

## Effects of Vertical Integration and Enterprise Combinations on Profitability in the Poultry Industry in Ogun and Oyo States of Nigeria

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**Abstract:** This study examines the effects of vertical integration and enterprise combinations on profitability of poultry farm in Ogun and Oyo States of Nigeria using descriptive statistics budgetary analysis and profitability indicators. The study data were collected through a combination of stratified sampling approach and purposive sampling method from 211 poultry farmers which consist of 110 non-integrated poultry farms 71 partially integrated poultry farms and 30 fully integrated poultry farms. Empirical evidence from the analysis reveals that relatively young farmers (below 40 years) own non-integrated poultry farms while older farmer operates partially integrated poultry farms and fully integrated poultry farms. All the 5 enterprise combinations show high profitability with egg production enterprise having the highest net farm income and profitability indices while the broiler production enterprise has the lowest gross margin and profitability indicators. The study further reveals that profitability increases with the extent of vertical integration in egg production and broiler enterprise while profitability decreases with vertical integration in broiler production enterprise.

**Key words:** Vertical integration, enterprise, profitability, effects

### INTRODUCTION

The short gestation period of poultry enables the poultry products to provide the greatest potential for bridging the protein supply-demand gap. This also gives poultry the quickest and highest turnover rates when compared to other livestock. Traditionally, domestic fowls are raised under non-integrated system of poultry production, Modern poultry production have become sophisticated and highly industrialized with some poultry farms adopting a scheme known as vertical integration (Consumer Union, 2000). Vertical integration can be defined as the combination of two or more stages of a production under single ownership. Vertical integration may be backward or forward. Backward integration occurs when a firm decides to make rather than buy an input from an independent supplier. Forward integration occurs when a firm decides to use rather than sell one of its products to independent customers. Conversely, vertical disintegration involves a decision to buy rather than make an input or to sell rather than use an input.

Dependence on the use of the external market to obtain an input or to exchange an output may have been through the use of a contract or a spot market. The quality of the input and the timelessness of the supply cannot be guaranteed. The failure of the external market creates

profit and risk incentives for the farm to integrate vertically (Kilmer, 1986). The major factor militating against the poultry industry which hamper production, is high cost of feed and feed ingredients especially maize (Taiwo, 1999; Ojo, 2003; Adebayo and Adeola, 2005). The feed problem transcends high cost, it also manifests via low quality feeds supplied by the feed millers which has a negative impact on the productivity-low level of egg production as well as rendering the birds susceptible to diseases, hence, the need for backward vertical integration via the production of quality feeds by each poultry farm-firm (Bamiro *et al.*, 2001; Shittu *et al.*, 2004). According to Egg Update a bulletin of the Commercial Egg Producers Association of Nigeria (CEPAN, 1996), feed millers and livestock operators are groaning under high prices of grains especially maize. Taiwo (1999) attributes the major problem facing the livestock industry to non-availability of inputs. He suggests that government should make concerted effort to encourage feed millers, especially the bigger ones, to go into grain production (i.e., backward integration). In many cases, a major objective of vertical integration is to minimize or at least greatly reduce, the transaction costs, that is the buying and selling costs incurred when separate companies own two stages of production and perhaps the physical handling costs as well (Williamson, 1979; Buzzel, 1983; Ouden *et al.*, 1996).

Several farmers diversify with the aim to reduce risk and increase profitability. According to Kay (1981) many business firms diversify or produce more than one product to avoid having their income totally dependent on the production and price of one product. It is assumed that if profit from one enterprise is poor, profit from producing and selling other products may prevent total profit from falling below acceptable levels. In agricultural production, diversification or enterprise combination may reduce income variability if all prices and yields are not low or high at the same time.

**MATERIALS AND METHODS**

This study was carried out in Ogun and Oyo states in the southwest region of Nigeria. Data collection was by personal administration of a questionnaire designed to obtain information on poultry farmers’ characteristics, flock size, production characteristics and economic aspect of production. Two sets of primary data were collected, one set from the vertically integrated poultry farms, which consist data from partially integrated farms and fully integrated farms; and the second set from poultry farmers that operate non-integrated farms. Stratified random sampling technique was employed for the collection of data from non-integrated poultry farmers and partially integrated poultry farmers in the two states. Each division in Ogun and Oyo states was treated as a stratum. Purposive sampling technique was employed for the collection of data from the fully integrated farms in each state due to the low number of the vertically integrated farms in the 2 states. Data were collected from 211 poultry which consist of 110 non-integrated poultry farms 71 partially integrated poultry farms and 30 fully integrated poultry farms.

**Analytical techniques:** Socio-economic characteristics were analysed using frequency tables and other descriptive statistics. In assessing the extent of vertical integration and the effect on profitability, following Buzzel (1983) the value added-sales ratio was employed as a measure of the extent of vertical integration in each poultry farm and poultry industry as a whole. Value-added is defined as sales revenue minus all purchases (material components, supply, energy and services by one enterprise from other enterprises). Purchases from another enterprise in the same poultry farm were treated as outside purchases.

The value added as a percentage of sales is given thus:

$$\frac{(VA)}{(S)} = 100 \left( S - \frac{P}{S} \right) \tag{1}$$

Ceteris Paribus, the more vertically integrated a poultry farm is, the higher will be the value added-sales ratio while a less integrated poultry farms have low value added-sales ratio. Value added-sales ratio of 100% implies that 100% of their sales is their contribution or value addition to the products.

**Profitability analysis:** Profitability analysis was used, in addition to value added-to-sales ratio, to assess the effect of vertical integration on profitability of the poultry enterprise. The poultry farms are classified into three-the non-integrated poultry farms, partially integrated and fully integrated poultry farms. Gross margin per 1000 birds and profitability measures were computed for each category of the poultry farms.

Comparative analysis of the gross margin of the three categories of the poultry farms was carried out so as to make inference on the effect of vertical integration on the profitability of the poultry farms.

Following Aihonsu (1999) the following profitability measures were calculated:

$$RMCF = TVP - TC \tag{2}$$

$$RRTI = 100 \left( \frac{RMCF}{TC} \right) \tag{3}$$

$$GM = TR - TVC \tag{4}$$

$$RRFC = 100 \left( \frac{RFC}{TFC} \right) \tag{5}$$

Where,

- RMCF = Return to Management Capital and Family labour or net income,
- TVP = Total Value Product,
- TVC = Total Variable Cost,
- CCB = Cost of Capital Borrowed ,
- CFL = Cost of Family Labour,
- RRTI = Rate of Return on Investment,
- TC = Total Cost,
- RFC = Return on Fixed Cost (Gross margin),
- RRFC = Rate of Return on Fixed Cost.

Depreciation on each farm asset was calculated using the straight-line method. By using this method the annual depreciation value was obtained thus:

$$\text{Annual depreciation value} = \frac{\text{Costprice-Salvagevalue}}{\text{Lifespan}}$$

Moreover, expected replacement cost for the fixed assets was used to account for inflation. This is

necessary because the cost of most working capital items such as breeding stock, equipment and machinery tend to increase both in monetary and real terms with time. It is therefore best from a management and planning point of view to use expected replacement cost (Makeham and Malcomn, 1986).

Each of these profitability measures was computed per 1000 birds. The values obtained for partially integrated poultry farms, fully integrated farms and non-integrated ones were compared so as to reveal the effect of vertical integration on profitability of poultry farms. The poultry farms are classified into three-the non-integrated poultry farms, partially integrated and fully integrated poultry farms. Gross margin per 1000 birds and profitability measure were computed for each category of the poultry farms. Comparative analyses of the gross margin and profitability measures of the three categories of the poultry farms vis-à-vis the enterprise combinations were carried out so as to make inference on the effect of vertical integration on the profitability of the poultry farms.

**RESULTS AND DISCUSSION**

**Socio-economic characteristics:** Table 1 and 2 present the socio-economic characteristics of 211 poultry farmers and poultry farms respectively. The results reveal that poultry farmers are relatively young men and women. Non-integrated poultry farms are owned by young poultry

farmers (below 40 years) while poultry farmers that are relatively old operate partially and fully integrated poultry farms. Correspondingly, a higher percentage of farmers that are highly experienced in poultry farming adopt vertical integration. This might not be unconnected with the fact that the older farmers possess the financial strength as well as the experience required for vertical integrated poultry farming. Poultry farmers in the three production systems are well educated which portends a high level of managerial ability and quick response to new innovations. Both male and female poultry farmers are involved in vertical disintegration poultry farming while vertically integrated (Partial and full) poultry farms are owned and operated by male poultry farmers. This suggests that male poultry farmers are more financially empowered than their female counterparts. Most of the full-time poultry farmers own and operate partially and fully integrated poultry farms. Most of the farms have a flock size that is less than 1000 birds. The non-integrated farms have the smallest flock size while the fully integrated farms have the largest flock size. There are full-time and part-time poultry farmers in the study area. Most of the full time farmers are involved in vertically integrated poultry farming while a large chunk of the part-time farmers are involved in vertical disintegration poultry farming. A large percentage of non-integrated poultry farmers have a relatively small flock size that is below 1000 birds while most partially integrated poultry farms have a

Table 1: Socio-economic economic characteristics of poultry farmers

Characteristics	Non-integrated		Partially integrated		Fully integrated	
	No	(%)	No	(%)	No	(%)
Age (years)						
Below 40	46	46.00	26	36.60	6	15.00
40-<50	20	20.00	25	35.20	15	37.50
50-<60	24	24.00	14	19.70	4	10.00
60 and above	10	10.00	6	8.50	15	37.50
Gender						
Male	84	84.00	60	84.50	36	90.00
Female	16	16.00	11	15.50	4	10.00
Main occupation						
Poultry farming	46	46.00	20	28.20	22	55.00
Civil service	12	12.00	12	16.90	4	10.00
Retirees	16	16.00	3	4.20	3	7.50
Others	26	26.00	36	50.70	11	27.50
Experience						
1-5	40	40.00	23	32.40	5	12.50
6-10	20	20.00	24	33.80	12	30.00
11-15	18	18.00	12	16.90	10	25.00
16-20	16	16.00	5	7.00	7	17.50
20 and above	6	6.00	7	9.90	6	15.00
Educational status						
No formal education	0	0.00	5	5.00	3	7.50
Primary	0	0.00	2	2.00	2	5.00
Secondary	18	18.00	18	18.00	6	15.00
Diploma/NCE	10	10.00	10	10.00	13	32.50
Degree	72	72.00	36	36.00	16	40.00

Computed from survey data (2004)

Table 2: Socio-economic economic characteristics of poultry farms

Characteristics	Non-integrated		Partially integrated		Fully integrated	
	No	(%)	No	(%)	No	(%)
Enterprise combination						
Egg production	84	84.00	32	45.10	28	70.00
Broiler production	6	6.00	6	8.50	0	0.00
Egg and broiler production	6	6.00	18	25.40	6	15.00
Egg and cockerel production	0	0.00	2	2.80	2	5.00
Egg, broiler and cockerel production	4	4.00	13	18.30	4	10.00
Flock size						
Below 1000	48	48.00	28	39.40	4	10.00
1000-<3000	32	32.00	28	39.40	14	35.00
3000-<5000	10	10.00	11	15.50	5	12.50
5000 or more	10	10.00	4	5.60	17	42.50
Years after establishment						
1-5	54	54.00	30	42.30	10	25.00
6-10	20	20.00	20	28.20	12	30.00
11-15	18	18.00	11	15.50	7	17.50
16-20	4	4.00	5	7.00	9	22.50
Above 20	4	4.00	5	7.00	2	5.00
No of poultry workers						
3 or less	64	64.00	45	63.40	8	20.00
4-6	32	32.00	14	19.70	20	50.00
More than 6	4	4.00	12	16.90	12	30.00

Computed from survey data (2004)

flock size that is relatively high. Farms are classified into three categories, namely, non-integrated, partially integrated and fully integrated poultry farms. Non-integrated poultry farms are commercial feed users, partially integrated farms use privately compounded feeds, but mill their feeds at commercial feed milling centres. Fully integrated farms use privately compounded feeds that are milled in their own feed mill.

**Enterprise combinations, profitability and extent of integration:** The gross margin/1000 birds, net farm income/1000 birds and profitability indicators are examined on the basis of enterprise combinations vis-à-vis the extent of integration with the aim of showing the profitability of different enterprises with respect to the extent of vertical integration. The enterprise combinations are egg production enterprise, broiler production enterprise, egg, broiler production enterprise and egg, broiler and cockerel production enterprise. The descriptive statistics of each enterprise combination are presented and discussed in the following order.

**Egg production enterprise:** The egg production enterprise refers to poultry farms that rear layers purposely for egg production. However, at the end of the laying period, the layers are culled and sold which is an addendum to the revenue and profit from the sales of eggs. The cost return structure of egg production enterprise by level of vertical integration is presented in Table 3.

The cost composition shows that feed consumes the largest share of the cost of production in all the three systems of production. The feed cost, contrary to expectation increases with the level of integration. Feed constitutes about 62, 64 and 70% in non-integrated poultry farms, partially integrated poultry farms and fully integrated poultry farms respectively. This agrees with the finding of Subhash *et al.* (1999). The gross margin per 1000 birds of egg production enterprise is ₦865, 265.61, ₦1, 159, 896 and ₦1, 018,975.90 in non-integrated poultry farms, partially integrated poultry farms and fully integrated poultry farms respectively. This implies that the partially integrated poultry farms have the highest gross margin while the non-integrated poultry farms have the least gross margin per 1000 birds. The higher economic performance of partially integrated poultry farms than fully integrated poultry farms is unexpected but it might not be unconnected with scope and scale incompatibility and underutilization of machineries and equipment in poultry farms that are fully integrated. The net farm income per 1000 birds and other profitability indicators follows the same trend. The poor economic performance of fully integrated poultry (egg) farms when compared with the partially integrated poultry farms might be attributed to high level of investment and underutilization of installed capacity of feedmill and other equipment and machinery. In conclusion therefore, the partially integrated poultry (egg) farms have the best economic performance in egg production enterprise in the study areas.

Table 3: Costs and returns structure per 1000 birds of an average poultry (egg) farm in the sample by extent of vertical integration adopted

Description	Extent of integration					
	Non-integrated		Partially integrated		Fully integrated	
	Amount (₦)	Share (%)	Amount (₦)	Share (%)	Amount (₦)	Share (%)
Revenue						
Egg	2822140.5	85.83 <sup>1</sup>	2639911.5	85.84 <sup>1</sup>	2447532.1	84.92 <sup>1</sup>
Spent layers	466032.04	14.17 <sup>2</sup>	435316.52	14.16 <sup>2</sup>	434546.05	15.08 <sup>2</sup>
Gross revenue	3288172.6		3075228.0		2882078.2	
Costs						
Birds stocked	479846.86	18.18 <sup>2</sup>	357401.81	16.89 <sup>2</sup>	277056.85	13.45 <sup>2</sup>
Feed	1641762.1	62.20 <sup>1</sup>	1362613.9	64.40 <sup>1</sup>	14444181.5	70.12 <sup>1</sup>
Veterinary services	31897.206	1.20 <sup>6</sup>	24449.734	1.16 <sup>5</sup>	21954.525	1.07 <sup>5</sup>
Labour	169303.64	6.41 <sup>3</sup>	98870.881	4.67 <sup>3</sup>	81239.696	3.94 <sup>3</sup>
Water	24260.353	0.92 <sup>7</sup>	18941.484	0.90 <sup>7</sup>	15409.903	0.61 <sup>6</sup>
Energy	34040.685	1.29 <sup>5</sup>	24332.188	1.15 <sup>6</sup>	9116.3140	0.44 <sup>8</sup>
Transportation	35335.774	1.33 <sup>4</sup>	25106.995	1.19 <sup>4</sup>	11536.685	0.56 <sup>7</sup>
Others variable cost	6460.3897	0.24 <sup>8</sup>	3614.9205	0.17 <sup>8</sup>	2606.7233	1.27 <sup>4</sup>
Total variable cost	2422907.0	91.79	1915332.0	90.53	1863102.2	90.46
Gross margin	865265.61		1159896.0		1018975.9	
Less: Fixed cost	216730.52	8.21	200422.00	9.47	196599.07	9.54
Net farm income	648535.09		959474.04		822376.87	
Profitability indicators						
Value added/sale ratio	0.2593		0.3548		0.3336	
Rate of returns on investment	26.0984		43.04272		39.3663	
Rate of returns on fixed cost	400.7599		553.6770		507.3153	

Note: Figures in superscripts denote the rank of revenue/cost share in an average poultry farms cost/return structure; Source: Computed from survey data (2004)

Table 4: Costs and returns structure per 1000 birds of an average poultry (broiler production enterprise) farm in the sample by extent of vertical integration adopted

Description	Non-integrated		Partially integrated	
	Amount (N)	Share (%)	Amount (N)	Share (%)
Revenue				
• Broiler	716666.67	100	850000.0	100
Gross Revenue	716666.67		850000.0	
Costs				
• Birds stocked	123334.62	19.48 <sup>2</sup>	120048.00	14.72 <sup>2</sup>
• Feed	193528.39	30.57 <sup>1</sup>	246173.78	30.19 <sup>1</sup>
• Veterinary services	19913.978	3.15 <sup>5</sup>	36000.000	4.42 <sup>6</sup>
• Labour	87806.452	13.87 <sup>3</sup>	120000.00	14.72 <sup>3</sup>
• Water	22358.070	3.53 <sup>4</sup>	31183.187	3.82 <sup>7</sup>
• Energy	12064.730	1.91 <sup>6</sup>	49313.53	6.05 <sup>4</sup>
• Transportation	5870.9677	0.93 <sup>7</sup>	41459.504	5.09 <sup>5</sup>
• Others variable cost	1146.2366	0.18 <sup>8</sup>	4122.0989	0.51 <sup>8</sup>
Total variable cost	466023.45	73.62	648300.09	79.52
Gross margin	250643.22		201699.91	
Less: Fixed cost	167000.00	26.38	167000.00	20.48
Net farm income	83643.216		34699.910	
Profitability indicators				
• Value added/sale ratio	0.3507		0.2373	
• Rate of returns on investment	13.2316		4.2561	
• Rate of returns on fixed cost	150.0858		120.7784	

Note: Figures in superscripts denote the rank of revenue/cost share in an average poultry farms cost/return structure; Source: Computed from survey data (2004)

**Broiler production enterprise:** These are poultry farms that raise broilers only. They are relatively few in number compared with poultry farms that are into egg production. The result in Table 4 shows the cost and return structure of average broiler farms by extent of vertical integration. The special feature that is peculiar to this enterprise is that there is no poultry farm that involved in sole broiler

production that is fully integrated. Hence, Table 4 shows the economic performance of non-integrated poultry farms and partially integrated poultry farms.

The cost composition shows that the feed cost have the lion share of the total cost of production in both non-integrated poultry farms and partially integrated poultry farms. In comparison however, the percentage

Table 5: Costs and returns structure per 1000 birds of an average poultry (egg and broiler) farm in the sample by extent of vertical integration adopted

Description	Extent of integration					
	Non-integrated		Partially integrated (N)		Fully integrated	
	Amount (N)	Share (%)	Amount	Share (%)	Amount	Share (%)
Revenue						
Egg	1033420.60	66.36 <sup>1</sup>	1835591.50	76.55 <sup>1</sup>	1765093.40	77.20 <sup>1</sup>
Spent layers	175760.62	11.29 <sup>2</sup>	299941.36	12.51 <sup>2</sup>	267443.48	11.70 <sup>2</sup>
Broilers	348079.92	22.35 <sup>2</sup>	262418.83	10.94 <sup>3</sup>	253863.86	11.10 <sup>2</sup>
Gross Revenue	1557261.14		2401951.20		2286399.90	
Costs						
Birds stocked	296861.60	21.59 <sup>2</sup>	403661.57	19.84 <sup>2</sup>	233781.05	16.99 <sup>2</sup>
Feed	822116.96	57.05 <sup>1</sup>	1134834.90	55.79 <sup>1</sup>	907145.58	65.40 <sup>1</sup>
Veterinary services	17660.819	1.23 <sup>5</sup>	20415.92	1.00 <sup>5</sup>	9452.95	0.69 <sup>4</sup>
Labour	48959.06	3.40 <sup>3</sup>	218352.08	10.73 <sup>3</sup>	15870.89	2.31 <sup>3</sup>
Water	17428.24	0.99 <sup>6</sup>	22370.32	1.10 <sup>4</sup>	5033.26	0.37 <sup>5</sup>
Energy	14202.32	1.15 <sup>7</sup>	14428.95	0.71 <sup>7</sup>	3630.85	0.26 <sup>7</sup>
Transportation	14059.80	1.50 <sup>4</sup>	17596.43	0.87 <sup>6</sup>	4262.85	0.31 <sup>6</sup>
Others variable cost	2975.25	0.21 <sup>8</sup>	3375.53	0.17 <sup>8</sup>	830.55	0.06 <sup>8</sup>
Total variable cost	1238495.90	85.94	1835035.70	90.31	1195883.60	86.39
Gross margin	318765.19		566915.53		1090516.10	
Less: Fixed cost	164528.27	14.06	199209.58	9.67	184682.03	13.61
Net farm income	154236.93		367705.95		905834.12	
Profitability indicators						
Value added/sale ratio	0.20		0.23		0.45	
Rate of returns on investment	9.94		17.52		69.69	
Rate of returns on fixed cost	192.10		277.11		551.27	

Note: Figures in superscripts denote the rank of revenue/cost share in an average poultry farms cost/return structure, Source: Computed from survey data (2004)

share of feed cost (30.57%) in non-integrated poultry farms is relatively higher than its share (30.19%) in partially integrated poultry farms, though the difference is marginal. Comparing the feed cost share across the poultry production enterprises, the feed cost share in broiler production enterprise is lower than the feed cost share in egg production enterprise. This finding agrees with that of Sani *et al.* (2000).

The gross margin analysis and all the profitability indicators are higher in non-integrated poultry farms than in partially integrated poultry farms. This could be due to half-way integration which according to Buzzel (1983) does not allow full benefits of vertical integration to manifest. It can therefore be concluded that broiler production enterprise have higher economic performance when poultry farmers practise vertical disintegration rather than vertical integration. Comparatively, the gross margin/1000 birds, net farm income/1000 birds and other indices of profitability in broiler production enterprise are lower than the values obtained in sole egg production enterprise. This might not be unconnected with dual sources of revenue in sole egg production enterprise.

**The egg and broiler production enterprise:** The third enterprise combination is egg and broiler production. The cost return structure of average egg and broiler production farm is presented in Table 5. The feed cost, as

it is in the other poultry enterprises discussed above, constitute the bulk of the total cost of production. The feed cost share in non-integrated poultry farms is higher than that of fully integrated poultry farms, which is in turn greater than that of partially integrated poultry farms. The highest feed cost share in fully integrated poultry farms is in contrary to expectation, but this might be due to scale and scope incompatibility and underutilization of the installed capacity of the feedmill. The veterinary cost share is next to feed cost share in non-integrated poultry farms while costs of birds ranked next to feed cost in both partially integrated poultry farms and fully integrated poultry farms. In all the three categories of poultry farms, egg is the major source of revenue while spent layers and broilers are rated 2nd and 3rd, respectively in partially integrated poultry farms and fully integrated poultry farms. But in non-integrated poultry farms, the contribution of broilers to revenue is greater than that of spent layers. This might be due to small flock (layers) size

The gross margin/1000 birds and net farm income/1000 birds of the fully integrated poultry farms are higher than that of partially integrated poultry farms which is in turn higher than that of the non-integrated poultry farms. In the same vein, the profitability indicators, the value added-sales ratio, rate of return on investment and rate of return on fixed cost in this enterprise combination increases with the level of integration which is in line with apriori expectation.

Table 6: Costs and returns structure per 1000 birds of an average poultry (egg and broiler) farm in the sample by extent of vertical integration adopted

Description	Extent of integration					
	Non-integrated		Partially integrated		Fully integrated	
	Amount (N)	Share (%)	Amount (N)	Share (%)	Amount (N)	Share (%)
Revenue						
Egg	1241396.0	71.03 <sup>1</sup>	1217596.20	64.99 <sup>1</sup>	1138284.9	66.37 <sup>1</sup>
Spent layers	221581.03	12.68 <sup>3</sup>	183467.47	9.79 <sup>4</sup>	158054.79	9.22 <sup>4</sup>
Broilers	59881.42	3.43 <sup>4</sup>	191582.36	10.22 <sup>3</sup>	186741.62	10.89 <sup>3</sup>
Cockerels	224911.07	12.87 <sup>2</sup>	280957.09	15.00 <sup>2</sup>	231989.43	13.53 <sup>2</sup>
Gross revenue	1747769.6		1873603.10		1715070.7	
Costs						
Birds stocked	251561.26	15.76 <sup>2</sup>	137137.86	10.51 <sup>2</sup>	142683.22	11.22 <sup>2</sup>
Feed	1113504.5	69.78 <sup>1</sup>	861984.75	66.09 <sup>1</sup>	872644.13	68.60 <sup>1</sup>
Veterinary services	16681.82	1.05 <sup>4</sup>	14164.83	1.09 <sup>5</sup>	14791.20	1.16 <sup>4</sup>
Labour	36656.13	2.30 <sup>3</sup>	71277.10	5.46 <sup>3</sup>	33296.06	2.62 <sup>3</sup>
Water	1750.27	0.11 <sup>7</sup>	15111.41	1.16 <sup>4</sup>	12287.72	0.97 <sup>6</sup>
Energy	2924.9012	0.18 <sup>6</sup>	7100.87	0.54 <sup>7</sup>	6812.40	0.54 <sup>7</sup>
Transportation	5401.07	0.34 <sup>7</sup>	10757.62	0.82 <sup>6</sup>	13595.02	1.07 <sup>5</sup>
Others variable cost	747.04	0.05 <sup>8</sup>	1734.71	0.13 <sup>8</sup>	1802.79	0.14 <sup>8</sup>
Total variable cost	1429226.9	89.56	1119269.2	85.82	1097912.5	86.31
Gross margin	318542.62		754333.93		617158.20	
Less: Fixed cost	166541.50	10.44	184981.53	14.18	174095.37	13.69
Net farm income	152001.12		569352.39		443062.83	
Profitability indicators						
Value added/sale ratio	0.20		0.4000		0.3484	
Rate of returns on investment	10.90		44.8497		33.6493	
Rate of returns on fixed cost	194.98		403.0826		346.3364	

**Eggs, broilers and cockerel production enterprise:** The fourth enterprise combination in the sampled poultry farms is eggs, broilers and cockerel production. The cost return structure of an average broiler cockerel/cock production enterprise is presented in Table 6. The result shows that the major source of revenue of this enterprise is the returns from eggs which constitute the bulk of the total revenue which is about 71, 65 and 66% in non-integrated poultry farms, partially integrated poultry farms and fully integrated poultry farms respectively. The cost structure shows that feed cost constitute the bulk of the total cost of production at all levels of integration while other variable costs which include the costs of repairs and maintenance have the lowest share of the total cost of production at all levels of integration. The gross margin per 1000 bird, net income/1000 birds and profitability indices is higher in non-integrated poultry farms than that of fully integrated poultry farms and as expected, the non-integrated poultry farms have the lowest values of all the profitability indicators and the gross margins. The relatively low gross margin/1000 birds, net income/100 birds and the profitability indices in fully integrated poultry farms might not be unconnected with scale and scope incompatibility of the feedmilling and poultry production as well as underutilization of the installed capacity of the feedmill. In conclusion it is imperative and profitable for farms that involved in this kind of poultry enterprise should endeavour to integrate partially by buying the feed ingredients and mill it at the commercial

feed milling centres since this will prevent the farmers from tying down capitals in form of physical assets. Full integration however is more profitable if the farmers can overcome the problem of scope and scale incompatibility.

In summary, egg production enterprise records the highest gross margin per 1000 birds, net farm income per 1000 birds and profitability indices at all levels of integration.

Closely linked to the egg production enterprise, with respect to the value of gross margin per 1000 birds and profitability measures is egg, broiler and cockerel production enterprise. The broiler production enterprise records the lowest gross margin per 1000 birds, net farm income per 1000 birds; value added sales ratio and other profitability indices. Amongst other enterprises that are combined with the egg production, the combination of egg, broiler and cockerel records the highest gross margin per 1000 birds at all levels of integration while the egg, broiler production enterprise records the highest net farm income per 1000 birds at full integration and non-integration levels.

## CONCLUSION

Feed cost accounts for 62-70, 30-31, 55-65 and 66-70% of total cost of production in egg production enterprise, broiler production enterprise; egg and broiler production enterprise and egg, broiler and cockerel production enterprise respectively. All the five enterprise

combinations show high profitability with egg production having the highest gross margin and profitability indices while the broiler production enterprise has the lowest gross margin and profitability indicators. The partially integrated poultry farms recorded highest level of net farm income and profitability indicators in egg production enterprise and egg, broiler and cockerel production enterprise. In egg and broiler production enterprise the fully integrated poultry farm recorded highest profit level profitability measures while the non-integrated have the higher net farm income in broiler production enterprise. Conclusively, profitability increases with the extent of vertical integration in egg production and broiler enterprise while profitability decreases with vertical integration in broiler production enterprise. Poultry farmers should therefore, concentrate a large proportion of their investment on sole egg production enterprise and enterprise combinations that involve egg production. On the basis of vertical integration, Farmers that are into sole egg production or egg, broiler and cockerel production enterprise should be involved in partial integration; fully integrated poultry farms should combine egg production with broiler while broiler should be raised in non-integrated poultry farms.

#### REFERENCES

- Adebayo, O.O. and R.G. Adeola, 2005. Socio-economic Factors affecting Poultry Farmers in Ejigbo Local Government Area of Osun Stte. *J. Human Ecol.*, 18: 39-41.
- Aihonsu, J.O.Y., 1999. Optimal Laying Period for Profitable and Sustainable egg production. *Ife J. Agric.*, 20: 67-80.
- Bamiro, O.M., A.M. Shittu and A.S. Kola-Olutokun, 2001. Private Feed Production as a Cost Reduction Strategy: Effects on Profitability of Poultry Business in Ogun State, Nigeria. *Ogun J. Agric. Sci.*, 1: 37-51.
- Buzzel, R.D., 1983. Is Vertical Integration Profitable. *Harvard Business Rev.*, 61: 92-102.
- Consumer Union, 2000. Animal Factories: Pollution and Health Threats to Rural Areas. <http://www.consumersunion.org>.
- Kay, Ronald D., 1981. *Farm Management: Planning, Control and Implementation* McGraw-Hill Kogakusha, Ltd.
- Kilmer, R.L., 1986. Vertical Integration in Agricultural and Food Marketing. *Am. J. Agric. Econ.*, 68: 1155.
- Makeham, J.P. and R. Malcolm, 1986. *The Economic of Tropic Farm Management*. Cambridge University Press, Cambridge.
- Ojo, S.O., 2003. Productivity and Technical Efficiency of poultry egg production in Nigeria. *Int. J. Poult. Sci.*, 2: 459-464.
- Ouden, M. den, A.A. Dijkhuizen, R.B.M. Huirse and P.J.P. Zuurbier, 1996. Vertical Cooperation in Agricultural Production-Marketing Chains, with special reference to Product Differentiation in Pork. *Agribusiness*, 12: 277-290.
- Sani, R.M., I. Tailor and S. Kushawa, 2000. Economics of Poultry Production in Bauchi State. A case study of Bauchi Local Government Area. *Nig. J. Anim. Prod.*, 27: 109-113.
- Shittu, A.M., G.O. Olayode, O.M. Bamiro and A.M. Fehintola, 2004. Effect of Using Non-conventional Feedstuff on the Productivity and Cost of egg farms in Ibadan, Nigeria. *Nig. J. Anim. Prod.*, 31: 65-78.
- Subhash Chandra, S. Joynal Abedin and S.M. Fakhru Islam, 1999. Performance of Commercial Poultry Farms: A profitability and Efficiency Analysis. *Bangladesh J. Agric. Econ.*, 21: 63-75.
- Taiwo, S.A., 1999. Seasonal egg glut: Implications for the poultry industry in Southern Nigeria. *Proc. Nig. Soc. Anim. Prod.* 26th Ann. Conf., pp: 420-423.
- Williamson, O., 1979. Transaction Cost Economics. The Governance of Contracted Relations. *J. Law Econ.*, 22: 233-261.