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ORIGINAL RESEARCH ARTICLE

Technical Efficiency of Poultry (Broiler) Farms in Oyo State, Nigeria

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ABSTRACT

Increasing the amount and efficiency of poultry production in order to meet the food need of the rapidly increasing Nigerian population call for the need to promote technical efficiency in the production of poultry. Hence, this study examined the technical efficiency (TE) of poultry (broiler) farms in Oyo State. Purposive sampling technique was used in selecting 193 poultry farmers in four Local Government Areas in Oyo State. Structured questionnaire was used to seek information on the socio-economic variables of the respondents, fixed and variable costs incurred, and the constraints faced by farmers in broiler production. The censored DEA model, descriptive statistics, and regression model were used in data analysis.

Results on TE showed that 13.47%, 22.79% and 13.98% of the poultry farms were efficient on the basis of constant returns to scale (CRS), variable returns to scale (VRS) and scale efficiency (SE), having efficiency scores of 1. The mean TE values for all the poultry farms considered were found to be 0.56 (±0.27), 0.78 (±0.17), and 0.70 (±0.26) for CRS, VRS and SE respectively. The factors that significantly affect TE of the farmers include marital status, poultry farming experience, access to loan, and age. The various constraints facing the poultry farmers ranked in order of severity include inadequate capital which ranked first; fluctuations in feed cost, lack of credit facilities, high cost of labour, diseases and parasites, mortality of birds, and inaccessibility to good water source, among others.

There is room for improvement in the TE of poultry farmers; 44%, 22% and 30% considering CRS, VRS and SE respectively. Higher levels of efficiency in production will help to improve the availability of animal protein through improved broiler production, given the existing level of resources.

Keywords: Input costs, determinants of technical efficiency, production constraints, broiler farms

INTRODUCTION

Poultry is a category of domesticated birds kept by humans for the purpose of collecting their eggs or killing for their meats or feathers, or for both. Poultry is the second most widely eaten meat accounting for 30% of meat production in the world, after pork at 38% (Ojo, 2003). Poultry outnumber all other forms of livestock in Nigeria and is found throughout the country wherever there is human settlement. Nowadays, chickens and eggs are regarded as comprehensive and favorite foods of people and they have a special place in food program of families. There are few, if any social or religious stigmas, attached to the use of poultry meat in human diet. Hence, the demand is high for live birds either for consumption or for festivities such as Christmas, New Year, Easter, id el-fitri, and etcetera.

The demand for meat has increased overtime owing to the cheap rate and high quality protein to maintain good human health. Meat has long been known for its high nutritive value, producing stronger and healthier people. Animal protein is essential in human nutrition because of its biological significance. Generally, poultry production is about twice as effective as producing pork and three times more as producing beef due to its very short cycle, thus making it easy for producers to respond to the circumstances of the day. So, poultry is a popular kind of meat in many places around the world (Ad Bal, 2011).

Poultry birds are good converter of feed into useable protein meat, the production cost per unit is low relative to other types of livestock, and the return to investment is high. Thus farmers need small amount of capital to start a poultry farm (Ojo, 2003). The livestock sub-sector, of which poultry is not an exception, is an important component of the Nigeria agricultural economy; its importance derived from the fact that it is one of the key contributors to national economy.

According to Ali (2002), Nigeria poultry production is expanding but is not keeping pace

with rapidly increasing domestic consumption requirement. Nigeria is the seventh largest country in the world, with a human population currently of around 175million, expected to exceed 200 million by 2020, and broiler output rose by more than 6% per year, according to the FAO (2009) data, the growth came to a halt in 2010 at 285,000 tonnes. Hence, the sudden decline has been attributed to the unsustainable nature of the commercialized poultry production. This non-sustainability is due to technical and socio-economic problem.

Compared to its population, Africa is only playing a minor role in the global poultry industry. Africa's share of the global population is 14% in 2009 but her contribution to global chicken meat and egg production were 4.5% and 4.1% respectively (FAO, 2009), out of which Nigeria contributed 7.2% of the total chicken production and 23% of the total egg production in Africa. Africa countries have a high negative balance of trade with chicken meat and in 2008, 666,000 tones had to be imported to meet the domestic demand though the import volume for shell egg was much smaller, about 32,000 tones (Windhorst, 2011).

Evidence has shown that the critical issue in poultry production in Nigeria is that of low production and inefficiency in resource allocation and utilization (Ojo and Afolabi, 2000). Increasing the amount and efficiency of poultry production in order to meet the food need of the population which continues to increase rapidly called for the need to promote technical efficiency in the production of poultry. Technical efficiency is the ability of a farm to produce the largest possible quantity of output from a given set of inputs. The modern theory of efficiency dates back to the work of Farrell (1957), who proposed that the efficiency of a farm consists of technical and allocative efficiencies; the two components combine to give a measure of economic efficiency. Awosanmi (1999) observed that poultry production seems to hold the answer to the national protein deficiency problem as its products such as meat and eggs provide an acceptable form of animal protein to most people throughout the world.

Changes in government policies occasioned by a general economic recession have been identified among the serious challenges facing the poultry industry. This has caused an astronomical increase in the cost of production, especially the cost of feeds, day old chicks, drugs and other sundries (Ahmad and Al Khraisat, 2013). The high costs of these inputs often result to loss and sometimes make farmers to abandon the enterprise.

Nigeria still imports frozen chicken. This results from hike in prices of pullets, eggs, chicken, and etcetera, due to poor production, incompetence/neglect of poultry farmers, and low supply of poultry products. According to Aromolaran and Bamgbose (1999), high cost of feed and high cost of fixed inputs pose serious problems to poultry farmers, thus hindering poultry business. This could be attributed to several factors ranging from inadequate available resources, low technical proficiency, to poor job experience; these usually culminate to low productivity and subsequently, reduced income of the farmer. Hence, it is imperative to measure efficiency of poultry production.

It is also important to measure producers' performance in order to provide guidance to various stakeholders on how to increase poultry production by identifying the extent by which broiler production efficiency could be raised with the available technology and resources at the farmers' disposal. Acquiring the maximum output with given level of input in efficiency measurement of the production function is the main target. This study investigated the technical efficiency and the various problems facing poultry farmers in Oyo State

The following questions were raised in the course of this study:

i. Are broiler farmers technically efficient?
ii. What are the factors influencing technical efficiency in broiler production?
iii. What are the constraints or problems faced by these farmers?

The main objective of the study is to estimate the technical efficiency of broiler farms in Oyo state. The Specific Objectives are to:

i. Estimate the technical efficiency of broiler farms
ii. Determine the factors affecting technical efficiency among broiler producers
iii. Identify the constraints faced by the poultry (broiler) farmers

Table I: VRS, CRS, and Scale Efficiency

Variable	Frequency	%	Mean
CRS	26	13.47	0.56 (±0.27)
VRS	44	22.79	0.78 (±0.17)
SE	27	13.98	0.70 (±0.26)

Source: Data analysis, 2014

Table II: Frequency Distribution of Efficiency Scores

Range	CRS		VRS		Scale	
	No	%	No	%	No	%
0.075 – 0.168	8	4.15	0	0.00	5	2.59
0.169 – 0.260	24	12.44	0	0.00	9	4.66
0.261 – 0.353	22	11.40	0	0.00	13	6.74
0.354 – 0.445	24	12.44	8	4.15	14	7.25
0.446 – 0.538	25	12.95	2	1.04	11	5.70
0.539 – 0.630	19	9.84	48	24.87	12	6.22
0.631 – 0.723	10	5.18	31	16.06	8	4.15
0.724 – 0.815	21	10.88	11	5.70	56	29.02
0.816 – 0.908	3	1.55	26	13.47	6	3.11
0.909 – 1.000	37	19.17	67	34.71	59	30.56
Total	193	100.00	193	100.00	193	100.00

Source: Data analysis, 2014

MATERIALS AND METHODS

This study was carried out in Oyo state, Nigeria. Ibadan is a major central city in the south western hub. Thus, the city is important in the national production and distribution of most poultry commodities, ranging from chicks to point-of-lay, pullets, spent layers, commercial broilers and poultry inputs such as drugs, vaccines and feed ingredients. The city has 11 local government areas (LGAs). Five of these are in the main city while six are in the suburbs. Most poultry production activities take place in the six suburb local government areas.

Purposive sampling technique was employed in this study. Four Local Government Areas (Akinyele, Oluyole, Ona-ara and Lagelu) in Oyo state were chosen based on predominance of registered poultry farmers as contained in the information from Poultry Association of Nigeria (PAN), Oyo State Chapter. A total of 200 copies of questionnaire were distributed to fifty farmers from each of the four local government areas but 193 copies were well completed. The primary data obtained captured the socio-economic characteristics of broiler farmers in Oyo State. Information was sought on fixed and variable inputs costs, and the constraints faced by the farmers.

The technical efficiency of the broiler farms was obtained by computing the DEA of the 193 farmers, and the results were presented using tables that show the efficiency distribution of VRS (Variable Return to Scale) and CRS (Constant Return to Scale) and SE (Scale Efficiency). To estimate the factors affecting technical efficiency, a regression analysis of technical efficiency estimates was run on the socio-economic variables. Descriptive analysis was used to show the level of severity of the various constraints faced by the poultry farmers.

Table III: Socio- economic characteristics of the poultry farmers

Variables	Frequency	Percentage	Mean
Age (years)			
≤ 20	3	1.6	(51±15.82)
2 1 – 30	9	4.7	
31 – 40	49	25.4	
41 – 50	28	14.5	
51 – 60	35	18.1	
61 – 70	41	21.2	
≥ 71	28	14.5	
Marital Status			
Singles	43	22.3	
Married	136	70.5	
Divorced	9	4.7	
Widowed	5	2.6	
Gender			
Male	116	60	
Female	77	40	
Level of Education			
No formal Education	16	8.3	
Primary Education	11	5.7	
Secondary Education	41	21.2	
Tertiary Education	125	64.8	
Poultry Farming Experience (years)			
1-3	6	18.7	(8±3.40)
4-5	37	19.2	
6-10	27	14.0	
≥10	93	48.2	
Household Size			
1-3	38	19.7	(6±2.20)
4-6	117	60.6	
7-9	28	14.5	
≥10	10	5.2	
Business commitment			
Part-time	100	52	
Full-time	93	48	

Source: Field Survey, 2014

Estimation of Technical Efficiency

One output and four inputs were used in the model. The output is the income from poultry business. The inputs are; cost of labour, price of day old chick, cost of electricity and cost of feed. In calculating technical efficiency; there are two types of input orientation used.

i. **Input Orientated Constant Return to Scale** (CRS) that requires every increase in all inputs will result in a proportional increase in output.
ii. **Input Orientated Variable Return to Scale** (VRS) that assume the convexity constraints, so it is more flexible and envelopes the data in a higher and tighter way than CRS.

$$SE = \frac{TECRS}{TEVRS}$$ *i.e. Scale Efficiency is Constant Return to Scale divided by Variable Return to Scale*

In this study DEA-solver software was used to calculate CRS and VRS with radial distances to the efficient frontier. In calculation of scale efficiency, the technical efficiency (TE) scores obtained from a CRS were decomposed into two components; one due to scale inefficiency and the other due to "pure" technical inefficiency. This was done by conducting both a CRS and a VRS.

Estimation of Factors Affecting Technical Efficiency

In determining the factors affecting technical efficiency of poultry farmers, a regression analysis was done using the socio-economic variables as independent variables.

Constraints to Poultry (broiler) production

The severity of the constraints identified by the poultry farmers were assessed in three categories; not severe, moderately severe, and severe. The respondents were to state their perception about each of the identified constraints. The attached weight to each response are; not severe = 1, moderately severe = 2, very severe = 3

Calculations

The weight of each response category was multiplied by the frequency, summed up and divided by sample size.

Likert rating $= \frac{Weight X\ frequency}{Number\ of\ respondents} = \frac{WF}{N}$

Where W = Attached weight to each response category

F = Frequency of the response

N = Number of respondents

The values obtained were used to rank the constraints in order of severity.

Table IV: Regression results on factors affecting technical efficiency

Variable	Coefficient	Std. Error	t-value	P>|t|
Single	-0.146*	0.085	-1.711	0.091
Divorced	0.261	0.119	1.188	0.331
Widowed	0.091	0.153	0.592	0.555
Non-formal Education	-0.125**	0.104	-1.903	0.032
Area of Specialization	-0.078	0.058	-1.343	0.183
Age of respondents	-0.050*	0.026	-1.878	0.064
Household size	0.006	0.040	0.153	0.878
Access to loan	0.165***	0.056	2.963	0.004
Access to good water source	0.040***	0.035	3.138	0.001
Feeds given to birds per month	-6.702	0.000	-1.049	0.297
Poultry farming experience	0.072**	0.030	2.447	0.016
Ownership of the business	-0.115	0.084	-1.370	0.174
(Constant)	0.380	0.176	2.158	0.034
F(10, 182)	4.369			
Prob> F	0.006			
R-squared	0.419			

Source; Data Analysis, 2014

Note: ***, ** and * indicate 1%, 5% and 10% level of significance

RESULTS AND DISCUSSIONS

Estimation of Technical Efficiency

Farms with efficiency score of 1 (technically efficient) were shown in Table I; those with TE scores of less than 1 were not efficient. From the results, 13.47%, 22.79% and 13.98% of the farms were technically efficient on the basis of CRS, VRS and SE technical efficiency. The mean values of TE scores for CRS, VRS and SE for all the poultry farmers considered were found to be 0.56 (±0.27), 0.78 (±0.17) and 0.70 (±0.255) respectively.

Distribution of Efficiency Scores

The frequency distribution of the TE scores is presented in Table II. Considering CRS, 19.17% of the poultry farmers had the highest efficiency scores of 0.909 – 1.0 while 4.15% had the least efficiency score of 0.075 – 0.168, and 46.62% had efficiency scores above the mean (0.56). Considering VRS, 34.72% of the poultry farmers had the highest efficiency scores (0.909 – 1.0)

while 4.15% had the least efficiency scores (0.354 - 0.445), and 53.89% had efficiency scores above the mean (0.78). Also, considering scale efficiency, 30.57% had the highest efficiency scores (0.909 – 1.0) and 2.59% had the least efficiency scores (0.075 – 0.168), and 62.24% were above the mean score (0.70). It is worthy of note that the mean of CRS, VRS and SE were above average. Also, more than 50% of farmers were above the mean considering VRS and SE.

Factors influencing technical efficiency in broiler production

Socio-economic factors of broiler farmers

The highest percentage of the respondents, 25.4%, were 31- 40 years, 21.2% of the farmers fell within the age bracket 61-70, while 1.6% of the farmers were less than 20 years of age. The mean age of the farmers was 51 years (±15.82) which shows that the farmers were in their middle age. Also, 70.4% were married, 22.3% of the respondents were single, 4.7% were divorced while 2.6% were widowed. Although the majority of the farmers were married, different categories of farmers were involved in poultry farming. Further, the percentage of male among the respondents was 60 while that of female was 40. This suggests that modern poultry farming is dominated by male probably because of the high risk involved, being labour intensive and other required husbandry processes which are not attractive to most women.

Results also show that most of the poultry farmers had formal education as 64.8% of the farmers were graduates of either Colleges of Education, Polytechnics or Universities and 21.2% had secondary education. The mean year of experience was 8 (± 3.40) and 48.2% of the poultry farmers had at least ten years of experience in broiler farming. Majority of the farmers (60.6%) had household sizes which ranged between 4 and 6 persons with mean household size of 6 persons (± 2.20). In addition, 48% were into full time poultry farming business meaning that the 52% of the poultry farmers had some other businesses. This is similar to the findings of Ojo (2003).

Table V: Constraints being faced by poultry farmers

Constraints	Perception of the level of severity							
	Not severe=1		moderately severe=2		Very severe=3			
	Freq.	%	Freq.	%	Freq.	%	Weighted Average	Rank
Inadequate Capital	25	12.9	43	22.2	125	64.7	2.51	1st
Fluctuation of feed's cost	39	20.2	51	26.4	103	53.3	2.33	2nd
Lack of credit Facilities	75	38.8	53	27.4	65	33.6	1.94	3rd
High cost of Labour	74	38.3	69	35.7	50	25.9	1.87	4th
Disease and Parasite	96	49.7	54	27.9	43	22.2	1.72	5th
Mortality	100	51.8	70	36.2	23	11.9	1.59	6th
In accessibility to good water source	120	62.1	69	35.7	4	2.0	1.40	7th
Water scarcity	121	62.6	69	35.7	3	1.5	1.38	8th
Poor electricity supply	151	78.2	21	10.8	21	10.8	1.32	9th
Poor weather condition such as high temperature and humidity	159	82.3	25	12.9	9	4.6	1.21	10th
Marketing problem such as low level of sales, poor prices	120	62.1	70	36.2	3	1.5	1.00	11th

Source: Field Survey Data, 2014

Regression results on factors affecting technical efficiency

The regression results on factors affecting TE of poultry farms are presented in Table IV. From the analysis, F= 4.369 ($p \leq 0.006$) shows that the variables used in this study were jointly statistically significant. This implies that the socio economic variables can jointly affect TE of the farmers. R-squared of 0.419 shows that 41.9% of the variation in dependent variable (TE) was jointly explained by the independent variables. Also, the results indicate that some of the independent variables were significant.

Marital status: Being a single poultry farmer affects TE negatively (significant at 10%) because majority of the singles are jacks of all trades, invariably, they had little or no time to efficiently supervise their farms because of their involvement in other societal activities such as politics and other occupations as a way of diversification.

Education: From the regression results, non-formal education had a negative effect on the technical efficiency of the famers at 5% level of significance.

Age: The age of the respondents had negative effect and was significant at 10%. This indicates that as poultry farmers advance in age, they become less technically efficient. This can be explained that as the farmers become older, the technical efficiency decreases gradually.

Access to loan: Access to loan was significant at 1% and had a positive effect on the level of technical efficiency of poultry farmers, this connotes that the more credit facilities (loans) are available to poultry farmers, the higher the TE.

Access to good water: From the results, access to good water had a positive influence on TE and significant at 1%. Access to good water source is very important in poultry production.

Poultry farming experience: Poultry farming experience was significant at 5% and had a positive effect on TE. As years of experience of poultry farmers increased, the probability of been technically efficient increases.

Area of Specialization: This had a negative effect on TE; farmers who had other areas of specializations (part-time) would not be able to concentrate fully on the enterprise thereby reducing efficiency.

Constraints faced by Poultry Farmers

From Table V, inadequate capital was the major constraint being experienced by the poultry farmers and that is why it ranked first with weighted average of 2.51, and fluctuations in feed costs ranked second (2.33). Considering the weighted average values, these two were the most severe constraints affecting the poultry farmers. Lack of credit facilities and high cost of labour ranked third and fourth respectively. Those constraints having average weighted values between 1.9 and 1.2 were considered to be moderately severe, while marketing problem was not serious at all, as it had the least average weighted value of 0.9 and ranked eleventh on the table.

CONCLUSION

More than half of the broiler farms were above the mean technical efficiency and there is room for improvement in the technical efficiency of poultry farmers; 44%, 22% and 30% considering CRS, VRS and SE respectively. Higher levels of efficiency in production will help to improve the availability of animal protein through improved broiler production, given the existing level of resources.

RECOMMENDATIONS

On the basis of the findings, improved education for poultry farmers and encouraging younger educated people into farming will increase efficiency. Also, improved operations of broiler farms through better access to loans and subsidies on production inputs like feed, drugs/medicine will be necessary for increasing efficiency.

CONFLICT OF INTEREST

The authors declare that there is no known conflict of interest as regards the conduct of this study and the data reported in this work.

REFERENCES

Ad Bal, A. O. 2011. Room for Alternatives. *World Poultry Magazine* no 27, 7(5).

Ahmad, A.A, Al Khraisat. 2013. Economic Analysis of poultry (broiler) production in Amma and Irbid District in Jordan.

Ali, O.A. 2002. Analysis of commercial poultry egg producers in Osun State. *Nigeria Journal of Animal production* 3(1): 75-79

Aromolaran, A.B. Bamigbose A.M. 1999. "Comparative cost Analysis of meat production and Energy production in

Abeokuta, Nigeria Tropical animal science 2(1): 185-193

Awosanmi, A.O. 1999. Economic of commercial livestock production in Nigeria, *International journal of Agricultural Extension*. Pp 54-79

Farrel, M.J, 1957. "The measurement of productivity efficiency". *Journal of Royal Statistical Society A120: 253-81*

Food and agriculture organization (FAO) 2009. FAO; data on poultry production

Ojo, S.O, 2003. Productivity and technical efficiency of poultry egg production in Nigeria.

International Journal of poultry Science 2 (6): 459- 464.

Ojo, S.O. and Afolabi, A.A, 2000. Analysis of commercial poultry production in Nigeria, *International journal of poultry Science*.

Windhorst, H.W. 2011. "Africa Gradually moves Towards Market Orientated Production", *World Poultry Magazine*. No 27, 7: 6-8