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# EFFICIENCY OF RESOURCE UTILIZATION: THE CASE OF BROILER PRODUCTION BY URBAN FARMERS IN UYO METROPOLIS.

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## Abstract

*Output – oriented technical efficiency indices were estimated by stochastic production frontier functions to survey data obtained from 70 broiler farmers in Uyo necropolis, Akwa Ibom State with the aid of questionnaire. Asymptotic parameter estimates were evaluated to describe efficiency determinants using the maximum likelihood estimation technique. The findings reveal a mean efficiency index of 0.81 implying that output from broiler production could be increased by 19 percent using available technology.*

## Introduction

Livestock is quite a common sight, especially in the open spaces in the outskirts of most cities. By far, poultry is the most commonly kept livestock and over 70% of those keeping livestock are reported to keep chickens (Armar – Klemesu and Maxwell, 2000). The main reasons and objective for keeping livestock particularly in urban areas include generating income, keeping animals as an economic asset, having access to dung as a source of manure and maximum production with as little costs as possible (Nunan 2000, Van Eekeren et al, 1995). Keeping broiler poultry requires efficient use of resources to optimize output. Empirical studies (Etim et al, 2005; and Udoh and Akintola, 2001; Udoh 2000; Udoh and Etim (forth coming ) agree that farming uses available resources as efficiently as possible to optimize agricultural production.

Inefficiency of resource use and utilization can seriously jeopardize and hamper food production and security. This paper aims at measuring technical efficiency of small scale broiler production by urban farmers in Uyo metropolis, Akwa Ibom State.

## Methodology

### The 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 234,615 (NPC, 1991; FOS, 1999). The area is located between latitude 5<sup>o</sup>17' and 5<sup>o</sup>27' North and longitude 7<sup>o</sup>27' and 7<sup>o</sup>58' East. Uyo covers an area approximately 35 square Kilometers animal precipitation ranges from 2000 – 2000m per annum. This rainfall regime received in most parts of the state encourages farming through-out the year (Etim and Ofem, 2005).

Data used for this study are mainly primary and were obtained from farmers, using structured questionnaire, in 2005. Specifically, 70 broiler farmers were randomly selected from urban and peri-urban zones of Uyo.

The Empirical model to determine the efficiency of resource use in the broiler farmers was by the use the stochastic frontier production function defined as

$$Y_i = f(X_i; \beta) \exp (V_i - U_i) \quad (i = 1, 2, \dots, n) \quad (I = 1, 2, \dots, n) \quad 1.$$

Where: Y = output of ith farm ;

X<sub>i</sub> = the Corresponding (M x Z) vector of inputs,

β = a vector of unknown parameter to be estimated;

F ( ) = an appropriate functional form ;



$V_i$  = a symmetric error component that accounts for random effects and exogenous shock;  
 $U_i \leq 0$  = a one sided error component that measures technical inefficiency.

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

$$\ln(Qty) = \beta_0 + \beta_1 \ln(LA) + \beta_2 \ln(LAB) + \beta_3 \ln(MED) + \beta_4 \ln(STO) + \beta_5 \ln(FEEDS) + V_i - U_i \dots\dots\dots(2)$$

Where Qty = the value of broiler output in Naira;  
 Labour is the labour employed in farm operation measured in Man days;  
 Medication is the value of drugs measured in Naira;  
 Stockings is the animal units.

With  $V_i \sim N(0, \sigma^2 V^2)$ ; and  
 $-u_i = \delta_0 + \delta_1(\text{Age}) + \delta_2(\text{Exp}) + \delta_3(\text{Ext}) + \delta_4(\text{Edu}) + Z_i \dots\dots\dots(3)$

Where

- Age is the age of the farmers in Years,
- Exp is farming experience in years,
- Ext. is access to extension contact (dummy),
- Edu is the level of formal educational attainment of the farmers in years and
- Zi is an error term assumed to be randomly and normally distributed.

The values of the unknown coefficients in equations (1) and (2) are jointly estimated by maximizing the likelihood function (Yao and Liu 1998; Udoh and Akintola 2001; Etim et al 2005; Udoh and Etim, forthcoming).

**Results and Discussion**

**Maximum likelihood (ML) Estimates and Inefficiency Estimates**

The model specified is estimated by maximum likelihood method using FRONTIER 4.1 software. Results on table I show ML estimates and inefficiency determinants of the sigma square(0.5398) is statistically significant and different from zero at  $\alpha = 0.01$ . Results indicate a good fit and the correctness of the specified distribution assumption of the error term. The variance defined as  $\lambda$  is estimated to be as high as 82.89 percent implying that the systematic influences that are unexplained by the production function are relatively dominant sources of random errors. Thus, the existence of technical inefficiency among the broiler farmers accounts for about 83 percent of the variation in the output level of the broilers kept. Feed appears to be the most important factor of production with an elasticity of 0.3514, followed by labour and land with elasticity of 0.2115 and 0.5149 respectively.

The estimated coefficient of the determinants of efficiency show that except for Age and education, the coefficients of other variables were highly significant. Results are synonymous with findings by Ram (1980), Parikh at al (1996), Udoh (2000)



**Table I: ML Estimates and Inefficiency Function**

Variable	Coefficients	Asymptotic t value
<b>Production Function</b>	4.7215	12.4217***
	0.5149	2.6182**
	0.2115	4.3150*
Constant term ( $\beta_0$ )	2.5814	1.9191*
Land ( $\beta_1$ )	0.3178	0.1241
Labour ( $\beta_2$ )	0.3514	8.1531***
Medication ( $\beta_3$ )		
Stockings ( $\beta_4$ )		
Feed ( $\beta_5$ )		
<b>Determination of</b>	- 0.6139	- 1.1 851
	0.7120	0.0448
<b>Inefficiency</b>	0.3184	- 6.1467***
	- 0.6327	2.1389**
	0.4128	1.1486
Intercept ( $\delta_0$ )		
Age ( $\delta_1$ )		
Exp ( $\delta_2$ )		
Exp ( $\delta_3$ )		
Edu ( $\delta_4$ )		
Sigma-square( $\delta_5^2$ )	0.5398	18.0535***
Gamma $\lambda$	0.8289	2.6140***
Ln (likelihood)	14.6254	
LR test	1.5212	
Quasi Function	7	
Number of observation	70	

Source: Computed from Frontier 4.1 result.

**Resource Use Efficiency Distribution**

An important feature of the stochastic production frontier is its ability to estimate individual farm specific technical efficiencies.

**Table II: Farm specific technical Efficiency**

Efficiency class	Frequency	percentage
< 0.40	3	4.29
0.41- 0.50	9	12.86
0.51 – 0.60	14	20
0.61 – 0.70	18	25.71
0.71 – 0.80	12	17.14
0.81 – 0.90	8	11.43
> 0.91	6	8.57
Total	70	100

Mean efficiency =0.81  
 Minimum = 0.01  
 Maximum = 0.98

The efficiency indices across the broiler farm on table II show considerable variation as the technical efficiency of all the sampled broiler farms are less than one.

**Conclusion**

The study analyzed the efficiency level of broiler production using the stochastic parameter estimation techniques. The farm specific technical efficiency distribution reveals a mean technical efficiency of 0.81 implying that production can still be increased by 19 percent using available technology.

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Table II: Farm specific technical efficiency

Efficiency class	Frequency	Percentage
< 0.40	7	4.50
0.41 - 0.50	9	13.86
0.51 - 0.60	14	20
0.61 - 0.70	18	25.71
0.71 - 0.80	12	17.14
0.81 - 0.90	8	11.43
> 0.91	6	8.57
Total	70	100

Maximum = 0.98  
Minimum = 0.01  
Mean efficiency = 0.81

The efficiency indices across the broiler farms on table II show considerable variation as the technical efficiency of all the sampled broiler farms are less than one.