

ASSESSING THE TECHNICAL EFFICIENCY LEVEL OF POULTRY EGG PRODUCERS IN ILORIN, KWARA STATE: A DATA ENVELOPMENT ANALYSIS APPROACH²

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Abstract

Evidence had shown that the critical issue in poultry production in Nigeria is that of low production and inefficiency in resource allocation and utilization. Nowadays, chickens and eggs are regarded as comprehensive and favorite foods of people and they have a special place in food program of families. This study assesses the technical efficiency level of poultry egg producers in Ilorin, Kwara state using Data Envelopment Analysis. A stratified random sampling technique was adopted in selecting 150 poultry egg producers. The data for the study were collected with the use of well structured questionnaires from poultry farmers. The result showed the poultry egg farmers are relatively technically efficient in their use of resources, with a mean technical inefficiency of 26%. The mean input slack for numbers of birds, feeds and labour have slacks of 6.936, 91.021 and 0.334 respectively implying that inputs could be decreased by those units and still produce the same level of output. The study concluded that the poultry egg farmers are relatively technically efficient. The study

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recommend that reducing excess amount of inputs on one hand and raising output on the other hand, efficiency level can be improved and farmers could benefit economically.

Keywords : Technical efficiency, Poultry egg producers , Data Envelopment Analysis

Introduction

Measurement of the efficiency of agricultural production is an important issue in developing countries. A measure of producer's performance is often useful for policy purposes, and the concept of economic efficiency provides a theoretical basis for such a measure (Russel and Young, 1983). Poultry is a sub-sector in the livestock industry constituting a major component in agriculture of developing countries such as Nigeria. According to Ali (2002) Nigeria poultry production is expanding but is not keeping pace with rapidly increasing domestic consumption requirements. Yet, poultry product provides direct cash and other sources of livelihood for many inhabitants and source of organic manure (Oyedipe, 2000).

However, given the fact that Nigeria is faced with great challenge as far as the inadequacy of livestock sub sector is concerned. Poultry has still been described as the fastest means of bridging the protein deficiency gap in the country as the products (meat and egg) are recognized as the richest natural sources of essential nutrients for man (Akinwumi *et al.*, 1979). The main challenge of modern agriculture in Nigeria is to increase the amount and efficiency of food production in order to meet the food need of the population which continues to increase rapidly. The term technical efficiency of a farm is its ability 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 consist of technical and allocative efficiencies: the two components combine to give a measure of economic efficiency.

Changes in government policies occasioned by a general economic recession have been identified as 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. The high costs of these inputs often result to loss and sometimes make farmers to abandon the enterprise; this is what is happening in Ilorin.

In most situation, measures adopted by both the government and farmers to improve the situation are geared towards reimbursing the input supplies which are mainly targeted to production increase neglecting the productivity aspect of the enterprise. However, in line with

Onyenweaku and Effiong (2006) and Ashagidigbi *et al.*, (2011), one of the major problems of poultry production in Nigeria is that of low productivity and inefficiency in resource allocation and utilization. Improvement of efficiency and fulfillment can be as one of the most effective methods to realize production development. From the available literature, studies have been carried out on technical efficiency of farmers in Nigeria setting. Such studies includes Binuomote *et al.*, (2008), Ojo (2003), Adepoju (2008), Ajibefun and Abdulkadiri (1999), Adesina and Djato (1997), Ajibefun *et al.*, (2002), Ashagidigbi *et al.*, (2011) and Yusuf and Malomo (2007). Nevertheless all these focus on technical efficiency but Alabi and Aruna (2006) also mentioned that little is known about the level of technical efficiency of Nigeria poultry industry in general. Technical efficiency determination could bridge this gap by helping poultry farmers to raise productivity without increasing resource base. Within this framework; this study aims to examine the technical efficiency of poultry egg producers in Ilorin, kwara state. it is anticipated that this study will contribute uniquely to available literature on empirical measurement of technical efficiency. Moreso, it will further help poultry farmers to identify factors at the farm level that affect poultry egg farmer's technical efficiency by determining the opportunity for increasing farm output. It will assist policy makers in formulating appropriate policies in poultry production as well as providing necessary information to intending poultry egg farmers.

Methodology

The study was carried out in Ilorin, the capital city of Kwara state. Ilorin city consist of three local Government areas namely: Ilorin west, Ilorin south and Ilorin east. Kwara state was created on the 27th may, 1967 as one of the 12 states that replaced the former four regional structures of the country. Ilorin had an estimated population of about 847,582 people as of 2006 (NPC, 2007).Ilorin is located on latitude 8° 30' N and longitude 4° 35'E. It is situated in the middle belt zone of Nigeria and occupies an area of about 150km² (Ajibade *et al.*, 2005).

The study area was divided into three: Ilorin south, Ilorin east and Ilorin west, chosen based on predominance of registered poultry farmers as contained in the information from poultry association of Nigeria (PAN), Kwara State chapter. These three divisions have the highest percentage share of poultry farmers in the state. A stratified random sampling technique was adopted in selecting 50 poultry egg from each division to make a total sample size of 150 respondents. The Data was obtained through a structured questionnaire and administered to the sampled farmers. Secondary information was obtained from journals, previous work and textbook.

Data envelopment analysis is a nonparametric method of measuring efficiency of decision making unit. Farrell (1957) formulated a linear programming model to measure technical efficiency of a firm with reference to benchmark technology characterized by constant returns to scale. This efficiency measures corresponds to the coefficient of resource utilization defined by Debreu (1951). Charnes *et al.* (1978) introduced the method of data envelopment analysis (DEA) to address the problem of efficiency measurement for decision making units (DMU) 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 produces identifiable and measurable input but lack market price of output and inputs.

This approach is based work of Farrell (1957) and Fare (1994) has since been improved upon and extended by Battese (1992) and Coelli (1996). Charnes *et al.* (1978) developed the fractional linear programming method of DEA. In Nigeria, Yusuf and Malomo (2007) in use of non parametric frontier production function on technical efficiency of poultry egg production in Ogun state that majority of farmers are relatively efficient. For this study output oriented DEA as designed by Coelli (1996) will be used to determine how much input mix the farmers would have to change to achieve the output level hat coincides with the best practice frontier. Technical efficiency will be measured as follows:

$$\text{Max TE} = \frac{\sum_{r=1}^s \alpha_r y_{ro}}{\sum_{i=1}^m \beta_i x_{io}}$$

$$\text{subject to } \frac{\sum_{r=1}^s \alpha_r y_{rj}}{\sum_{i=1}^m \beta_i x_{ij}} \leq 1, j = 1, \dots, n$$

$r = 1 \dots s$; $i = 1 \dots m$.

α , β are variables to be estimated and x_{ij} and y_{ij} respectively are the quantities of the i^{th} input and r^{th} output of the j^{th} farm. As the ratio is maximized it would be constrained to be no greater than one.

Thus, if TE equals one, then it is perfectly efficient.

Inputs = layer birds (numbers); Feed (kg), Labour (man/days).

Output = eggs (crates)

Firm = 1...n

Result And Discussion

The distribution of technical efficiency score among the farm is presented in Table 1. The Table showed that 32.67% of the farmers are operating within the efficiency score of 0.901-1.0, 18.67% are within the efficiency score of 0.501-0.6, 22% within the efficiency score of 0.801-0.9 and 18% are within the efficiency score of 0.701-0.8. The mean efficiency score is 0.74. The maximum and mode of the technical efficiency is 1. The median efficiency is 0.78 while the minimum technical efficiency score is 0.337.

Table 1: Distribution of technical efficiency

Efficiency interval	Farm frequency	Percentage
0.301-0.4	10	6.67
0.401-0.5	9	6.00
0.501-0.6	28	18.67
0.601-0.7	14	9.33
0.701-0.8	18	12.00
0.801-0.9	22	14.67
0.901-1.0	49	32.67
Total	150	100
Mean	0.74	
Median	0.78	
Mode	1	
Minimum	0.337	
Maximum	1	

Source field survey 2012

The result shows that 32.67% of the farmers operate on a high efficiency level of 0.901-1.0. This high degree of technical efficiency suggests that very little marketable output is sacrificed to resource waste as reported by Yusuf and Malomo (2007). The implication of this is that the farmers are utilizing their resources proficiently. The overall mean technical efficiency which is 0.74 implies that on average poultry egg farmers observed output is 0.26 less than the maximum output which can be achieved from the existing level of inputs. In addition it is an indication of opportunity for improvement in efficiency which could either increase output or reduce cost of production given the present technology and operating close to the frontier. The observed efficiency (0.74) can be attributed to various factors ranging from technical production constraints, socio-economic and environmental factors. Furthermore, it has been argued by Yusuf and Malomo (2007) that non physical inputs like

experience, information asymmetry and other socioeconomic factors might influence the ability of a farmer to use the available technology efficiently and this agrees with Ojo (2003).

This outcome shows that the egg producers are relatively efficient in the study area, holding up the findings of Yusuf and Malomo (2007); Adepoju (2008); Binuomote *et al.*, (2008); Ismat *et al.*, (2009); and Ashagidigbi *et al.*, (2011) in evaluating the technical efficiency of poultry farmers using non parametric and parametric frontier on production efficiency found that poultry farmers technical efficiency were relatively high.

Output slacks: The value for output slack is all zeros revealing that there is no slack in the output meaning they are optimized.

Input slacks: This problem arises when it is questionable as to whether a farm is on efficiency point on the frontier (Yusuf and Malomo, 2007). If one could reduce the amount of any of the input used and still produce the same output, it is known as input slack which is also referred to as input excess.

The input slacks provide an accurate indication of technical efficiency of a farm by Farrell in Data Envelopment Analysis. On the average; numbers of birds, feeds and labour have slacks of 6.936, 91.021 and 0.334 respectively. These imply that inputs could be decreased by those units and still produce the same level of output. Thus, the poultry egg farmers are said to be inefficient in input usage by the said values. From the result above, labour is more efficiently utilized than other inputs while feed is the most underutilized input. This result disagrees with Yusuf and Malomo (2007) whose result showed that feed is more efficiently utilized and labour is the most underutilized.

Conclusion And Recommendations

In the context of the result obtained, the following conclusions are made; Despite complains of poultry egg farmers on the rapid increase in price of feed ingredient. On average, the poultry egg farmers are relatively technically efficient in the study area. As evidenced from the study, the technical efficiency result showed that the poultry egg farmers operate at a relative efficiency score which indicates that they are not operating at full efficiency. The study therefore, recommends that reducing excess amount of inputs on one hand and raising output on the other hand, efficiency level can be improved and farmers could benefit economically. This could contribute to compensating high cost of production, thus improve farm revenue and generally help anticipated poultry egg farmers. The input slack which showed feed to be underutilized as among the input used and it accounts for the highest percentage of total cost of production. This study then recommends that additional

units of birds should be introduced so as to address the problem of underutilization of feed so as to improved efficiency level of the farmers.

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