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ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

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# Economic Performance of Commercial Poultry Farms in Oyo State Nigeria

Olasunkanmi M. Bamiro
Department of Agricultural Economics, Olabisi Onabanjo University, Yewa Campus, Ayetoro, Nigeria

**Abstract:** This study focuses on the economic performance of the commercial poultry farms in some selected Local Government areas of Oyo State, Nigeria. Data was collected from 71 farmers using purposive sampling technique. The result of the study shows that the profitability of poultry enterprise is a function of enterprise combination as well as scale of production. The budgetary analysis shows that in all enterprise combinations, farmers that operate on large scale have highest gross margins. On the basis of enterprise combinations, the egg production enterprise records the highest gross margin while the broiler production enterprise records the lowest gross margin. The regression analysis shows that flock size, feed, labour have significant positive effects on the value of output while interaction between layers and broilers have negative impact on the value of output. In the allocation of all the variable inputs the poultry farmers are not efficient.

**Key words:** Commercial poultry farms, poultry farmers, poultry feed

## INTRODUCTION

The Nigerian Agricultural sector is responsible for the provision of food and livestock with poultry production being responsible for 80% of the production (Omotosho *et al*., 1988). However, the output level still remains low compared to the input committed (Ajibefun *et al*., 2000) and the poultry products are grossly inadequate because the supply is lower than demand. Hence, the need for increase in the production of poultry and poultry products. Poultry is highly dependent on grains and other feed ingredients normally utilized by man. They therefore compete directly with man for feeds but grain production in Nigeria is far less than demand. A change in output of maize vis-a- vis its price are immediately reflected in change in output and prices of poultry products.

**Plan of the study:** The remaining part of this paper is organised as follows: the next section presents the methodology; the third presents the results and their discussion, while the final section presents conclusion €and recommendations.

## MATERIALS AND METHODS

This study covers a one-year period from December 2003-2004. Primary data were collected from 71 poultry farms in some selected Local Government Areas of Oyo State. Purposive sampling technique was followed for the study. Out of 71 sample poultry farms, 21 were small, 30 were medium and 20 were large poultry farms. Farm size was classified following Omotosho and Oladele (1988), Subhash *et al*. (1999) and Ojo (2003). Farms having <1000 birds were considered as small farms, 1000-3000 as medium farms while those having 3000 and above birds as large farms.

**Analytical technique:** Descriptive statistics was used to determine the profitability of the commercial poultry farms. On the other hand, tabular, statistical as well as econometric methods were used to determine the relationship between the variable inputs and the output; and the efficiency analysis.

**Profitability analysis:** The following profit (Π) equation was used to determine the profitability of commercial poultry farms:

$$\Pi = PeEs + PeEg + TVBP - PxiXi + TFC \quad (1)$$

$$\text{Gross margin} = \text{Total Revenue} - \text{Total variable cost} \quad (2)$$

**Model specification and estimation:** Production function was used to find the effect of production input on the value of output with the use of regression. Four functional forms namely linear, exponential, semi-logarithmic and Cobb-Douglas (i.e., double-logarithmic) production functions were fitted to the study data in order to choose the lead equation for resource productivity and resource allocation efficiency analysis in poultry production in the study area. The implicit forms of the production function estimated for the sampled farms is presented in Eq. 2 below:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9) \quad (3)$$

where:

$Y$ = Value of output (₦)
$X_1$ = Population of layers
$X_2$ = Population of broilers
$X_3$ = Population of cockerels
$X_4$ = Population of layers and broilers
$X_5$ = Population of layers and cockerels

$X_6$ = Population of broilers and cockerels
$X_7$ = Feed 25 kg bags
$X_8$ = Number of workers
$X_9$ = Other operating expenses (₦)

The study data were estimated using Ordinary Least Square (OLS) technique and the Cobb-Douglas production function was chosen as the lead equation. The choice was based on the consideration of Adjusted $R^2$, standard error of estimate, number of significant variables and "a priori" expectation in relevance to economic theory.

**Efficiency analysis**

**Allocative efficiency:** The estimated lead production function was used to calculate the indices of efficiency. If a farmer has allocated his inputs among his production alternatives efficiently, assuming he is operating under conditions of perfect competition in the product and factor markets, the following equilibrium condition will prevail:

$$P_Y * \frac{\delta Y_i}{\delta Xi_j} = P_{Xj} \quad (4)$$

where:

$P_Y$ = The expected price (marginal revenue) for product $Y_i$
$P_{Xj}$ = The price (marginal cost) of factor $X_j$
$\delta Y_i/\delta Xi_j$ = The marginal physical product of $X_j$ in the production of $Y_i$

The marginal product was obtained from the calculated production functions at the geometric means to establish the prices implicit in the allocations that was made by the "average farmer". For this purpose the equilibrium condition is written as:

$$P_Y * \frac{\delta Y_i}{\delta Xi_j} = P_{Xj}$$

i.e., MVP = MFC

If MVP = MFC, that is MVP/MVC = 1, it implies that the resources are efficiently allocated. However, if the MVP is greater than MFC, there is underutilization of resources, on the other hand if MVP is less than MFC there is over-utilization of resources.

## RESULTS AND DISCUSSION

**Budgetary/gross margin analysis:** Gross margin analysis was used to analyze the cost and return structure for different scale of enterprises. The gross margins of 4 different enterprises namely Egg production enterprise, Egg and broiler production enterprise, Egg, broiler and cockerel production enterprise on the basis of scale are presented in Table 1-4.

**Egg production enterprise:** The egg production enterprise refers to poultry farms that rear layers purposely for egg production. In addition to the sales of eggs, which is the major source of revenue, additional revenue is realized from the sales of culled layers. The result of the budgetary analysis of egg production enterprise by level of production is presented in Table 1. The cost composition shows that feed consumed the lion share of the cost of production at all levels of production. In accordance with apriori expectation the feed cost increases with the scale of production. This result is in consonance with that of Alabi *et al.* (1999), Nwajuiba (2002) and Bamiro *et al.* (2006).

**Broiler production enterprise:** The cost return structure of broiler production enterprise is presented in Table 2. The cost composition shows that cost of feed have the largest share of the total cost of production. However, the feed costs in broiler production enterprise are relatively small at all scales of production when compared with their corresponding feed costs in other poultry production enterprises. This result agrees with the findings of Sani *et al.* (2000) and Bamiro *et al.* (2006). Feed constitutes about 49, 64 and 59% in small scale, medium scale and large scale broiler production enterprises respectively while the pooled data result indicates that feed constitutes about 57% of the total variable cost. The gross margin analysis signifies increase in gross margin of the broiler farms with the scale of production.

**Eggs and broiler production enterprise:** The third enterprise considered in this study with respect to the scale of production is egg and broiler production enterprise. The economic performance of the enterprise combination is presented in Table 3. The result shows that the cost composition follows the same trend with that of egg and broiler production enterprise, that is the feed cost, consumed the largest portions of the total variable cost. However, contrary to expectation, the feed cost increases with the scale of production, the average feed cost for all farms is about 76%. Revenue accrued to this enterprise from 3 major sources, which include sales of eggs, broilers and sales of culled layers. The highest revenue was realized via the sale of eggs while the revenue from the sales of broilers ranked second. This finding is inconsonance with that of Bamiro *et al.* (2006).

The gross margin, in accordance with apriori expectation increases with the scale of production.

**Egg, broiler and cockerel enterprise:** The egg, broiler and cockerel enterprise involves the raising of layers mainly for the purpose of eggs and broiler and cockerel for meat. Hence, revenues accrued to the farmers that are involved in this enterprise via sales of eggs, culled

Table 1: Gross margin for egg production enterprise

| Characteristics | Small scale | Medium scale | Large scale | Average |
|---|---|---|---|---|
| Average bird's population | 460 (75) | 2,283 (320) | 8,460 (672) | 2498 (644) |
| **Revenue** | | | | |
| A. Eggs value | 1,778,198 (646152) | 4,862,817 (1,365,949) | 23,711920 (6,100,240) | 7118878 (2152651) |
| B. Spent layers' value | 916,771 (172,600) | 5,745,615 (1,129,695) | 3,749,000 (1,089,853) | 10,411386 (3,560, 398) |
| C. Total revenue | 2,694,969 (1291264) | 6,228,432 (1,228,776) | 27,460,920 (6,100,240) | 8496190 (2378192) |
| **Cost** | | | | |
| A. Cost of bird stock | 223,833 (38,329) | 703,00 (297,949) | 774,375 (207,123) | 442,785 (95592) |
| B. Cost of feed | 774838 (130,275) | 3,376,647 (3510181) | 11261400 (3510181) | 3,496,585 (1,052,594) |
| C. Cost of labour | 91,500 (14,518) | 106,00 (18,439) | 490,800 (115,074) | 174,840 (39,543) |
| D. Cost of Vitamin and drug | 25392 (4502) | 51,166 (10,796) | 110,600 (23,481) | 48620 (8661) |
| E. Cost of electricity | 9,642 (5302) | 22,2000 (2,082) | 27,940 (2,738) | 16,316 (3,392) |
| F. Cost of transportation | 5,371 (3245) | 42,000 (18,896) | 33,800 (10,892) | 19,848 (6,034) |
| G. Cost of water | 7,542 (3,325) | 3,333 (3,333) | 20,500 (10,500) | 5,024 (2,07) |
| Total variable cost | 1,115,053 (166,705) | 4,493,216 (900,635) | 11,370,425 (4,112,252) | 3,872,242 (1,134,800) |
| Gross Margin (TR-TVC) | 1740023 (185,678) | 2,019,764 (701764) | 16,090,495 (4,173,349) | 3,701,242 (1,378,649) |

Computed from field survey (2004), *Figures in parenthesis are standard errors

Table 2: Gross margins for broiler production enterprise

| Characteristics | <1,000 birds small scale | 1,000-5,000 birds medium scale | >5,000 birds large scale | Average |
|---|---|---|---|---|
| Average bird's population (Broilers) | 750 (200) | 2040 (249) | 6,200 (349) | 2237 (622) |
| **Revenue** | | | | |
| A. Broiler's value | 587,500 (162,500) | 1,205,800 (330,647) | 3,410,000 (420258) | 269285 (45538) |
| B. Total revenue | 587,590 (162,500) | 2,426,730 (607,021) | 3,600,00 (721364) | 804865 (169,636) |
| **Cost** | | | | |
| A. Cost of birds stock | 130,000 (33272) | 299,00 (56,212) | 260,000 (62254) | 269,285 (45538) |
| B. Cost of feed | 315,812 (102,687) | 921,460 (210,707) | 1,200,000 (322,415) | 804,865 (169,636) |
| C. Cost of labour | 63,000 (3,000) | 157,200 (58,431) | 480,000 (65215) | 174,000 (57,939) |
| D. Cost of Vitamin and drug | 20,000 (2,000) | 25,600 (4,965) | 48,000 (6328) | 27,000 (4330) |
| E. Cost of electricity | 10,253 (4852) | 12,660 (5,587) | 2,400 (1250) | 10912 (4,382) |
| F. Cost of transportation | 2,000 (2000) | 9,600 (6,997) | 10,000 (6895) | 7,750 (4,382) |
| G. Cost of water | 1,200 (120) | 14,640 (8,967) | 18,000 (9856) | 11,400 (5,922) |
| Total variable cost | 640,500 (125,664) | 1440160 (296,471) | 2,048,000 (455,856) | 1,411,614 (255,951) |
| Gross margin (TR-TC) | 109,500 (98524) | 986,569 (728,767) | 1,560,000 (302,455) | 943,192 (52,7955) |

Computed from field survey (2004), *Figures in parenthesis are standard errors

Table 3: Gross margins of broilers and egg producing farms

| Characteristics | <1,000 birds small scale | 1,000-5,000 birds medium scale | >5,000 birds large scale | Average |
|---|---|---|---|---|
| Average Bird's population (Broilers and layers) | 583 (109) | 2190 (392) | 17,250 (7,750) | 4136 (1862) |
| **Revenue** | | | | |
| A. Eggs value | 908,600 (151,556) | 3,56,654 (986,987) | 19,809,600 (19250400) | 5,448,479 (2,885,276) |
| B. Broiler's value | 168,667 (41,874) | 626100 (147641) | 6738000 (2,238,000) | 14,60831 (704967.7) |
| C. Spent layers' value | 148,166 | 568,004 | 128,080 | 7,312,748 |
| Total revenue | 1,225,433 (182,670) | 4,754,758 (1,074,095) | 26,675,680 (21,360,321) | (3481409) |
| **Cost** | | | | |
| A. Cost of birds stock | 262,833 (40,346) | 741,512.5 (115,891) | 2,962,500 (687,500) | 72,738 (272,278) |
| B. Cost of feed | 549,506 (45,656) | 2528684 (545,790) | 13,344750 (7,429,250) | 3,735,960 (151,2,886) |
| C. Cost of labour | 58466 (14,112) | 87,000 (22,847) | 224,000 (32,000) | 101,492 (21,141) |
| D. Cost of Vitamin and drug | 15466 (5428) | 50,680 (16,618) | 90,000 (30,000) | 48,603 (12,454) |
| E. Cost of electricity | 13,333 (961) | 18,407 (2,204) | 39,400 (1,400) | 20,466 (12,756) |
| F. Cost of transportation | 2000 (2,000) | 32,900 (10,545) | 44,700 (9,300) | 27,584 (7,679) |
| G. Cost of water | 2480 (2,480) | 8,250 (5,662) | 10,270 (6185 ) | 5,649 (3,563) |
| Total variable cost | 904,086 (76,301) | 3,467,433 (694,114) | 16,715,570 (8,168,050) | 4,912,494 (1,796,542) |
| Gross Margin (TR-TVC) | 321,346 (109,480) | 1,287,325 (623,409) | 9,960,110 (13,192,270) | 2,400,254 (1,803,476) |

Source: Computed from field survey (2004), *Figures in parentheses are standard errors

layers broilers and cockerel. One salient feature of this enterprise is the non-existent of small-scale farmers that are involved in this enterprise combination. This might not be unconnected with the capital requirement vis-à-vis the scale of production that is required for viability and profitability of this enterprise combination.

The large-scale enterprise recorded higher gross margin than the medium scale enterprise in accordance with apriori expectation. In the same vein the medium scale farms incurred lower total variable cost than the large-scale producers.

**Regression analysis:** The regression analysis was carried out with Cobb-Douglas production function,

Table 4: Gross margins of egg, broiler and cockerel production enterprise

| Characteristics | 1,000-5,000 birds medium scale | >5,000 birds large scale | Average |
|---|---|---|---|
| Average bird's population | 2,402 (369) | 10,075 (4,316) | 5192 (1,856) |
| Revenue | Amount ₦% | Amount ₦% | Amount ₦% |
| A. Eggs value | 1,922,971 (403,880) | 12,670,700 (3,563,582) | 5,831,236 (2,029,947) |
| B. Broiler's value | 518,785 (199,840) | 688,500 (192973) | 1081 (272) |
| C. Cockerel value | 549,785 (180,365) | 1,998,000 (540750) | 1089136 (302,526) |
| D. Spent layers' value | 739,001 | 2,192,500 | 1,465,750 |
| Total revenue | 3,730,542 (530,628) | 17,549,700 (4889597) | 8,755,690 (2,671,103) |
| **Cost** | | | |
| A. Cost of birds | 426535 (97,652) | 1,545,000 (744,045) | 833,250 (304,929) |
| B. Cost of feed | 2,089,098 (308,703) | 5,413,650 (861,462) | 3,298,026 (610826) |
| C. Cost of labour | 90,857 (25,063) | 488,000 (163926) | 235272 (82590) |
| D. Cost of vitamin and drugs | 96,000 (64,246) | 60,450 (21,193) | 83072 (40689) |
| E. Cost of electricity | 14542 (3,866) | 24,425 (2,227) | 18,136 (2916) |
| F. Cost of transportation | 24,742 (9,314) | 23,500 (13,865) | 24,290 (7,357) |
| G. Cost of water | 3,771 (3,771) | 2,500 (2,500) | 3,309 (2,479) |
| Total variable cost | 2,745,548 (377189) | 7,559,525 (745,550) | 5,961,108 (806,701) |
| Gross margin (TR-TVC) | 984,994 (343,799) | 9,992,175 (4,599,258) | 2,794,582 (2,056,726) |

Source: Computed from field survey (2004), Figures in parentheses are standard errors

Table 5: Parameter estimates of poultry production function

| Variables | Coefficients |
|---|---|
| **Flock size** | |
| A. Layers | 0.727* (8.78) |
| B. Broilers | 0.635* (8.11) |
| C. Cockerels | -0.336 (-1.27) |
| Layer and broilers interaction | -0.343* (-7.37) |
| Layer and cockerel interaction | -0.217 (1.495) |
| Broiler and cockerel interaction | -1.2 (-0.05) |
| Feed | 0.200** (1.851) |
| Labour | 0.258** (1.851) |
| Other operating expenses | 8.26 (0.097) |
| Constant | 8.604 (9.195) |

Figures in parentheses are t-values, *Significant at *1% **Significant at 10%, $R^2 = 0.89$ F = 55.85*

Table 6: Parameters from the production function

| Input | MVP | MFC | MVP/MFC |
|---|---|---|---|
| Layers | 110.20 | 140 | 0.78 |
| Labour | 20.00 | 2000 | 0.01 |
| Feed | 90.00 | 90 | 0.10 |
| Broiler | 78.00 | 130 | 0.60 |
| Layers and Broiler | 81.60 | 125 | 0.70 |
| Layers and cockerel | 19.71 | 80 | 0.30 |

following Subahash *et al*. (1999), Mbanasor (2002), Ojo (2003) and Bamiro *et al*. (2006). The result is presented in Table 5.

The coefficient of multiple determination ($R^2$) is 89% implying that 89% of the variation in the value of output is explained by the independent variables coupled with the significance of the F statistic is an indicator of the goodness of fit of the production function. The flock size viz; layers; broilers, cockerel, layers and broilers interaction and are significant at 1% probability level. Labour and feed are significant at 10% probability level. Other variables have no significant influence on the value of output. The positive significant effects of flocks of layers and broilers signify that increase in the flock size will bring forth a corresponding increase in the value of output. This result agree with the findings of Ajibefun *et al*. (2000), Subahash *et al*. (1999) and Bamiro *et al*. (2006). The results show that 1% increase in the flock size of layers and broiler will respectively increase the value of output by 7.3 and 6.4%. Layers and broilers interaction, however, negatively influence the value of output, indicating that the value of output declines with increase in the combination of layers and broilers. The positive coefficients of feed and labour signify positive impact of both resources on the value of output. This result is also in consonance with Bamiro *et al*. (2001).

**Allocative efficiency:** The ratios of Marginal Value Product (MVP) to Marginal Factor Cost (MFC) for all the resources in the production system are presented in Table 6. The values of these ratios are <1, indicating disequilibrium. This suggests that there is overutilization of these resources. Conclusively, the poultry farmers are not efficient in the allocation of their resources. This finding agrees with that of Mbanasor (2002).

**Conclusion and recommendations:** This study shows that poultry enterprise in the study area is profitable, however the profitability level is a function of the scale of production and type of poultry enterprise. In all the enterprise combinations identified in this study, the large-scale enterprises have the highest gross margins. On the basis of enterprise combination, the egg production enterprise has the highest gross margins while broiler production enterprise records the lowest gross margin.

The regression analysis indicates that flock size, feed; labour significantly and positively influence the value of poultry output while layers and broilers interaction has negative effect on the value of poultry output. The allocative efficiency analysis indicates that the poultry

farmers are not efficient in the allocation of their resources.

The poultry farmers should, for the purpose of profitability, concentrate their investments on egg production enterprise. Furthermore, the farmers should reduce the utilization of the variable resources so as to increase allocative efficiency.

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