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Resource Use Efficiency in Small Holder Poultry Production in Imo State, Nigeria

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ABSTRACT - This study was conducted to determine the efficiency of resource utilization in small holder poultry production in Imo State, Nigeria. Data were collected with structured questionnaire from 160 randomly selected small holder poultry farmers, and analysed using production function model estimated using the ordinary least squares multiple regression analysis and efficiency determination technique. Results obtained revealed that allocative efficiency values for labour, seed, drugs and medication, capital, management and other inputs were 0.02, 0.03, 0.37, 0.06, 0.05 and 0.32 respectively, implying that the resources were over utilized. Also the value of returns to scale was 1.535 which implies increasing returns to scale of production. This study recommended that farmers should improve on their resource use efficiency through rational planning and execution of farm business operations as well as generation of adequate production capital.

KEYWORDS: Resource Use, efficiency, poultry, Imo State.

INTRODUCTION

Farm business whether modern or traditional involves the use of resource inputs in the production or outputs. Land, labour, capital and management have been classified as the major factors of production (Olayide and Heady 1982, Upton, 1997). An increase in output can then result from the level and or the method in which they are combined. Efficiency is

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concerned with the rate at which inputs generate output and the use of inputs to produce output, and the potential output which may be obtained from a specific set of inputs (Olagoke, 1991). Khan and Maki (1979) distinguished between two types of efficiencies; technical and allocative, while Yotopoulos and Lau (1973) developed an operational concept of economic efficiency. Technical efficiency is a ratio of total output to total input (Saleem, 1999), while Allocative efficiency is the ratio between total cost of producing one unit using optimal factors proportions in a technically efficient manner (Ogunfowora and Essang, 1972). Economic efficiency is the product of technical and allocative efficiency (Oh and Kim, 1978), which indicates the cost per unit of output for a firm which perfectly attains both technical and price efficiency.

The levels of efficiency of resources use in farming depends on a number of factors. These factors can be classified broadly into information and managerial qualities of farmers, risk effects, inputs supply problems and institutional factors such as tenancy and imperfect capital market (Ali and Byerlee, 1991). The maximum output which can be obtained from a given set of inputs varies between farmers and this is because the degree of technical efficiency which a farmer is able to attain is closely related to the environmental conditions of his farm.

In small holder poultry production, the efficiency of resources use is a critical issue. This is so because, peasant agricultural production is fraught with myriads of constraints against optimal resource acquisition and utilization. Livingstone and Ord (1984) pointed out that there is low level of resource use efficiency in Africa generally. Olayemi (1981) corroborated this fact in stating that land, fertilizer and labour were underutilized in his study on resource use efficiency in swamp rice production involving small farmers in Kwara State. Nwagbo and Onwucheka (1988) in their study on Economics of rice production by farmers in Ebonyi state found that level of resource use was below optimum and concluded that resources were not efficiently allocated. Mac Arthur (1999) also found that there is low labour productivity in traditional agriculture. Alimba and Ezinwa (2001) observed that labour and fertilizer were not efficiently utilized in Yam-based mixed cropping system in Eastern Nigeria.

In general, the major source of technical and allocative inefficiencies is likely to be the management qualities of farmers such as formal schooling, extension contacts, and technical knowledge and skills (Ali and Byerlee, 1991). Lau and Yotopoulos (1971) pointed out that shortage of capital often places limits on production potentials and profit.

If a farm is under capitalized relative to its production potential, the farmer must ration the use of capital and this often leads to low farm performance, and consequently inefficient resource utilization.

A large proportion of the poultry farmers in Imo State are smallholder farmers keeping not more than 1000 birds (MANR, 1998). Previous researches on poultry production in the state identified resources used in poultry production as labour, capital equipments, day old chicks, feed, drugs and vaccine and also estimated the profitability among classes of poultry farmers. None of the studies analysed resource use efficiency of the farmers. This study intends to analyse the level of efficiency of utilization of various resources used by the farmers, so as to provide the basis for policy recommendations towards improved poultry production in Imo State.

METHODS AND MATERIALS

Study Area

This study was conducted in Imo State. The State presently comprises three agricultural zones namely Owerri, Orlu and Okigwe sub divided into 27 Local Government areas (LGAs). The state has distinct wet (March – October) and dry (November – February) seasons. The average annual rainfall is approximately 2280mm with monthly rainfall figures less than 65mm during the dry season. Temperature is high throughout the year, having an annual mean range of 23°C – 32°C (MANR, 2002).

Sampling Procedure and Data Collection

A pilot survey of the three agricultural zones was conducted to acquaint the investigator with the socio-cultural and physical environment of the poultry farmers, identify and select research assistants and informants. The Block extension agents in each LGA, the resident extension agents and key informants in the communities prepared the sampling frame of small holder poultry farmers. Four LGAs were selected from each agricultural zone, and from each selected LGA four communities were selected, giving 16 communities. The selection of the LGAs and communities were purposive, based on having greater number of smallholder poultry farmers. From each community 10 small holder poultry farmers were randomly selected giving a sample size of 160 small holder poultry farmers.

Relevant data were collected from the farmers with structured and validated questionnaire.

Analytical Technique

Data were analysed using production function and estimated using ordinary least squares (OLS) multiple regression analysis. The production function is implicitly specified as

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, e)$$

Where, Y = value of poultry output (N), X_1 = Cost of labour (N), X_2 = Cost of feed (N), X_3 = Cost of Drugs and Medication (N), X_4 = Cost of Capital (N), X_5 = Cost of management (N); X_6 = other Costs (N), e = Stochastic error.

Four functional forms of the model Linear, Semi-log, Cobb-Douglas and Exponential were fitted to know the function that fits best to the data.

The Cobb-Douglas function gave the best fit to the data and was used for further analysis as the lead equation. This choice was made because the function produced the highest values of coefficient of multiple determination, R^2 and t-ratio, gave the highest number of significant variable coefficients and conform to a priori expectations.

The efficiency of each of the resources used was determined using the method employed by Mijindadi (1980), Onyenweaku (1986) and Awoke (2004), where the marginal value product (MVP) of each resource was equated to its marginal cost (MC).

$$MPP_{xi} = \frac{dy}{dx} = b_i$$

$MPV_{xi} = p_y b_i$, where MVP is marginal value product and b_i is the estimated parameters. Since the dependent variable (y) is in value terms, the first partial derivative of the production function produced the marginal value product.

$$MVP_{xi} = MC$$

Then a MVP to MC ratio of less than 1 implies over utilization of input while ratios of more than 1 and exactly 1 imply under utilization and efficient utilization respectively (Onyenweaku 1994, Awoke and Okereke 2002, Awoke 2004). Also where there are increasing marginal returns the sum of the coefficients is more than 1 while values of 1 and less than 1 imply constant marginal return and decreasing marginal return respectively (Upton 1997, Gujarati 2000).

RESULTS AND DISCUSSION

Table 1 Results Of Multiple Regression Equation For Small Holder Poultry Farms.

Explanatory Variables				
And important Statistics	Linear function	Semi-log function	Cobb-Douglass function	Exponential function
Intercept	10.1902	2.5016	0.8922	0.6728
Labour (x_1)	1.0519 (3.052)**	14.2014 (1.055)	0.6928 (3.648)**	0.0027 (2.182)*
Feed (x_2)	5.910 (2.813)**	10.4109 (3.008)**	0.4213 (3.108)**	0.0008 (0.456)
Drugs & Medication (x_3)	2.1824 (1.423)	8.1614 (1.116)	0.0833 (2.518)*	0.0016 (3.199)
Capital (x_4)	3.7609 (1.682)	9.8122 (2.404)*	0.1608 (2.213)*	0.0003 (1.506)
Management (x_5)	1.4668 (2.417)	11.4113 (1.744)	0.0774 (3.412)**	0.0018 (2.447)*
Other inputs (x_6)	3.0717 (1.088)	3.0912 (0.919)	0.0996 (2.333)*	0.0009 (2.307)*
R^2	0.4919	0.3744	0.8219	0.5012
F	24.6870**	15.2609**	117.6779**	25.6269**
DW	1.6014	1.4012	2.3018	1.8215
N	160	160	160	160

Figures in parentheses are t-ratios

* t-ratios significant at 0.05 level

** t and ratios significant at 0.01 level

Source: Summarized from computer output, 2004

The estimated multiple regression equations of the production functional forms are presented in Table 1. The results of the Cobb-Douglas function which emerged as the lead equation show that, the coefficients of labour (x_1) Feed (x_2), Drugs and Medication (x_3), Capital (x_4), Management (x_5) and other inputs (x_6) were 0.6928, 0.4213, 0.0833, 0.1608, 0.0774 and 0.0996 respectively. The multiple regression coefficients for labour, feed and management were significant at 1% level while those of Drugs and medication, capital and other inputs were significant at 5% level. The signs of the variable coefficients are positive in line with a priori expectation. This direct and significant variable relationship indicate that increases in the magnitude of these variables lead to increases in the value of poultry output. The coefficient of multiple determination, R^2 was 0.8219 which is very high and implies that 82% of the observed variation in poultry output of the smallholder farmers could be attributed to the combined effect of the variables

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included in the regression model. The F-ratio was significant at 1% while the Durbin-Watson value of 2.30 was an indication of the absence of autocorrelation among the independent variables tested using the Durbin-Watson statistics. The summation of the coefficients of X_1 , X_2 , X_3 , X_4 , X_5 , and X_6 , gave 1.5352, which implies that the smallholder poultry farmers were operating at increasing returns to scale, where each additional input resulted in more than one unit increase in output. This finding is similar to those of Awoke (2004) who found that there was increasing returns to scale in small holder multiple cropping system in Ebonyi State, and Awoke and Okereke (2002) who reported that there was increasing returns to scale in smallholder sweet potato production in Ebonyi State.

Efficiency of Resource Use

Table 2. Efficiency of Resource utilization in small holder Poultry Farming

Input	Marginal value Product (IMVP)	Marginal Cost (MC)	Efficiency (IMVP/MC)
Labour	0.6928	36.5	0.02
Feed	0.4213	12.8	0.3
Drugs and Medication	0.0833	0.228	0.37
Capital	0.1608	2.93	0.06
Management	0.0774	1.53	0.05
Other inputs	0.0996	0.316	0.32

Source: Computed from Cobb-Douglas Regression Output, 2004

The price efficiency of individual resource use is presented in Table 2. The result shows that the allocative efficiency values for labour, feed, Drugs and Medication, Capital, Management and other inputs were 0.02, 0.03, 0.37, 0.06, 0.05 and 0.32 respectively, indicating that the small holder farmers over utilized the labour, Feed, Drugs and Medication, Capital, Management and other inputs resources in poultry production. This result is in line with the findings of earlier studies that Capital, Labour and Management are over utilized in Multiple cropping system (Awoke, 2004), capital and Labour inputs are over utilized in traditional agriculture, fertilizer and capital were not efficiently utilized in small holder yam-based Cropping system in Eastern Nigeria (Alimba and Exinwa, 2002), planting material and Capital were not efficiently utilized in small scale potato production (Awoke and Okereke, 2002).

POLICY IMPLICATIONS AND CONCLUSION

This study revealed that there was the economic problem of over utilization of production resources in the smallholder poultry farming in the study area. This might be attributed to over exploitation in the use of available resources within the limits of available funds.

The small holder poultry farmers were operating at increasing returns to scale, but their production inputs were over utilized implying resource use inefficiency. This is due to the fact that adequate production inputs are lacking in small holder farming systems coupled with crude management practices. It is recommended that farmers should improve on their resource use efficiency through adequate planning and execution of farm business operations, and exploring more avenues for sourcing fund for increased farm production in the state.

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