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# Profitability of semi-intensive and intensive egg production in South-West and South-South zones of Nigeria.

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## Abstract

*The paper examines the profitability of two improved poultry systems (semi-intensive and intensive egg production systems) in the South-West and South-South zones of Nigeria using descriptive statistics, farm budget analysis approach and the benefit-cost analysis. The data for the study were obtained through a multi-stage sapling approach from 70 poultry farmers selected from four states (Edo and Delta in South-South; Lagos and Oyo in the South-West) in the study area. Empirical evidence from the analysis shows that the poultry farmers are predominantly male and mostly single. A greater proportion (80%) of them fell between the ages of 31-50 years and had a least secondary school education. Majority of the farmers (86%) used black nera breed because of its high productivity, resistance to diseases and environmental stress and good quality carcass when disposed as spent layer. The study further reveals that differences exist in profitability between the two groups of poultry farmers as the net income of farmers using the battery cage system was about 1.8 times the net income of farmers using deep litter system. However, the benefit-cost ratio indicates that both groups of farmers are making profit since the benefit-cost ratio of their poultry business exceeds one.*

**Key words**: Profitability, Semi-intensive system, and intensive system and egg production

## Introduction

Domestication of poultry was dated as far back as 2000 years ago when man decided to manipulate and modify the habitat of Jungle fowls in advancing his own comfortable existence. It is now realized that no species other than poultry was so much modified and manipulated in the history of man for the sake of accomplishing his own desire. The world now knows many varieties of poultry breeds and strains, which are highly productive and efficient with no comparison at all with their ancestor-the jungle fowl. FAO (1999) reports that, poultry still remains the largest livestock group estimated to be about 14000 million, consisting of chickens, ducks and turkeys in the world. The industry for the common man has become very popular during the past few years due to the growing rate of unemployment and population explosion (MdRasheed, 2002). The industry in Nigeria is characterized by small number of birds usually kept for special occasions under the free range or scavenging system of management. This scavenging system of managing poultry is mostly common in the greater part of Africa (Jensen, 1996; Gueye, 1998) until recently when attention shifted to commercial poultry industry in both meat and egg production under the intensive and semi- intensive husbandry. Historically, the growth of poultry production began as a result of the advantage of poultry industry over other livestock industries. These include the high energy protein level in human diet of poultry products (Flock, 1994); employment generation for the

unemployed (Ravi, 1998); rapid turnover rate and short incubation period of twenty one days (Mokwunye, 2000); source of income to the keepers (Nelson, 1996); source of nutrient for land improvement (Agboola *et al* 1997 and Ojewola *et al.*, 1998). Others include wide acceptability and ready market for the products owing to fewer social taboos (Ikpi and Akinwumi 1979, Adeowo et al., 1999); and easy adaptability to various environment (Oluyemi and Robbert, 1988). In spite of these advantages the industry is yet to attain the desired level of productivity in Nigeria due to the high cost of production (Omeje *et al.*, 1999). For example, poultry egg farmers are faced with the problem of extremely high cost of day-old chicks, drug and other poultry inputs beside the egg glut problem which resulted from the withdrawal of government in egg marketing scheme formed after independence in 1960 without arrangement for its replacement (Taiwo, 1999). The situation was further worsened after the introduction of Structural Adjustment Programme (SAP) in 1986 when poultry began to operate at 30% below capacity with about 30% reduction in the numbers of eggs laid per bird per day owing to unstable foreign exchange that contributed to increase feed price (Atteh, 1998). In recent times, egg production in Nigeria is said to have pick up again (Ajakaiye et. al., 1999), this is in spite of the fact that the 500 percent rise in poultry products prices has not been able to offset the increased cost of production (Guobadra, 1996).

Although poultry production is generally believed by a few as being profitable (Oluyemi and Robert, 1988), the demand and supply gap especially with poultry egg in Nigeria still remain wide owing to low egg production. The contribution of intensive and semi intensive egg production in term of quantity and quantity is yet to make the desired impact necessary for the reduction of this gap. Most analysis of profitability (Abdularahim and Salem, 1996; Ajibefun and Daramola, 1998 and Bamgbose *et al.*, 1998) in egg production have shown great inconsistency which arose from various factors of production and marketing. Even when the cost of production in intensive system is lower in term of small areas of land required and minimization of feed wastage, it is rather expensive in terms of the battery cage and other equipments while that of the free range or deep litter (semi-intensive systems) need more areas of land, increase in feed wastage, high labour, building and equipment costs (Steveson, 1997 and Hill *et al.*, 1997). The crucial question then is, is egg production under the intensive and semi-intensive still a profitable business in Nigeria? This paper in an attempt to answer this question has the following specific objectives: to describe the socioeconomic characteristic of the respondents that influence egg production in the study area; to identify management practices of egg producers as well as determine and compare the profitability of egg production between the intensive and semi-intensive systems in the study area. In the rest of the paper, section two is devoted to methodology, section three deals with the results and discussion, while the last section concludes the paper.

## Methodology

*Data*

Data used for the analysis were collected in 2002-2003 from 80 poultry farmers involved in egg production of which seventy were used (40 semi-intensive and 30 intensive production system farmers). They were selected randomly through a multistage sampling approach which entail the selection of four States (Edo, Delta, Lagos Oyo), two local government areas (in each of the four states) and two locations per local government area with high concentration of improved poultry production systems in the South-south and South-west of Nigeria based on information obtained from the initial survey of the areas of study. The data covered size of stock (birds), labour use (family and hired), type and quantity of feed used, types and quantity of drugs, prices of inputs and outputs and some demographic characteristics of the operators. Ten of questionnaires retrieved

from the semi-intensive farmers were discarded due to improper filling.

*Method of analysis*

The descriptive statistics were used to analyze the socioeconomic characteristics of poultry farmers in the study are, while the profitability of egg production under different systems of management were measured using tools such as the farm budget analytical approach and financial ratos.

The budget approach was developed to show net returns to the business after all expenses have been met. The model is of the form;

$$GM = \sum_{i=1}^{m} P_i q_i - \sum_{i=1}^{n} C_i x_i \quad \text{.....(1)}$$

$$TR = \sum_{i=1}^{m} P_i q_i$$

$$TVC = \sum_{i=1}^{n} C_i x_i$$

NFI =GM – TFC

Where

GM = Gross Margin (N)
$P_i$ = unit price of output (N)
$q_i$ = quantity of output
$C_i$ = unit price of input (N)
$x_i$ = quantity of variable inputs
TR = Total Revenue (N)
TVC = Total Variable Cost (N)
NFI = Net Farm Income
TFC = Total Fixed Cost (N)
IC = Interest on capital at 16% 2002 rate

Financial ratios were used to assess the efficiency and returns to key aggregates of the production systems under study. The ratios employed for this purpose include the efficiency ratio (i.e. operating ratio) and the income ratio (i.e. returns to scale ratio) and is of the form:

Operating ratio (percentage) =

$$\frac{\sum_{i=1}^{n} C_i X_i}{\sum_{i=1}^{m} P_i X_i} * 100 \quad \text{.....(2)}$$

Returns to scale ratio (percentage) =

$$\frac{NFI}{TR} * 100 \quad \text{.....(3)}$$

Where the symbols used in the equation are as defined in the budget equation above.

The operating ratio is an indicator of the ability of the management to control operating cost, including administrative expenses, while returns to sales show how large an operating margin the enterprise has on its sales.

## Results and discussion

*Characteristics of poultry egg producers*

The results of the analysis of socio economics characteristics of the poultry eggs farmers in table 1 shows that, the greatest proportion of respondents falls between active working age of 31-50 years with 80% of this group of farmers practicing deep litter system for their egg production, and 90% practicing the battery cage system. The observed difference between the two groups with respect to the proportion of respondents within the age bracket 31-50 years might probably be due to the fact more of the younger farmers (31-40) who less risk-adverse adopt cage systems.

More males were also found to be in egg production business than females (about 89% to 11%) in the study area. This finding however contradicts Brorholt and Odgaard (1999) observations that poultry keeping is the skill of housewives. The high levels of men involvement may be due to high demand of labour in terms of feeding, egg collection, and changing of poultry litters which women may not be able to combine with household chores. The unmarried were also more involved (80%) in egg production business than the married. The reason might be that the married are more committed to other house activities that may prevent them from carrying out the daily/routine activities involved in the poultry keeping. Also farmers with small family

size (1-5) are more involved in poultry egg production (50%) than those with large family size. Majority of the respondents have at least secondary school education (70%) to enable them perform effectively in their management practices such as administration of drugs, feeds, as well as in effective marketing of eggs. None of the respondents with informal education were seen to practice battery cage system possibly due to the technical knowledge people believe it involved. This result suggests that well educated farmers' responds more readily in using new technology as observed by other studies (Seyoum *et. al,* 1998 and Ajibefun and Aderinola, 2004). Further revealed from the table is the fact that a grater proportion (84%) of the poultry farmers have farming as their major occupations as compared with the few others (16%) whose main occupation were either civil service work, trading and teaching. Farmers having between 6-10 years of experience in egg production were about 49% and 70% of them operated the deep litter system of poultry production. In addition about 44% of the respondents had between 11-20 years of experience and 66% of them operated the battery cage system of poultry production.

***Management practices of the egg producers.***

Table 2 indicates that, both intensive system of poultry keeping (battery cage) and semi-intensive system (deep litter) are generally used by poultry egg farmers in the study area. 57 percent of the respondents used deep litter system because it is less expensive and easy to manage by them and 43% used the battery cage system. Most respondents used black nera (86%) obtained from farms like Zartech and Asian farms located in Ibadan due to its high productivity and resistance to diseases, environmental stress and good quality carcass when disposed as spent layers. However 14% used other kinds of birds like brown nera obtained from Chi-farm, also at Ibadan. Majority of the farmers (61%) used hired labour during production, while 20% used family labour with only 19% combining both hired and family labour. Only those with small capacity (≤ 2000 birds) considered family labour important in terms of egg picking, feeding, watering and clearing of litters. About 56% of the farmers used compounded feed formulated by them to reduce cost and to be able to monitor the level of nutrients, while, the rest obtained their feed from feed mills and stores. Over 80% of the respondent's capitals were obtained from personal savings and profits from other businesses, 14% from government loans and 6% from cooperatives. 64% owned their farm equipment, while 36% got theirs through leasing from local government, cooperatives and other farmers. Number of breeding stocks also varies from farmer to farmer. About 61% of the respondents started egg production with up to 400 birds using point of lay in order to avoid risk associated in rearing the chicks to point of lay; while 39% raise their own birds from day old in order to monitor their performance up till the point of lay and during laying.

*Farm budgets results*

Results of the budget analysis presented on Table 3 shows that the variable cost incurred by farmers of both systems (battery cage and deep litter) of poultry production includes feed, labour, drugs and water. The table indicates that the operating cost of deep litter system poultry farmers (₦ 45, 801) was slightly lower than that of farmers (₦ 47, 290) practicing the battery cage system. Feed cost was the highest cost incurred in both systems of production (45% and 41% in litter and cage systems respectively). Although these values confirm that feed constitutes a major ingredient in any system of poultry production they were however lower in comparison to the values obtained by perivious studies (Ayanwale and Bamire, 1996; Abduraheem and Saleem 1996; Obioha, 1992, Alabi *et al.*, 1999, and Nwajuiba *et al.*, 2002). In recent times various substitutes are becoming available to the farmers for feed formulation and so most costly feed items are often being supplemented with less costly ones thereby reducing the overall feed cost. Other costs include cost of stocks which was observed to be about 15% and 20% of the total cost for litter

**Table 1:** *Demographic characteristics of poultry egg farmers in Southern Nigeria.*

| Characteristics | Deep litter system Frequency | % | Battery cage system Frequency | % | Pooled Data Frequency | % |
|---|---|---|---|---|---|---|
| **No of sample** | 40 | 100.00 | 30 | 100.00 | 70 | 100.00 |
| **Age group** | | | | | | |
| 21-30 | 4 | 10.00 | 3 | 10.00 | 7 | 10.00 |
| 31-40 | 10 | 25.00 | 21 | 70.00 | 31 | 44.20 |
| 41-50 | 22 | 55.00 | 6 | 20.00 | 28 | 40.00 |
| 51-60 | 2 | 5.00 | - | - | 2 | 2.90 |
| >60 | 2 | 5.00 | - | - | 2 | 2.90 |
| **Sex** | | | | | | |
| Male | 35 | 90.00 | 27 | 90.00 | 62 | 88.60 |
| Female | 5 | 10.00 | 3 | 10.00 | 8 | 11.40 |
| **Marital status** | | | | | | |
| Single | 32 | 80.00 | 24 | 80.00 | 56 | 80.00 |
| Married | 8 | 20.00 | 6 | 20.00 | 14 | 20.00 |
| **Household size** | | | | | | |
| 1-5 | 20 | 50.00 | 15 | 50.00 | 35 | 50.00 |
| 6-10 | 18 | 45.00 | 3 | 10.00 | 21 | 30.00 |
| 11-15 | 2 | 5.00 | 6 | 20.00 | 8 | 11.40 |
| >15 | - | - | 6 | 20.00 | 6 | 8.60 |
| **Education** | | | | | | |
| No formal | 1 | 2.50 | - | - | 1 | 1.40 |
| Primary/adult | 1 | 2.50 | 6 | 20.00 | 7 | 10.00 |
| Secondary | 28 | 70.00 | 21 | 70.00 | 49 | 70.00 |
| Tertiary | 10 | 25.00 | 3 | 10.00 | 13 | 18.60 |
| **Major occupation** | | | | | | |
| Farming | 38 | 95.00 | 21 | 70.00 | 59 | 84.28 |
| Civil service | 1 | 2.50 | 6 | 20.00 | 7 | 10.00 |
| Trading | 1 | 2.50 | 1 | 3.30 | 2 | 2.85 |
| Teaching | - | - | 2 | 6.67 | 2 | 2.85 |
| **Farming experience** | | | | | | |
| 1-5 yrs | 1 | 2.50 | 3 | 10.00 | 4 | 5.71 |
| 6-10 | 28 | 70.00 | 6 | 20.00 | 34 | 48.57 |
| 11-15 | 9 | 22.50 | 12 | 40.00 | 21 | 30.00 |
| 16-20 | 2 | 5.00 | 8 | 26.70 | 10 | 14.29 |
| >20 | - | - | 1 | 3.30 | 1 | 1.43 |

and battery systems respectively, labour cost (16% and 9% for litter and battery systems respectively), cost of medication/drugs which was about 3% and 4% of total costs of litter and battery systems respectively and water cost which was the list cost (1% and 2%) in both systems. The low values observed for medication is not an indication that this resource is less important. If the appropriate medical care is not taken it can result in 90% loss in the farm (Alabi *et al.*, 2000). The indication however, is that there is need to give more attention to medication

**Table 2:** *Management practices by poultry eggs producers*

| Practices | Frequency | Percentage (%) |
|---|---|---|
| **Type of Management** | | |
| Deep litter system | 40 | 57 |
| Battery cage | 30 | 43 |
| **Types of stock** | | |
| Black nera | 60 | 86 |
| Brown nera | 10 | 14 |
| **Sources of labour** | | |
| Hired labour | 43 | 61 |
| Family labour | 14 | 20 |
| Both hired and family | 13 | 19 |
| **Sources of feeds** | | |
| Self- formulated feeds | 39 | 56 |
| Obtained from feed shops | 31 | 44 |
| **Sources of capital** | | |
| Personal saving | 56 | 80 |
| Government loans | 10 | 14 |
| Cooperatives loans | 4 | 6 |
| **Sources of farm equipment** | | |
| Owned by farmers | 45 | 64 |
| Leased elsewhere | 25 | 36 |
| **Rearing modes** | | |
| At the point of lay | 43 | 61 |
| From day old to point of lay | 27 | 39 |

on the farm in both systems as this can help in disease prevention and mortality reduction.

The average fixed cost figure however, reveal that the capital expenditure on fixed assets with respect to poultry farmers practicing battery cage system was higher (about 35%) than that of poultry farmers practicing deep litter system. This is because of the huge investment made by this group of farmers on capital equipments such as the battery cages.

Gross revenue for both groups of poultry farmers was observed to come from the sale of eggs and spent layers. It is important to note that certain factors such as laying rate of birds, type of birds, size of the birds (in population) and type of production system normally affect gross farm revenue. Table 3 shows that poultry farmers with the battery cage system of production had higher gross revenue than poultry farmers using the deep litter system of production. This is as a result of the income realized from the sales of eggs. The low revenue from eggs observed in farmers practicing deep litter system might be as result of low number of eggs sold by this group of farmers when compared with the battery cage farmers. Similarly, the gross margin of poultry farmers using deep litter system was lower than the gross margin of farmers operating the battery cage and the average gross margin (₦ 205, 169) of all the farms (pooled data). This is as a result of the low revenue generated from the sales by this group of farmers while the

variable costs were the highest. The deep litter system is known to accommodate less number of birds when compared to the battery system, consequently the yield of less number of eggs for farmers operating this system. As further shown on the table, the net income of deep litter poultry farmers was lower than the average net income (₦ 168, 811) of all the farms and that of the battery cage farmers. The net income of farmers using the battery cage system is about 1.6, and 1.2 times the net income of farmers using deep litter system and all farms respectively. This result was however in line with the outcomes of past studies (Stevenson, 1997; and Hill *et al.*, 1997). Financial ratios results from Table 3 also reveal that deep litter system farmers incurred higher cost of operation than their battery cage counterparts. The high operation ratio (26%) experienced by deep litter system farmers may be due to the large expenses on labour and low

**Table 3:** *Average costs and returns in Naira (₦) per system for poultry egg farmers*

| Items | Deep litter system | Battery cage system | All farms |
|---|---|---|---|
| **Gross revenue** | | | |
| Eggs | 136,035.90 | 229,076.13 | 185,767.42 |
| Spent layers | 72,589.63 | 75,897.94 | 74,007.48 |
| Total GR. | 208,625.53 | 304,974.07 | 259,774.90 |
| **Variable cost** | | | |
| Feed | 37,671.02 | 41,115.49 | 38,393.51 |
| Labour | 13,201.47 | 9,275.50 | 11,500.63 |
| Drugs | 2,719.23 | 4,136.33 | 3,326.56 |
| Water | 1,101.59 | 1,763.12 | 1,385.10 |
| Total VC. | 54,693.31 | 56,290.44 | 54,605.80 |
| **Gross margin** | | | |
| *A*. Gross revenue | 208,625.53 | 304,974.07 | 259,774.90 |
| *B*. Total variable cost | 54,693.31 | 56,290.44 | 54,605.80 |
| *(A – B)* | 153,932.22 | 248,683.63 | 205,169.10 |
| **Fixed cost** | | | |
| [1]Depreciation | 5,456.42 | 10,900.41 | 7,991.97 |
| Cost of stock | 12,329.54 | 20,042.68 | 15,890.74 |
| [2]Interest rate on capital | 11,596.68 | 13,957.36 | 12,475.40 |
| Total FC. | 29,382.64 | 44,900.45 | 37,983.11 |
| **Net Farm Income** | | | |
| *C*. Gross margin | 153,932.22 | 248,683.63 | 205,169.10 |
| *D*. Total fixed cost | 29,382.64 | 44,900.45 | 36,358.11 |
| *(C – D)* | 124,549.58 | 203,783.18 | 168,810.99 |
| **Operating ratio (%)** | 26.23 | 18.46 | 21.02 |
| **Returns to sale ratio (%)** | 59.70 | 66.82 | 64.98 |

[1]Depreciation cost on buildings and equipments used for poultry egg production
[2]Interest rate at 16% on capital used for the business by farmer using year 2002 prime lending rate

sales eggs. Similarly the ratio on returns to scale for deep litter farmers was also lower (60%) than battery cage counterparts which was about 67%. This further reveal that the operating margin of deep litter system farmers was low hence the need for greater sales that must be made by this group of farmers to make an adequate return on investment. Overall both systems of poultry egg production were assessed to be profitable. However the battery cage poultry farmers make more profit than the deep litter system farmers in the study area.

## Conclusion and Recommendations

In this paper we examined the profitability of semi-intensive and intensive egg production systems in south-west and south-south zones of Nigeria. Observations were that differences exist in net profit between the battery cage system (intensive system) and the deep litter system (as semi-intensive system). The result shows that, even though the two systems are profitable, the battery cage system is more profitable than the deep litter system. Majority of the poultry farmers (61%) only purchase their layers at laying point while other (39%) obtain their stocks at day old. The implication of this is that mortality rate of the birds may be higher with subsequent reduction in the number of eggs produced as well as profitability. Also, the implication of the low values of medi-care cost from the study is that there is need to give more attention to medication on the farm as it will help in disease prevention and mortality reduction. Besides, farmers need to combine the strategy of acquiring and raising their own layers for thorough monitoring of the birds performance. Furthermore, the ban on importation of chicken into the country without subsequent arrangement of increasing the current level of poultry stocks by the local producers or breeders will lead to a wider gap between demand and supply there by making intended poultry keepers to book for several days before getting their stocks. The implication is that the cost of stock acquisition may be so high thereby leading to the folding-up of most poultry farmers. The ban should therefore not be seen as a solution to the problem of poultry egg producers but rather that effort should be geared towards encouraging local poultry breeders to both increase the size and develop improved breeds that are competitive with imported one in order to enhance profitability. High priority should also be giving to increasing the supply of locally produced feed ingredients which can act as substitute to imported feed thereby reducing the feed cost.

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