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## Effect of agricultural credit on the output and profitability of egg farms in Abia State, Nigeria

L. Tanko, and A.J. Jirgi,

Department of Agricultural Economics and Extension Technology, Federal University of Technology, P.M.B. 65, Minna, Niger State, Nigeria.

### Abstract

*The study examined the effects of agricultural credit on the output and profitability of egg farms in Abia State, Nigeria. Primary data were collected with structured questionnaire during the 2004 production season from a total of 120 egg farmers selected using purposive random sampling technique with which the production, profit and cost functions were estimated using the Ordinary Least Squares (OLS) regression technique. Results show that total quantity of feed, farm size and cost of drugs positively and significantly influenced egg output at 1%, 1% and 5% levels respectively. Results of the profit function reveals that total output of eggs, agricultural credit and average price of eggs per crate had positive and significant effects on profit at 1%, 5% and 5% levels respectively. Sufficient evidence exists to suggest that productivity level differ across farms with and those without access to credit. This study recommends increased incentives to farmers in form of credit facilities. Farmers should be encouraged to belong to organized farmer groups such as Co-operatives.*

**Keywords:** Agricultural credit, output, profitability, egg farms

### Introduction

Nigeria, like many other developing countries of the world is faced with the task of meeting the protein demands of her ever-increasing human population. The eggs and meat from poultry are good sources of animal protein. Poultry meat and eggs provide man with nutrients for growth, tissue replacement and for weight control as a result of its lower fat content (Oluyemi and Roberts, 1982). Poultry eggs rank second to cow milk in terms of nutritive value and are the most economically produced animal protein (FAO, 1990). An average hen's egg contains about 13% protein, 12% fat and particularly rich in calcium, phosphorus and potassium (Akinwunmi, *et al.*, 1979).

There are fewer religious or social taboos associated with the consumption of eggs when compared with pigs and cattle. Esmail (1998) observed that people are attracted to invest in poultry because of the limited land area needed for poultry farms as compared to other agricultural enterprises and public concern over possible hazards associated with consumption of red meat. According to Ikeme (1990), the two most important factors responsible for the phenomenal increase in poultry production in the country have been profitability and quick recoupment of invested capital. According to Adebayo (2002), Nigerians still consume less than 7gm of protein per head per day of the recommended 70gm by the Food and Agricultural organization (FAO).

Agricultural credit is considered as one of the most valuable instruments for agricultural transformation development and for alleviating poverty among rural farmers, (Vincent, 1995; Olomola, 1996). Credit enhances borrowers' purchasing power. It can be used to obtain assets that are expected to yield returns (Pischke and Rouse 1993). Against the background that feed cost alone accounts for 70 – 80% of the total costs of raising livestock (Gieteman 2001), profitability in poultry business depends on how effectively a farmer can manage his feed costs in such a way that least cost is achieved without sacrificing technical efficiency.

Poultry enterprise is capital intensive. The problem of low income of smallholder farmers in Nigeria explains the low levels of productivity and return from poultry investment which implies that only few inputs can be acquired by the poultry farmers (Ojo, 1999). The two main sources of capital for investment are savings and credit. Loans sourced from borrowing are extremely low because much is spent in servicing the total financial needs of the farm households which include off-farm activities such as consumption, social needs etc thus decreasing productivity (Pischke and Rouse, 1993). According to Nto (1981), farmers find it difficult procuring credits from financial institutions to finance their farms as a result of lack of acceptable collateral, poor quality in the organization and management of the poultry farms and lack of adequate records which are required by financial institutions. More so, high default rate on loan repayment makes institutional credit inaccessible to farmers (Famoriyo and Nwagbo, 1981). Given the prevailing circumstances, there is need to ascertain the effect agricultural credit has on egg output. This study therefore examined the effects agricultural credit has on the output and

profitability of egg farms in Abia State, Nigeria, and examines the costs and returns associated with the enterprise.

## **Materials and Methods**

### *Study Area*

This study was conducted in Abia State. Abia State is located in Eastern part of Nigeria. It lies between latitudes 4°-7°N and longitudes 7°-8°E. The State is located in the rain forest agroecological zone with an estimated total annual rainfall of about 2252.10mm distributed over two peak rainy periods, namely, April-July and mid October to mid November respectively. The State covers a total land area of about 762,720km<sup>2</sup>. The State is divided into three agricultural zones, namely: Umuahia, Aba and Ohafia and consists of 17 Local Government Areas (LGAs). According to National Population Commission (NPC) (1991), Abia State has a population of about 2,368,574 people consisting of 1,160,141 males and 1,208,433 females and about 226,706 farming households (Emerole, 2002). About two-thirds of the total population are engaged in small-scale agriculture. Within each zone, the farmers cultivate a variety of crops including cassava, yam, maize, plantain, banana and vegetables. Livestock reared in Abia State include cattle, sheep, goat, pig and poultry.

The State was stratified into the existing three agricultural zones, namely, Umuahia, Aba and Ohafia Agricultural zones. From each agricultural zone, two LGAs and two communities in each LGA were purposively selected based on the preponderance of egg production enterprises. From the twelve rural communities, 10 household heads were randomly selected from the sampling frame, which is the total number of poultry enterprises in each of the communities giving a total sample size of 120 respondents.

Primary data such as expenditures on feed, labour, drugs, foundation stock as well as credit, quantity and price of output and farm income were collected using structured questionnaire alongside personal observation during the 2004 production season. Data were analyzed using descriptive statistics such as percentages and means. The Ordinary Least Squares (OLS) multiple regression technique was used in estimating the production, total variable cost and profit functions.

The Cobb-Douglas production function was estimated, while the total variable cost and profit functions were estimated using the linear functional form. These functional forms have been widely used in previous studies (Martin and Mitra, 2000; Bamiro *et al*, 2001) to achieve similar objectives, for ease of estimating the required parameters.

Implicitly, the models are specified as follows:

*Production Function:*

$$Q = f(X_1, X_2, X_3, X_4, D_1, e_1) \quad (1)$$

*Total Variable Cost Function:*

$$C = f(Q, D_2, r, e_2) \quad (2)$$

*Profit Function:*

$$= f(Q, D_3, P, r, e_3) \quad (3)$$

Where:

- Q = total output of eggs per farm (in ₦)
- X<sub>1</sub> = total quantity of feed supplied (in kg)
- X<sub>2</sub> = number of poultry attendants employed per farm
- X<sub>3</sub> = cost of drugs supplied to birds per farm (in ₦)
- X<sub>4</sub> = number of laying birds per farm
- D<sub>1</sub>, D<sub>2</sub> and D<sub>3</sub> = dummy variables for the production cost and profit functions

respectively (taking on values of 1 for farmers with credit and 0 for farmers without credit)

- P = average price per crate of eggs sold by the farm (₦)
  - R = unit cost of feed supplied to birds in (₦ per kg)
  - C = total variable cost of producing the eggs i.e costs of feed, water, medication etc (₦).
  - " = gross profit per week defined as the value of eggs produced less total variable cost of producing eggs (₦).
- e<sub>1</sub>, e<sub>2</sub>, and e<sub>3</sub> are the residual error terms in the production, cost and profit functions in equation 1, 2 and 3 respectively.

The parameter estimates were obtained using the ordinary least square technique. The effects of using agricultural credit on average variable cost and profit of the farms were captured in terms of the coefficients of the dummy variables D<sub>1</sub>, D<sub>2</sub> and D<sub>3</sub>.

## Results And Discussion

a. *Socio-economic Profile of Respondents*  
 Analysis of the socio-economic attributes of the respondents show that the average farm household had six family members and the typical farmers interviewed were males constituting 78% of the total respondents, while the remaining 22% were females. Also the typical farmers interviewed was married, 46 years old and had completed primary school education. The average farm size was 75 birds, operating expenses per week averaged ₦15,350, the mean years of farming experience was 10.

### b. *Estimation of the Production, Profit and Total Variables Cost Functions*

The estimated production, profit and total variable cost functions for an average farm

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in the study area are summarized in equations 4 - 6 below:

*Estimated production function:*

$$\ln Q = 2.162^{***} + 0.141D_1^* + 0.735^{***} \ln X_1 + 0.020 \ln X_2 + (8.491) \quad (1.956) \quad (14.331) \quad (0.128) \\ 0.174 \ln X_3^{**} + 0.859 \ln X_4^{***} \\ (2.578) \quad (8.312) \quad \dots \quad \dots \quad (4)$$

$$R^2 = 0.793, R^2 = 0.801, F\text{-ratio} = 94.593$$

*Estimated Profit Function:*

$$Q = 154.422Q^{***} + 7.117D_3Q^{**} - (362.938) \\ (18.624) \quad 22.335r^{**} + 14.277P^{**} - - - - (5) \\ (80.764) \quad (2.101)$$

$$R^2 = 0.938, R^2 = 0.941, F\text{-ratio} = 378.625$$

*Estimated total variable cost function:*

$$TVC = 116.543Q^{***} + 13.518D_2Q^{***} + \\ (354.129) \quad (-2.762) \\ 13.430r^* - - - - (6) \\ (19.512)$$

$$R^2 = 0.958, R^2 = 0.969, F\text{-ratio} = 11011.935$$

*Note:* Figures in parentheses are the respective t-ratios

\*\*\* implies that the estimated coefficient was significant at 1%

\*\* implies that the estimated coefficient was significant at 5%

\* implies that the estimated coefficient was significant at 10%

*Computations were based on Field Survey Data 2004*

The results reveal that the double-logarithmic functional form provides a good fit to the production data used for the analysis (Equation 4). The explanatory variables included in the model explained about 79.30% of the variation in egg output (dependent variable). Except for the number of poultry attendants employed per farm, the other variables, namely quantity of feed supplied, farm size and cost of drugs positively and significantly influenced egg output of an

average farm at 1%, 1% and 5% levels respectively. The coefficient for quantity of feed supplied to the birds was 0.735. This implies that if feed supplied is increased by 1%, there will be a corresponding increase in egg output of 0.735% holding other variables constant. The results also showed that the output slope dummy for agricultural credit positively and significantly influenced egg output at 10% level. Farmers with access to credit tend to be more disposed to hire labour, purchase production inputs such as feed, drugs/vaccines etc. which have positive effects on farm incomes and productivity. A one percent increase in number of birds raised by an average farm was observed to have caused about 0.859 percent increase in egg output.

The estimated profit function for a representative farm in the survey area is depicted by equation 5. The results reveal that the linear functional form provides a good fit. An overwhelming 93.80% of the variation in profit of the sampled farms is explained by the explanatory variables included in the model. All the explanatory variables, including the unit cost of feed supplied to the birds, had positive and significant influence on farm profit. In particular, the results indicated that for every N1.00 increase in sales price per crate, there would be a corresponding increase in profit of egg farms by N14.28. A unit increase in total output of eggs per farm per week resulted in farm profit increasing by N154.99. The coefficient of the dummy variable ( $D_3$ ) included in the function was 7.117. This was found to be significant at the 10% level. This underscores the positive effect agricultural credit has on farm profit and that sufficient evidence exists to suggest that productivity level differ across farms with access to credit and those without. Small farmers have a poor resource base and over rely on the meager household resources thereby compelling them to operate optimally along their production functions while being much less

successful in shifting from a production function to a higher one.

Equation (6) shows the estimated total variable cost function. The results indicate that the linear functional form also provides a good fit. The explanatory variables included accounted for a greater proportion (95.80%) of the variation in the total variable costs of an average farm surveyed. It was also found that the unit cost of feed supplied to the birds ( $r$ ), as well as all the other explanatory variables, namely total output ( $Q$ ) and access to agricultural credit (dummy), had significant effects on the total variable costs variously, being positive for output ( $Q$ ) and cost of feed and negative for the output slope dummy for the use of agricultural credit. For an average egg farm, the average variable cost of a crate of egg was indicated to be about N103.21 while gross margin was indicated to increase by about N154.42 for a unit increase in egg output. Poultry farmers with access to agricultural credit had their average variable/marginal cost lowered significantly by about N13.52 per tray occasioned by the cushioning effect of the financial support they received which resulted to an increase of average variable/marginal profit by about N7.12 per tray of egg.

*c. Analysis of costs and returns*

Layer production as is the case of other enterprises is not without associated costs because factors of production always command a price. A summary of the associated costs and returns in layer production in Abia State during the 2004 production season is presented in Table 1.

Results in Table 1 indicate that layer production is a profitable venture in the study area, because the computed net returns value is positive and large, i.e N11,016.10. This implies that the

business had broken-even and more than compensated for the costs incurred. At the margin, N1.00 in invested capital could yield up to N1.92k. Table 1 also shows the percentage composition of the various cost items in relation to the total expenses. It indicated that feed cost accounts for an overwhelming 39.95% of the total cost of production, while the cost of purchasing day-old chicks ranked second accounting for about 17.21% of the total cost. Overall, operating costs constituted a greater proportion i.e 52.14% of the total cost of layer production in the study area. In smallholder agriculture, investments in capital items is usually very minimal.

## Conclusion and Recommendations

*a. Conclusion*

The study attempted to highlight the effects of agricultural credit on egg production under the prevailing economic circumstance. It is obvious that the need for increased financing to augment the poor resource base of the farmers is inevitable if profitability of the egg farms is to be enhanced. The need for the introduction of subsidized credit is therefore imminent as farmers with access to credit realized more profit.

*b. Recommendations*

The cost of feed has been identified as a variable significantly affecting the output of egg farms. Governments at all levels should create a conducive environment for private investors to establish feed mills at strategic locations.

Egg farmers' Co-operatives should be established and encouraged to enable farmers access agricultural credit. Infrastructure such as Veterinary Clinics, transportation and marketing facilities should be well developed and linked up with production.

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**Table 1. Costs and Returns in Layer Production in Abia State, 2004.**

Cost items	Amount in ₦	% of total cost
<b>Average Fixed Cost(AFC)</b>		
Day old chicks*	4,338.00	17.21
Poultry house	2,378.00	9.43
Drinkers	917.30	3.64
Feeders	817.70	3.24
Interest on borrowed capital	339.00	1.34
Lantern	548.90	2.17
Drier	361.80	1.43
Deep litter*	1,539.00	6.10
Miscellaneous	836.00	3.31
<b>Sub total</b>	<b>12,075</b>	<b>47.87</b>
<b>Average Variable Cost (AVC)</b>		
Feed	10,067.00	39.95
Medication	755.60	2.99
Veterinary services	600.00	2.48
Hired labour	175.09	0.69
Water and electricity	1,519.70	6.03
<b>Sub total</b>	<b>13,117.39</b>	<b>52.14</b>
<b>Average Total Cost (ATC)=AFC+AVC</b>	<b>= ₦25,193.10</b>	
<b>Returns</b>		
Sales of eggs	14,156.90	39.09
Culling	9,052.30	25.00
Droppings	7,342.50	20.27
Empty feed bags	5,657.48	15.64
<b>Average Gross Returns(AGR)</b>	<b>36,209.20</b>	<b>100.0</b>

Source: Field Survey Data, 2004.

Note: Fixed cost items were depreciated using the straight-line-method

- implies not depreciated.

Average Net Farm Income = AGR - ATC

= ₦36,209.20 - ₦25,193.10 = ₦11,016.10

Percentage proportion of AVC of total = 52.14%

Percentage proportion of AFC of total = 52.14%.

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