 10^0 32^1 and longitude $7^0 17^1$E (Otegbeye *et al,* 2001). It has an annual rainfall of about 1000mm-1500mm per annum, usually seasonal and conventional in nature. However, the raining season usually begins early from May - October and dry season from October – April. The study area consists of villages and major wards such as Turunku, Rigasa, Igabi, Badikko, Pako, Asikolaiye, and Kalla among others. The area has contributed immensely to the Nigerian economy especially in the area of agricultural production of major crops like yam, onion, cassava, maize, millet, and pepper. Nigerians of different tribes and ethnic groups such as Igbo, Hausa, Yoruba, Fulani, Gbagyi, and Ebira live together in peace and harmony but the predominant tribal majorities are the Gbagyis and Hausas.

Sampling Techniques

Multi-stage sampling techniques were employed in this study. Igabi Local Government area was purposively selected out of twenty three local government areas in Kaduna State because of the concentration of poultry farmers in the study area. At the second stage, four (4) villages which include Mando,Turunku, Maranba –Jos and Kauya Village were randomly selected out of twenty seven (27) villages under Igabi Local Government Area. Then the third stage, thirty (30) questionnaires were distributed in Mando because of the high concentration of family poultry farmers in the area, Kauya and Maraban-jos twenty five (25), each while Turunku twenty (20) respondents were randomly selected, to give a total of hundred (100) respondents.

Method of Data Collection

Primary data was used for this study. This was obtained by the use of well-structured questionnaires to family poultry farmers in the study area.

Analytical Techniques

Simple Descriptive Statistics

Descriptive statistics such as tables, frequency distribution and percentages were used to achieve objective (i) and (v)

Model Specification of the Stochastic Frontier Production Function

The stochastic frontier production function was specified as,

$$Y=\beta_0+\beta_1 InX_1+\beta_2 InX_2+\beta_3 InX_3+\beta_4 InX_4+\beta_5 InX_5 (V i – Ui) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(1)$$

Where:

Y = Total output from family poultry production (₦)
X_1 = Feeds (₦)
X_2 = Medicines/vaccines (₦)
X_3 = Poultry size (₦)
X_4= Labor in (man-days)
X_5= Transportation cost (₦)
V_i= random error assumed to be independent of U_i, identical and normally distributed with zero mean and constant variance N (0, δ^2)
U_i, = technical inefficiency effects which are assumed to be independent of V_i V, they are non-negative truncation at zero or half normal distribution with ₦(μ, δ^2u)
If U_i, = 0 implying that production lies on the stochastic frontier.
If U_i,> 0, production lies below the frontier and it is inefficient.
Technical Inefficiency Model
In addition to the general model, this inefficiency model was designed to estimate the influence of some farmer's socio-economic variables on the technical efficiencies of the farmers.
The model is defined by:

$$U_i = \partial_0 + \partial_1 Z_1 + \partial_2 Z_2 + \partial_3 Z_3 + \partial_4 Z_4 + \partial_5 Z_5 + \partial_6 Z_6 + \partial_7 Z_7 \text{---------- (2)}$$

Where:
U_i = Technical inefficiency of the farmers, Z_1 = Age of the farmers in years (years), Z_2 = Farmers age (years), Z_3 = Household size (number of persons), Z_4 = Education (years), Z_5= Poultry experience (years), Z_6=Membership of association (years) and Z_7= Extension contact (number of contacts in a year)
∂'s, β's and γ coefficients are unknown parameters to be estimated along with the various parameters which are expressed in terms of $\delta s^2 = \delta v^2 + \delta u^2$; γ (gamma) = $\delta u^2 / \delta s^2$
Where the γ - parameter has value between zero and one, ($0 \leq \gamma < 1$).
The parameters of Stochastic Frontier Production Function (SFPF) model were obtained by maximum likelihood estimation method using the computer programme, FRONTIER VERSION **4.1** where equations (1) and (2) were jointly estimated.

RESULTS AND DISCUSSION

Table 1 shows that both men and women were actively involved in family poultry production but the percentages of men were more. Men accounted for 60.6% while female were about 39.3%. The high number of males might be attributed to the fact that in most study areas it is believe that the men are to provide for their wives and children from the meat and income after the sales of the birds. While in other study areas the women engage in poultry production in order to keep themselves busy and have little income.
The table shows that about 56.4% of the respondents were married. About 36.17% were single while 2.1% were divorced and 5.3% were widowed. The high number of married people in the business was to reduce labour cost as most married persons have children that constitute the labour force in family poultry production. This finding supports (Nwajiuba and Nwoke, 2000) who asserted that large number of farmers, men and women go into poultry production, many of whom do so for income generation purposes.
From the table 37.2% were within the productive age range of 34-43years. Therefore, for family poultry farmers in the study area they were energetic and able to cope with the rigorousness of poultry production while 26.60%, 17%, 12.8%, 4.26% and 2.1% were between the ages 44-53years, 24-33years, 54-63years,64-73years and under 23 respectively.

The result shows that about 56.4 % of family poultry farmers had formal education and primary, secondary and tertiary level at 4.3 %, 18.0 % and 56.4% respectively. On the other hand, 12.8 percent had no formal education. This implies that there were more educated people in family poultry production. However, this does not suggest that in family poultry production education was not a barrier but rather an added advantage for efficient management. With this level of education, there is tendency of the farmers being able to increase the level of technology adopted and skill acquisition. This study agrees with the findings of (Ologbon, Olugbenga, Ambali, & Omotuyole, 2012) that found out that greater percentage of small scale poultry farmers in Ogun State had formal Education. The findings disagrees with the findings of Gbigbi (2013) that found out that greater percentage of artisanal fishing households in Niger Delta had no formal education.

This indicates that there was influx of new entrants into family poultry production in recent times. The result shows that majority 42.5% had poultry experience of 6-10years, followed by about 38.3 % who had poultry experience of 1-5years, 13.4 % had poultry experience of 11-15years and 5.3 % had poultry experience of 16years and above. This agrees with Agwu (2004) who noted that the more experienced is could increase their level of acceptance of new ideas and innovations as a means of overcoming their production constraints and hence an advantage for increase in production.

Family size is recognized as a major source of labour supply in small holder agricultural production in most African country like Nigeria. This comprises the labour of all males, females and children in a household, who participate in agricultural production. The table shows the distribution of respondents according to their household size. Majority of the respondents (55.3%) fell within the household size of 6 -10 persons, (27.6%) fell within the household size of 1-5 persons, 9.6% had family size of 16-20persons and finally 8.5% had family size of 11-15persons. This result agrees with the findings of Ugbome (2006) who found out that majority of the respondents (small scale poultry farmers in Delta State) had an average family size of 6 people.

The table below shows that 55.32% of the respondents are member of cooperative and about 44.68% did not belong to any cooperative organization. This implies that majority of family poultry farmers are member of a cooperative.

Determinant of Technical Efficiency in Family Poultry Production

Table 2 shows the results of the efficiency model for family poultry production in the study area using the stochastic frontier production function. The table also shows the maximum likelihood Estimates (MLE) of the stochastic frontier production of family poultry production in the study area. The result shows that three of the explanatory variables (inputs) namely cost of feed with coefficient 0.16632934, poultry size 0.74780507 and cost of labour 0.35947323 were significant at 1%, 5% and 10% respectively. This means an increase in these factors of production will increase the technical efficiency of family poultry production. This finding is agreement with those of Udoh and Etim (2009) and Ezeh *et al* (2012) in which they found out that broiler production and quantity of feed were directly related. They also found out that feed was the most important factor of production as birds that were properly fed gained weight faster, attained table weight earlier and attracted higher unit prices.

The estimated variance (δ^2) was statistically significant at 1%, an indication of the goodness of fit and correction of the specified assumptions of the composite error term distribution. Gamma

(γ) was 0.60; this indicates that 60% technical efficiency level was attained by family poultry farmers.

Table 1: Distribution of the Respondents base on their socio economic characteristics

	Frequency (N= 94)	**Percentage (%)**
Sex		
Male	57	60.6
Female	37	39.3
Marital Status		
Single	34	36.1
Married	53	56.4
Divorced	2	2.1
Widow	5	5.3
Age		
<23	2	2.1
24-33	16	17.0
34-43	35	37.2
44-53	25	26.6
54-63	12	12.8
64-73	4	4.3
Education		
No Formal Education	12	12.8
Adult Education	8	8.5
Primary Education	4	4.3
Secondary Education	17	18.0
Tertiary Education	53	56.4
Years of Experience		
1-5	36	38.3
6-10	40	42.5
11-15	13	13.4
16-20	5	5.3
Household size		
1 – 5	26	27.6
6 – 10	51	54.3
11 – 15	8	8.5
16 – 20	9	9.6
Member of cooperative		
Yes	52	55.3
No	42	44.7
Total	94	100

Source: Field Survey, 2018

Table 2: Estimated Cobb-douglas Stochastic Frontier Production Function of Family Poultry Production In Igabi Local Government of Kaduna State.

Variables	Parameters	coefficient	standard-error	t – ratio
Output	β_0	0.47254194	0.69147289	0.68338462
Feed	β_1	0.16632934	0.76738285	0.21674883*
Medicines/vaccine	β_2	0.83749673	0.10191739	0.82174074
Poultry size	β_3	0.74780507	0.63628217	0.11752727*
Labour in (man-day)	β_4	0.35947323	0.16078007	0.22358072*
Diagnostic Statistics				
Log Likelihood ratio 0.32571				
Sigma square	δ^2	0.125867	0.414107	0.3039484
Gamma	γ	0.596603	0.2665053	0.2238616
LRTest 0.70948				
N = 94				

***, * *, * * *** at 1%, 5% & 10% level of probability
Source: Field survey, 2018

Technical Efficiency Estimate for Family Poultry Production

The technical efficiency shows the ability of farmers to derive maximum output from the inputs used in family poultry production.

The technical efficiency of the sampled family poultry farmers was less than 1 (or 100%), indicating that all the family poultry farmers are producing below the maximum efficiency frontier. A range of technical efficiency was observed across the sampled respondents where the spread was large. The best family poultry farmer had a technical efficiency of 94%, while the least family poultry farmer had a technical efficiency of 56%. The mean technical efficiency was 81%. This implies that on the average, the respondents were able to obtain just over 81% of optimal output from a given set of inputs. This shows that family poultry farmer technical efficiency can be improved by 19% in order to raise the level of poultry production output in the study area.

Conclusion

The study investigated the technical efficiency of family poultry production in Igabi L.G.A of Kaduna, Nigeria. The results revealed that feed, poultry size and labour influenced the technical efficiency of family poultry farmers. Individual levels of technical efficiency ranged between 52% and 31% suggesting that opportunities still exists for increasing productivity and income of family poultry farmers in the study area.

Recommendations

The results of this study have some vital policy implications for enhancing the technical efficiency of family poultry farmers. The following policy implications are presented;

i. Government should develop and implement policies aimed at subsidizing cost of production inputs like feed, drugs/medicine, day old chicks and target such policies at experienced family poultry farmers to help increase production and efficiency.
ii. The State Ministry of Agriculture should implement already existing laws that will prevent hatchery operators from selling day-old chicks with hatcheries related problems to the rearers. Also, more hatcheries should be provided by the ministry to make day-old chicks readily available and affordable at reduced price.
iii. Farmers should make effort to keep their surroundings clean and ensure that litter materials are disposed off as at when due. This will help to reduce the incidence of disease outbreak and improve conditions for poultry rearing which in turn will lead to increase in production output.

Table 3: Distribution of Technical Efficiency ratings of Family Poultry (broiler) Production in Igabi Local Government Area of Kaduna State

Efficiency	**Frequency**	**percentage (%)**
0.50 – 0.55	2	2.1
0.56 – 0.65	7	7.6
0.66 – 0.75	8	8.7
0.75 – 0.85	48	52.2
0.86 – 0.95	29	31.5
Total	94	100
Mean efficiency = 0.81		
Minimum technical efficiency = 0.56		
Maximum technical efficiency = 0.94		

Source: Field Survey, 2018

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