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TECHNICAL EFFICIENCY OF POULTRY PRODUCTION: THE CASE OF BROILER PRODUCERS IN UYO URBAN

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Abstract
The technical efficiency of broiler farmers was investigated using the stochastic frontier production function, which incorporates a model for the technical inefficiency effects. Farm-level survey data were obtained from 70 farmers using well structured questionnaire. Variables included in the model for the inefficiency effects are extension contact, farming experience, age and educational attainment of the farmers. The parameters of the stochastic frontier production were estimated simultaneously with those in the model of inefficiency effects. Findings however suggest that none of the sampled broiler farms in the study area reached the frontier threshold. Results further reveal that output from broiler production increased by 18 percent using available technology.
Keywords: `Technical, Efficiency, Peri-Urban, Broiler

Introduction

Poultry is by far the largest livestock group and is estimated to be about 14,000milion, consisting mainly of chickens, ducks and turkeys (FAO,1999). Poultry production has evolved as one of the most efficient industries producing food (Musa and Olarinde,2008). According to Ironkwe and Ekine (2008), more people especially in developing countries are consuming more eggs and poultry meat each year. The consumption of poultry meat between 1999 and 2000 had an average annual growth rate of 10% (Poultry International, 1996). The share of livestock credit going to poultry production reflects the importance of poultry in Nigeria. In 1999, out of N16,193500 granted to the livestock sector N11,668,000(72.05%) of livestock was disbursed to poultry.

The consumption of animal protein in Nigeria, a vital food ingredient, critical to growth has been inadequate (CBN, 2004). Consumption of animal protein in Africa, Nigeria inclusive, remains one of the lowest in the world (Ojo and Evbuomwan, 1997). According to Ezike and Nwoye 2004) cited in (Anamayi et al 2008), the consumption level of 4.5g per caput, is below the FAO minimum level of 35g per caput. Poultry production is one of the quickest means of reducing the problem of protein inadequacy in our diets because poultry is characterized by rapid growth rate, high feed conversion efficiency and early maturity (Anyaehie and Irole 2008). Poultry production offers the greatest potential for bridging the protein deficiency gap existing in the country (Lorgyer et al 2008).

The concept of farm efficiency which is an important issue today in most developing economies including Nigeria dates back to the Pioneering Works of Farrel (1957) who reported that technical efficiency is the ability to produce a given level of output with a minimum quantity of inputs. Poultry production particularly broiler enterprise uses resource inputs for its production. Recent and empirical studies by Udoh and Akintola (2001); Udoh (2005), Etim et al(2005) Udoh and Etim (2006); Etim and Udoh (2006;2007) suggest that farmers being primary managers of land need to manage problems arising from deteriorating natural resources and use available inputs as efficiently as possible to optimize agricultural production. Pretty (2002) highlights the need for farmers to produce food without damaging or destroying the environment and to make the best use of available natural and social resources for sustainable production. Unsustainable and inefficient use of resource inputs can seriously jeopardize and hamper food production and security (Nafziger, 1996; Udoh and Akintola (2001a), Udoh and Etim (2006). This study therefore analyzes the farm level technical efficiency of broilers production in Akwa Ibom State.

Methodology

Study Area, Sampling and Data Collection Procedure:

The study was conducted in Uyo Local Government Area, the capital city of Akwa Ibom State, Nigeria. It has an estimated population of 309,573 (NPC, 2006). The area is located between latitude $5^0 17^I$ and $5^0 27^I$ North and longitude $7^0 27^I$ and $7^0 58^I$ East. Uyo covers and area approximately 35square kilometers with annual precipitation ranging from 2000-3000mm per annum. This rainfall regime received in most parts of the State encourages farming throughout the year (Etim and Ofem, 2005). Data used for this study are mainly primary and were obtained from farmers using structured questionnaire. Specifically,70 broiler were selected from 2 peri-urban zones of Uyo viz Nsukkara and Mbiabong areas.

The empirical model to measure the technical efficiency of broiler farmers utilized multiple regression based on stochastic frontier production function defined as:

$$T_i = f(X_i;) \exp(V_i)(i = 1, 2, ...n,) \quad .... (1)$$

Where Y = output of ith farm

X_i = The corresponding (M x Z) vector of inputs

= A vector of unknown parameters to be estimated

F( ) = an appropriate function form

V = A symmetric error component that accounts for random effects and exogenous shock

$U \leq 0$ = a one sided error component that measures technical efficiency

To develop a model that is flexible and can develop the data, Cobb-Douglas production function was specified and is expressed as:

$$Ln(Q) = \beta_0 + \beta_I Ln(X_i) + \beta_2 Ln(X_2) = \beta_3 Ln(X_3 + \beta_4 Ln(X_4) + \beta_5 Ln(X_5) + V_i - U_i \quad .... (2)$$

where Q is the value of output in Naira, X_1 is the stocking density measured as the total number of birds stocked by the farmer, X_2 is the labour employed in farm operation in mandays; X_3 is the value of drugs in naira, X_4 is the value of concentrates in naira, X_5 is the cost of day old chicks in naira.

With $V_i \sim N(O, \sigma V^2)$ and

$$e^{UI} = \delta_0 + \delta_I(Ext) + \delta_2(Exp) + \delta_3(Age) + \delta_4(edu) + Z_i$$

Where Ext is access to extension contact (dummy), Exp is family experience in years. Age is the age of the farmer (years). Edu is the level/of educational attainment of the farmers in years, Z_i is an error term assumed to be randomly and normally distributed.

Results and Discussion

Maximum likelihood (ML) Estimated and Inefficiency Estimates

The model specified is estimated by maximum likelihood method using FRONTIER 4.1 software. Results on table 1 show ML estimates and inefficiency determinants and sigma square (0.4091) is statistically significant and different from zero at $\sigma = 0.01$. Result indicates goodness of fit and the correctness of the specified distribution assumption of the error term. The variance defined as λ is estimated to be as high as 71.50 percent implying that the production functions are relatively dominant sources of random error. Thus the existence of technical inefficiency among broiler farmers account for about 71.50 of the variation in the output level of the birds raised. Labour appears to be the most important resource in production with an elasticity of 0.4124 followed by feed and stocking density with elasticity of 0.4110 and 0.3112 respectively. The estimated coefficient of the inefficiency determinants reveal that except for age and education, the coefficient of other inefficiency variables were highly significant. Findings are consistent with Ram (1980), Parikh et al (1996), Udoh (2005), Etim and Udoh (2006), Etim and Udoh (2007).

Resource Use Efficiency Distribution

An important feature of the stochastic production frontier is its ability to estimate individual, farm-specific technical, allocative and economic efficiencies. Table 2 shows farm specific resource use efficiency indices.

Results on table 2 show considerable variation of efficiency index across the broiler farms. The fact that the technical efficiencies of all sampled broiler farms are less than one is an indication that none of the farmers reached the frontier threshold.

Conclusion

The study measured the farm level technical efficiency and its determinants using stochastic parametric estimation techniques. The farm specific technical efficiency distribution of the sampled pumpkin farms shows a mean technical efficiency of 0.82 indicating that production level of broilers could still be increased by 18 percent using available technology

Table 1: M.L. Estimates and Inefficiency Function

Variable	Coefficient	Asymptotic value
Production Function	2.4210	2,612***
Constant term (β_I)	0.3112	2.611***
Labour (β_2)	0.4124	2.154**
Value of drugs (β_3)	0.3108	2.8011***
Value of concentrate (β_4)	0.4110	1.8140*
Cost of day old chicks	0.6510	1.2013
Inefficiency Function		
Intercept (δ_0)	0.3102	1.4004
Ext (δ_I)	0.4203	2.1140**
Exp (δ_2)	0.5024	1.7039*
Age (δ_3)	0.307	1.4010
Edu (δ_4)	0.2189	1.1022
Diagnostic Statistics		
Sigma (δ_5^2)	0.4091	20.1142***
Gamma (λ)	0.7150	2.2242**
Ln (likelihood)	14.0012	
LR test	6.9740	
Quasi function	1.6144	
Number of observation	70	

Source: Computed from frontier4.1 result

Note: All explanatory variables are in natural logarithms. A negative sign of the parameters in the inefficiency function implies that the associated variables have a positive effect on technical efficiency and a positive sign indicates the reverse is true. Asterisk indicate significance***1%, **5%, *10%.

Table 2: Farm Specific Technical Efficiency

Efficiency Class	Frequency	Percentage
<0.40		
0.01 - 0.12	4	5.71
0.13 - 0.39	19	27.14
0.40 - 0.66	30	42.86
0.67 - 0.93	14	20
>0.94	3	4.29

>0.91			
Total		70	100

Mean Efficiency = 0.82; Minimum = 0.01
Maximum = 0.94

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