

## Response of the Commercial Poultry Sub-Sector to National Policy Regimes in Imo State, Nigeria

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**Abstract:** This study assessed the relative performance of rural commercial poultry farmers in Imo State, between 2000-2003 and 2004-2007 and the influence of the policy instruments implemented within these periods on this performance. Twelve out of the Twenty Seven Local Government Areas in the three Agricultural Zones in the area were chosen for the study through simple random sampling technique. Data were subjected to a multiple regression analysis, structural stability test, costs-returns analysis and the  $\chi^2$ -test. Results showed that the output and profit margins of farmers were significantly higher in 2004-2007 period, leading to the conclusion that the policy instruments employed within this time frame had stronger influence on these performance indices. The  $\chi^2$ -test showed that the returns on investment were dependent on the policy instrument implemented in each period. It was recommended, among others, that these instruments should be relied upon to guide the commercial poultry sub-sector operations in the State.

**Key words:** Rural commercial, poultry farmers, policy, agriculture zone, performance

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### INTRODUCTION

The National economy has, in recent times, passed through a plethora of policy regimes in an attempt to reposition the various sub-sectors on the part of stable economic growth and development. A multiplicity of policy instruments were introduced at various periods with a view to determining an effective and efficient set that would chart a sustainable course for agricultural growth and development (Oguoma, 2003). The results had been mixed (Ojo, 1991; Capiro *et al.*, 1993; Isijola, 2000a), just like the experiences reported for a number of other economies (Diaz-Alejandro, 1985; Atiyas, 1989). On the advise of the Central Bank of Nigeria (CBN), a number of policy instruments were introduced between 1986-1993, 1993-1998, 1998-1999 and 1999-2007 with diverse aims (Okigbo, 1989; Isijola, 2000a, b; Adeyemi, 2006). These economic reform policies were associated with changes in political leadership that occurred in each of these periods.

Although, the reform policies conformed with the ideas expressed in Campos and Esfahani (1996) on political reforms and interest groups, they did not conform with the prescriptions of Camdessus (1990). The watershed policy came in 2003 when the 2004 national budget was presented, incorporating the medium-term economic reform programme, formally set out in the National Economic Empowerment and Development Strategy (NEEDS) document. The document elaborated on the extensive and far-reaching banking sector reforms of 2004 (Ebong, 2006), all in a bid to ensure an enhanced

performance of the various sub-sectors of the economy. Introduction of the earlier instruments resulted in adverse consequences across sub-sectors (Ojo, 1989; Akande, 1989; Balogun and Alawa, 1989) but particularly in the poultry sub-sector in terms of aggregate farm output, farm profit margin, return on investment as well as a number of unaddressed factors that are thought to directly influence commercial poultry production, such as the percentage of agricultural bank loans disbursed to the poultry sub-sector, real interest rate charged on agricultural loans, the settled default claims from the poultry sub-sector by the Agricultural Credit Guarantee Scheme Fund, the real wage rate, price of feeds utilized by poultry farmers, commodity terms of trade for poultry products, liquidity ratio of commercial banks. The effects of these policy shifts are still the subject of much debate. It is not yet established empirically the period in which the joint influence of these policies had the most significant effect on the performance of the poultry sub-sector and their determinants. This study was therefore, designed to estimate the influence of the policy instruments on the performance of the poultry sub-sector. It specifically estimated the relative influence of the policy instruments implemented between 2000-2003 and 2004-2007 on the farm output, farm profit and Return on Investment (RoI) of the commercial poultry farmers. It was hypothesized that the joint impact of the policy instruments on poultry output was not different between the two periods under reference and that following the policy shifts, the observed earnings (profit margin and return on

investments) of poultry farmers were not significantly different from the expected between these reference periods, implying that the returns earned were independent of the policy instruments.

## MATERIALS AND METHODS

The study was conducted in 2008 and primary data were sourced from 12 Local Government Areas (LGAs) out of the 27 LGAs in the three Agricultural Zones in Imo State, namely, Owerri, Okigwe and Orlu. Since the Agricultural Zones in the State have unequal number of LGAs the proportionate sampling technique was adopted in the choice of the LGAs to ensure representiveness. Thus, 5 LGAs, 4 LGAs and 3 LGAs were chosen from Owerri, Orlu and Okigwe Agricultural Zones, respectively. The list of poultry farmers was compiled from the records of the State Agricultural Development Programme (ADP) and the Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB). A total of 125 respondents out of 1,050 Poultry farmers who benefited from credit facilities from institutional sources during the reference periods were chosen by simple random sampling. The proportionate sampling technique was also adopted to reflect the unequal sizes of Poultry farmers in each of the sample LGAs. The input-output data of these respondents were obtained by the use of structured questionnaire subjected to a pre-test. The profit margin of the respondents was estimated from their Cost-Revenue profile specified as:

$$\Pi = \sum_{j=1}^n P_j Q_j - \sum_{j=1}^n (P_j \times Q_j) + K \quad (1)$$

Where:

- $\Pi$  = Profit Margin (N)
- $P_j$  = Unit price of output j (₦)
- $Q_j$  = Estimated output j (₦)
- $P_j$  = Unit price of input j (₦)
- $X_j$  = Estimated quantity of input j (₦)
- $K$  = Annual Depreciation using the straight line method (₦).
- $n, j$  = Sample size,  $n$ , in period  $j$

The  $\chi^2$ -test was conducted to determine a hypothesized dependence of the Return on Investment (RoI) on policy instruments used. The statistic was specified as:

$$\sum_{j=1}^n \frac{(O_j - e_j)^2}{e_j} \quad (2)$$

Where:

- $O_j$  = Frequency of observed Profit Margin in the  $j$ th cell in a contingency table
- $e_j$  = Frequency of expected Profit Margin in the  $j$ th cell in a contingency table

Following Chow (1960)'s and Fisher (1970)'s approaches, two linear Regression functions were first specified, with the double-log form shown as:

$$\text{Log } Q_i = b_0 + b_1 \text{Log } X_1 + b_2 \text{Log } X_2 + \dots + b_7 X_7 + e_i \quad (3)$$

Where:

- $i=1$  = Aggregate output (kg).in period 2000-2003
- $i=2$  = Aggregate output (kg) in period 2004-2007
- $Q$  = Pooled output (kg) 2000-2007
- $X_1$  = Bank Loans to poultry sub-sector as % of agric. sector disbursements
- $X_2$  = Real interest rate charged on agricultural loans (1986-2003 = 100) (%)
- $X_3$  = Settled default claims from the Poultry sub-sector by the ACGSF
- $X_4$  = Real wage rate (1986-2003 = 100) (%)
- $X_5$  = Price of Feeds utilized by Poultry Farmers (₦)
- $X_6$  = Commodity terms of Trade for poultry products (%)
- $X_7$  = Liquidity ratio of Commercial Banks (%)
- $e_i$  = Error term

Among the functional forms tried, the double-log model was chosen as the lead model over the linear, semi-log and exponential models based on its superior economic, econometric and statistical characteristics.

The F-statistic was specified as:

$$F = \frac{[\sum e_p^2 - (\sum e_1^2 + \sum e_2^2)]/k}{(\sum e_1^2 + \sum e_2^2)/(n_1 + n_2 - 2k)} \quad (4)$$

Where:

- $\sum e_p^2$  = Pooled error-sum-of squares in for 2000-2007
- $\sum e_1^2$  = Error-sum-of squares for 2000-2003 period
- $\sum e_2^2$  = Error-sum-of-squares for period 2004-2007
- $K$  = Number of parameters
- $n_1$  = Number of observations in 2000-2003
- $n_2$  = Number of observation in 2003-2007

This was compared with  $F_{0.05}$  with  $V_1 = k$  and  $V_2 = n_1 + n_2 - 2k$  degrees of freedom. To compare the output of respondents between the two periods the structural stability test was carried out, following Gujarati (1995) to test for significant difference between the intercepts of the two functions. The function was specified as:

$$Q = b_0 + b_1 D_1 + b_i X_i (i = 1-7) + u_i \quad (5)$$

Where:

- $b_0$  = Intercept term
- $D$  = Dummy (assuming the value of 1 for period 2004-2007 and 0 otherwise)
- $X_i (i = 1-7)$  = Independent variables as previously defined

This test hypothesized that the corresponding intercepts in the regression functions were not different in the two periods, implying that the impact of the policies on output was equal between the two periods. The Z-statistic was used to test the null hypothesis that no significant difference existed between the mean output in the two periods.

## RESULTS AND DISCUSSION

The summary Cost-Revenue profile, Net profit margin and Return on Investment (RoI) of survey farmers operating an average flock size of 1000 Broilers raised from 3 weeks old are showed in Table 1.

Analysis of the cost-revenue profile of survey farmers presented in Table 1 shows that the policy package implemented between 2004-2007 period was superior in terms of percentage change in Net Profit Margin and Return on Investment. This can be seen from the Average Total Cost which in 2000-2003 period was ₦32, 244.35 and the Average Total Revenue which was ₦64,432.11, showing a Net Profit Margin of ₦32187.76. On the other hand, the Average Total Cost for the 2004-2007 period was ₦64, 188.36 with an Average Total Revenue of ₦1 92,364.34, showing a Net Profit Margin of ₦1 28175.98. This shows that Net Profit Margin rose from ₦32187.76 in 2000-2003 period to ₦1 28175.98 in 2004-2007 period. This indicates an average rise of 298.21% in Net Profit Margin. Average Total Cost rose from ₦32, 244.35 in 2000-2003 period to ₦64, 188.36 in 2004-2007 period which indicates an average rise of 99.07%. This shows that despite higher rises in cost of production in 2004-2007 period, farm earnings outweighed the cost of production, as reflected by the higher rise in Net profit Margins in 2004-2007 period. This means that farmers fared better with the policy package in 2004-2007 policy period. Again the RoI was 99.82% in 2000-2003 policy period and 199.69% in 2004-2007 period, suggesting also that the wealth status of the farmers was higher with the policy package implemented in 2004-2007 period than was the case in 2000-2003 period. The test to determine the dependence of RoI on the policy instruments implemented in particular period is as shown in Table 2.

The analysis shows that at 5 and 1% levels of significance and  $df = 1$ , the chi-square tabulated is 3.84 and 6.63, respectively while the calculated value is 43.04 which led to the rejection of the null hypothesis of no significant difference between observed and expected RoI and the acceptance of the alternative hypothesis that the observed returns on investment was significantly higher than the expected. This indicates that the RoI of the farmers were dependent on policy instruments used

Table 1: Cost-revenue profile of survey farmers

Costs	2000-2003	2004-2007	Change (%)
Average Total Cost (ATC) (₦)	32,244.35	64,188.36	99.07
Average Total Revenue(ATR) (₦)	64,432.11	1 92,364.34	198.55
Net Profit (₦)	32,187.76	1 28,175.98	298.21
Return on Investment (RoI (%))	99.82	199.69	-

Field Survey Data (2008)

Table 2: Chi-square analysis of return on investment (RoI) of survey farmers

Range of profit margin	No. of farmers (2004-2007)	No. of farmers (2000-2003)	Total
32-100	50 (48.50)	47 (48.50)	97
101-120	20 (41.00)	62 (41.00)	82
121-129	55 (35.5)	16 (35.5)	71
Total	125	125	250

$\chi^2_{0.05} = 3.84$ ;  $\chi^2_{0.01} = 6.63$ ;  $\chi^2_{cal} = 43.04$ ; Decision: Reject  $H_0$ ; Accept  $H_1$ ; Field Survey Data, 2008 (Figures in parentheses are expected values)

within each period. The result corroborates an earlier study carried out by Oguoma (1997). This result means that the introduction of the financial liberalization policy, with focus on the promotion of market-based allocation of credit, through the deregulation of interest and exchange rates significantly influenced the direction of output flows within the poultry industry. The result of the multiple regression analysis is as shown in Table 3.

The results in Table 3 show that 78 and 72% of the variation in output in the commercial poultry enterprises were accounted for by the variables in the period  $Q_1$  (2000-2003) and  $Q_2$  (2004-2007), respectively. The bank loans to the agricultural sector disbursed to the poultry sub-sector ( $X_1$ ) was significant in  $Q_2$  period but not in  $Q_1$  period. This means that the policy shift in 2004-2007 period resulted in more financial flows into the commercial poultry industry than was the case in 2000-2003 period. The real interest rate charged on Agricultural Loan ( $X_2$ ) was significant in both functions but while it was positive in the  $Q_2$  period, it was negatively signed in  $Q_1$  period. This suggests that the liberalized interest rate enhanced the level of output and earnings in the commercial poultry sub-sector in  $Q_2$  period and depressed them in  $Q_1$  period. The settled default claims from the poultry sub-sector by the ACGSF ( $X_3$ ) was significant and negatively signed in  $Q_2$  period but was not significant in  $Q_1$  period. This means that output declined with increases in default claims on the ACGSF by financial institutions. This suggests that there were increased cases of default in loan repayment by the commercial poultry producers in the  $Q_2$  period despite their increased output and earnings. It further suggests that there are deliberate loan defaulters among the operators in this sub-sector. Cases of such deliberate loan defaulters were reported by Oguoma (2003). The credit squeeze experienced in the economy may have constrained the ACGSF in not meeting her obligation to the financial institutions in respect of loan defaults. This suggests that the operators did not get as much cash

Table 3: Result of the double-log multiple regression analysis

Periods	Constants	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>	X <sub>7</sub>	R <sup>2</sup>	R <sup>2</sup>	F-ratio
Q <sub>1</sub>	0.89	- 0.65 (0.45)	- 0.98* (0.03)	0.45 (0.32)	-0.45 (0.49)	-0.58* (0.23)	-0.36* (0.18)	0.32 (0.64)	0.78	0.66	59.26
Q <sub>2</sub>	0.68	0.52* (0.14)	0.78* (0.32)	- 0.84* (0.41)	-0.59 (0.38)	-0.70* (0.22)	0.82* (0.31)	0.19 (0.19)	0.72	0.69	42.98

Field Survey Data (2008); \*Significant at 5% level of probability; Figures in parentheses are standard errors of estimates

inflows that would have been the case if they repaid their loans and this affected their output and earnings negatively. Real wage rate (X<sub>4</sub>), although not significant in both functions was negatively signed in each case, suggesting the possibility that real farm wages depressed farm output and earnings in the two periods. Prices of feeds utilized by poultry farmers (X<sub>5</sub>) were significant and negative in the two structural relations. This means that feed costs depressed farm output and earnings in the two periods. Commodity terms-of-trade for poultry products (X<sub>6</sub>) was significant and negative in Q<sub>1</sub> and significant but positive in Q<sub>2</sub>. This means that the commodity terms-of-trade adversely affected farm output in Q<sub>1</sub> period but played a positive role in the enhanced farm output and earnings to poultry farmers in Q<sub>2</sub> period. Liquidity ratio of commercial banks (X<sub>7</sub>) was not significant in the two functions. This was in spite of the more favorable liquidity provisions for commercial banks' operations in the two periods. The non-significance of this variable is not surprising since it clearly proves the reluctance of the commercial banks in financing the poultry industry, perceived as high risk venture, which made it possible for the commercial banks to manage 80.3% of total assets and 85.3% of the Deposit Liabilities of the financial institutions (Central Bank of Nigeria, 1987). The result of the Chow's test is as shown in Table 4.

From Table 4, an F-value of 19.43 and the F-tab of 2.06 led to the rejection of the null hypothesis that the structural relations were stable between the two periods and the acceptance of the alternative that these structural relations were significantly different in two periods. The estimated function in Eq. 5 was:

$$Q = 3.21 + 1.98D^* + 0.22X_1 + 1.25X_2 + 0.93X_3 + 1.98X_4^* + 2.21X_5^* + 0.18X_6 + 0.22X_7^* \quad (6)$$

(0.11) (0.02) (1.22) (1.32) (1.24) (0.02) (0.98) (0.88) (0.03)

From the composite function above, the estimated function for Q<sub>1</sub> Period (2000-2003) was:

$$Q_1 = 3.21 + 0.22X_1 + 1.25X_2 + 0.93X_3 + 1.98X_4^* + 2.22X_5 + 0.88X_6^* + 0.22X_7^* \quad (7)$$

(1.22) (1.32) (1.24) (0.02) (0.98) (0.18) (0.03)

Table 4: Test of equality of the two linear regression estimates

Periods	E <sub>u</sub>	E <sub>t</sub>	F <sub>value</sub> (V <sub>1</sub> = 8; V <sub>2</sub> = 109)
Q <sub>1</sub>	39	-	F <sub>cal</sub> = 19.43
Q <sub>2</sub>	22	-	F <sub>tab</sub> = 2.06
Total (Q <sub>1</sub> + Q <sub>2</sub> )	61	106	

F<sub>cal</sub> = 19.43 > F<sub>tab</sub> = 2.06; Decision: Reject H<sub>0</sub>; Accept H<sub>1</sub>; Field Survey Data (2008)

The estimated function for Q<sub>2</sub> period (2004-2007) was in Eq. 8. Figures in parentheses in all the functions are standard errors of estimates; \*Significant at 5% probability level in Eq. 8:

$$Q_2 = 5.19 + 0.22X_1 + 1.25X_2 + 0.93X_3 + 1.98X_4^* + 2.21X_5^* + 0.88X_6^* + 0.22X_7^* \quad (8)$$

(1.22) (1.32) (1.24) (0.02) (0.98) (0.18) (0.03)

The intercept terms in Q<sub>1</sub> and Q<sub>2</sub> were subjected to the Z-test for mean difference and at 5% probability level, the null hypothesis of no significant difference between the two intercepts was rejected and the alternate hypothesis was accepted meaning that the output in Q<sub>2</sub> period was significantly higher than that in period Q<sub>1</sub>. This means that the range of antecedent policy instruments implemented within 2004-2007 had more positive impact on those intermediate factors that influenced the performance of the commercial poultry sub-sector, such as the quantum of agriculture sector bank loans disbursed to the commercial poultry sub-sector, real interest rate charged on agricultural loan, settled default claims from the poultry sub-sector by the ACGSF, real wage rate, price of feeds utilized by commercial poultry farmers, commodity terms of trade for poultry products, liquidity ratio of commercial banks. The sub-sector would be enhanced if the co-efficients of these variables form the guideposts for future intervention by government.

## CONCLUSION

The study estimated the relative influence of the antecedent policy instruments implemented between 2000-2003 and 2004-2007 on the performance of the commercial poultry industry in Imo State. It was hypothesized that the joint impact of the policy instruments on output, profit margin and return on

investment of the commercial poultry operators was not different between these two reference periods. The results show that the output, net profit margin and return on investment of the poultry farmers were significantly higher in 2004-2007 than in 2000-2003 reference periods. The significant intervening variables which determined the performance of the commercial poultry operators within the period were the amount of agriculture sector loans disbursed to the commercial poultry sub-sector, the real interest rate, the settled default claims from the poultry sub-sector by the Agricultural Credit Guarantee Scheme Fund (ACGSF), commodity terms-of-trade for poultry products, the trade policy implemented in the two periods.

The null hypothesis that the structural relations were stable between the two periods was rejected and the alternative that these values were significantly higher in the structure for  $Q_2$  period was accepted, meaning that the commercial poultry operators earned significantly higher level of output, profit margin and return on investment in 2004-2007 policy regime than was the case in the 2000-2003 period. It was concluded on the basis of the results that the policy package implemented between 2004-2007 was more effective than that implemented between 2000-2003 in terms of their influence on the performance and well-being of the poultry farmers in Imo State.

### RECOMMENDATIONS

In view of the higher level of performance recorded by the commercial Poultry farmers, it is recommended that: the package implemented between 2004-2007 be revisited by policy designers as the basic planning tool for sustained commercial poultry sub-sector growth and development. Further studies be carried out to see how 2004-2007 policy package affected the other sub-sectors of the economy, both at the national and state levels. The trade policy that was shown to be working at cross purposes with interest rate structures should be closely re-examined and its components adjusted to ensure their harmonious operations. Since the demand for inputs needed for poultry production is import inelastic and with the implications of this, recognized in Whitehead (1974), government is further advised to further streamline her tariff structures with more liberal concessions to basic material inputs needed for production in the poultry industry. Local sourcing of these basic raw materials should be intensified in order to make our import demand for them elastic and so minimize the drain on our foreign exchange. A well-streamlined educational programme

should be put in place to enlighten farmers on alternative sources of feeding-stuff for their livestock and how to improvise, for example, grass-legume pastures in convenient lots to reduce the production costs and dependence on imported components. Such a programme should communicate to farmers how to harness such by-products as rice brans, spent grains and wheat offal which are often ignored and wasted during harvest and/or processing. Joint-venture poultry projects should be encouraged between commercial poultry farmers and local entrepreneurs to enable them have access to equipment and operating inputs.

For them to have access to these facilities the exchange rate should no longer be left to the whims of market forces alone but a market-determined range should be delimited beyond which official intervention should be allowed to guide the operations of the foreign exchange market.

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