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Efficiency of indigenous poultry feed production enterprises in Yewa division Ogun state, Nigeria

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Abstract
The research work was undertaken to analyze the efficiency of indigenous poultry feed production among poultry feed owners in Yewa Division of Ogun State. A total number of twenty structured questionnaire were administered on poultry feed farmers using the purposive sampling techniques. Descriptive budgetary and regression analytical method were used to analyze the primary data collected. The study confirmed that the age of most farmers in the study area fell between 40-49 and majority (90.0%) of the sampled farmers were males, and 60.0% of the respondents had formal education up to tertiary level. The study showed that 95.0% of the poultry feed farms were owned by individuals which implies that majority falls under one-man business and thus bear the risk and benefit alone. The result of budgetary analysis showed that the Total Variable Cost incurred was N3,535,608.91 and the Total Fixed Cost was N2,880,431.42 which sums up to the Total Cost of N6,416,040.33. The Total Revenue was N10,208,367.80 with a Gross Margin of N6,672,758.89 and Net Farm Income of N3,792,327.46. The profitability ratio was 1.306 while the Operating Ratio was 0.346. The result of regression analysis showed that the amount of raw material and labour determine the production efficiency of indigenous poultry feed production at 10% and 1% level of significance respectively. Also, year of experience cost of raw materials and operation expenses also influence production inefficiencies at 5%, 1% and 5% respectively. Unstable power supply, excess market supply and spoilage, inadequate fund and capital were the major production constraints faced by the poultry farmers in the study area. In view of the result of the finding and the identified production constraints, since the feed farmers are faced with inadequate fund, credit facilities should be readily made available by micro-credit agencies to poultry feed farmers.

Keywords: Indigenous, Poultry, Feed, Budgetary, Production

Introduction
Poultry meat and eggs have become very important means of bridging the protein supply gap in Nigeria. To maximize profits and plan future enterprise activities, a feasibility analysis prior to investment and proper management during the operation are required. Proper management ensures efficient production and good quality products (meat or eggs). This is accomplished by controlling diseases, maintaining feed efficiency, proper handling of wastes, and proper sanitizing of the poultry house. Due to the short turnover rates of poultry flocks and strong market demand, the poultry business could potentially be a profitable enterprise. Thus, many Nigerians in the recent time have developed interest in poultry production as a result of awareness of the nutritional value and the great opportunities for making profits. However, the supply of key inputs has continued to becloud the enterprises especially since some of the ingredients in feed formulation are sourced abroad (Akinwumi and Ikpi, 1996) [1].

Feed costs have a major impact on the profitability of poultry farm operations. The high cost of feed is related to the energy and protein contents of the diet. In an unbalanced diet, with an excess in protein, feed would cost more, thus increasing production costs. With low protein diets, chickens would take more time to grow, and could be at a higher risk of catching diseases.

Chickens have different nutrient (feed) requirements depending on their type, age, and sex.

Rations formulated to meet nutrient requirements produce faster growing, and healthier chickens,

and thus better products and more profits (Xu and Jeffrey, 1998, D'Sousa *et al*, 2007) [13]. Excess dietary nutrients are often excreted in the faeces. The excess nitrogen and phosphorus in faeces could cause a threat to the environment. For this reason, managing feed formulas for accuracy is an important step in poultry farm management to safeguard the environment, and reduce operating costs (Chadd, 2008) [5].

However, the advancement in the poultry sector in Nigeria is currently being undermined by the escalating cost of feeds. Previous studies have shown that the high cost of compound feeds for poultry is derived largely from the exorbitant prices of feed ingredients, increasing competitive demand for them and scarcity of the conventional ingredients (Ojewola *et al*., 2004) [10]. In order to reduce the feed cost which accounts for about 70% of the total cost of poultry production, indigenous poultry feed enterprises came into existence. Most small scale poultry enterprises now depend on these indigenous feed

rations. The raw materials are sourced locally. The feed constitutes mainly of maize, sorghum spent grains, groundnut cake, soya bean meal, fish meal and bone meal. According to Atteh and Ologbonia (1993) [2] such alternatives should have comparative value but cheaper than the conventional feeds. They should also be available in large quantities and should be easily accessible and affordable

In Nigeria, the feed industry is dominated by few large commercial feed industries usually based in Europe or America who run local franchised industries. The composition of their rations is not purely based on indigenous feed ingredients. The industry depends much on importation of major feed ingredients. The erratic supply of feeds by these franchised industries enhanced the growth of the indigenous feed enterprises. The indigenous feed enterprises have been evaluated in terms of their feed quality and suitability for inclusion in poultry diets and have been found suitable for use by small feed compounders in Nigeria (Igwebuike et al., 2001) [9].

Studies have also shown that most of the feeds available from the indigenous feed enterprises are fresh and of high quality. Unlike the non-indigenous feed products available in the market supposedly balanced feed which has been identified to be inadequate due to the use of certain imported feed supplements that have overstayed their shelf life (Oluyemi, 1995 and Igwebuike *et al*, 2001) [9].

Currently in Nigeria emphasis has been placed on encouraging indigenous feed enterprises that make use of local ingredient in formulating feeds for the poultry industry. Due to this, the numbers of such enterprises are on the increase. It has therefore become pertinent to examine the enterprises in order to ensure sustainability and the need to meet the requirements of these fast growing enterprises.

Indigenous Feed Enterprises are seen as an honest approach because of ease of availability of raw materials, and access by poultry farmers. A number of strategies have been adopted such as price policies, input subsidies, production credit and liberalization) by governments and individuals to increase the output of these poultry feed enterprises, yet their performance is low in terms of meeting the needs of the poultry industry. Interestingly, the request for the products of the enterprises is on the increase (Ewa, 2006) [8].

Objectives of the Study

The main objective of this study was to analyze the efficiency of poultry feed production in Yewa Division, Ogun State.

The specific objectives were to:

1. Describe the socio-economic characteristics of indigenous poultry feed producers in the study area.
2. Estimate the cost-returns structure and profitability of indigenous poultry feed production enterprises.
3. Estimate the technical efficiency of indigenous poultry feed production enterprise.

Research methodology

The Study Area

The setting for the study was Yewa Division of Ogun State, Nigeria. Ogun State comprises four divisions namely: Remo, Ijebu, Egba and Yewa Divisions. Yewa Division is formerly known as Egbado Division, which consists of five Local Government Areas. They are: Ado-Odo, Imeko-Afon, Ipokia, Yewa North and Yewa South. The main inhabitants of the Division are mainly Yoruba extraction, speaking various dialects like Yewa, Anago, Egun and Ohori, Other ethnic groups also exist in a peaceful atmosphere like Hausas, Igbos and Igedes. Yewa river is an important tourism attraction in the study area

Sources and Methods of Data Collection

The study used both primary and secondary data. Structured questionnaire was used for the collection of the primary data. The information were collected from poultry feed production entrepreneurs in the study area. The secondary data were obtained from published sources such as journals, books and the past records as well as other relevant sources.

Sampling Techniques

The purposive sampling technique was used for the study. Three Local Government Areas namely: Yewa North, Yewa South, and Ado-Odo Local Government Areas were purposively selected out five Local Government Areas in Yewa Division, Ogun State based on dominance and availability of feed mill enterprises (Odugbemi 1992). Five poultry feed mills each were randomly selected from Yewa North and Yewa South Local Government Areas while ten feed mills were randomly selected from Ado-Odo/Ota Local Government Area making a total of sample size of 20 poultry feed mill enterprises.

Methods of Data Analysis

Descriptive statistics and regression analysis were the major analytical tools used for the analysis of data collected. Frequency distribution and percentages were used to describe the socio-economic characteristics of the indigenous poultry feed entrepreneurs. To analyze the cost-returns structure and profitability among indigenous poultry feed production enterprise, budgetary analysis; involving cost analysis, gross margin, profit and depreciation charges were estimated as follows:

1. Cost Analysis

TC = TVC + TFC (N) ……. (1)

Where:

TC is the total cost of production input

TVC is Total variable cost for raw materials and labour.

TFC is Total Fixed Cost which includes cost of all fixed assets which can last for a year or more.

2. Gross Margin Analysis

GM = TR – TVC (N) ……. (2)

Where;

GM = Gross Margin

TR = Total Revenue

TVC = Total Variable Cost

3. Net Income Analysis

$NI = TR - TC(N)$ ……. (3)

Where;
NI = Net Income (Profit)
TR = Total Revenue
TC = Total Cost

4. Depreciation

Depreciation on each asset was calculated using the straight line method. Following Bamiro, *et. al* (2006) [3], the annual depreciation value was obtained thus;

$$\text{Annual Depreciation Value} = \frac{\text{Cost of each item} - \text{Salvage value}}{\text{Expected life span (years).}} \quad \ldots. \quad (4)$$

Estimation of Technical Efficiency

To estimate the technical efficiency of indigenous poultry feed production in the study area, the Cobb Douglas Stochastic frontier production function which is defined below will be employed;
The stochastic frontier that was estimated is of the form:

$$\text{In } Y_1 = \beta_0 + \beta_1 \text{In} X_1 + \beta_2 \text{In} X_2 + \beta_3 \text{In} X_3 + \beta_4 \text{In} X_4 + (Vi - Ui) \ldots\ldots\ldots \quad (5)$$

Where:
Y = Quantity of feed produced (tonnes) by the i^{th} producer
X_1 = Raw material (kg)
X_2 = Labour (family and hired labour in mandays)
X_3 = Operating expenses (naira)
X_4 = Fixed capital (Depreciation)
V_i = Random errors which covers random effects on production outside the control of the decision unit and.
U_i = Technical inefficiency effect which are the result of behaviour factors which could be controlled by an efficient management (Xu *et al*, 1998).

The technical inefficient effect U_i is defined by

$U_i = \delta_0 + \delta_1 Z_{1i} + \delta_2 Z_{2i} + \delta_3 Z_{3i} + \delta_4 Z_{4i} + \delta_5 Z_{5i} + \delta_6 Z_{6i} + \delta_7 Z_{7i}$
Where: Z_1, Z_2, Z_3, Z_4, Z_5, Z_6 and Z_7 represent age, gender, level of education, year of experience, cost of labour, cost of raw materials and operating expenses of the producer respectively.
These are included in the model to indicate their possible influence on technical efficiencies of the poultry farmers. The β's and δ's are scalar parameters to be estimated. The variances of the random error σv^2 and that of technical inefficiency effect δu^2 and overall variance of the model σ^2 are related thus: $\delta^2 = \delta v^2 + \delta u^2$; and the ratio $\gamma = \delta v^2 / \delta u^2$, measures the total variation of output from the frontier which can be attributed to technical inefficiency (Battese and Cora, 1977) [4]. The estimate for all the parameter of stochastic frontier production and inefficiency model are simultaneously obtained using the program frontier version 4.1 (Coelli 1995) [6].

Results and discussion

The study presents the findings of the data analyses and the interpretation of the results. These are presented in the following order; the descriptive statistical analyses, cost and return and the stochastic frontier model.

Table 1: Socio-economic characteristics of poultry farmers

Variables	Frequency	Percentage
Age (years)		
40-49	10	50.0
50-59	7	35.0
60-69	3	15.0
Sex		
Male	18	90.0
Female	2	10.0
Location		
Village	13	65.0
Town	7	35.0
Production experience (years)		
1-5	5	25.0
6-10	4	20.0
11-15	1	5.0
16-20	2	10.0
21 and above	8	40
Marital status		
Married	13	65.0
Single	5	25.0
Separated	2	10.0
Educational level		
Primary	6	30.0
Secondary	2	10.0
Tertiary	12	60.0
Household size		
1-3	5	25.0
4-6	12	60.0
7-9	3	15.0
Types of ownership		
Personal/private	19	95.0
Family	1	5.0
Nature of job involvement		
Full time	13	65.0
Part time	7	35.0
Total	20	100

***Source*:** Field Survey, 2015

The age of the poultry feed farmers is an important factor that affects the level of productivity and overall coping ability within the poultry feed business. Age is believed to influence the level of physical work and the wiliness to take risk (Bamiro, *et al* 2006) [3]. Table 1 showed the distribution of poultry feed farmers according to their age. Modal age fell between 40-49 years which accounted for 50.0%. This implies that there is less interest in poultry feed production among the young members of the population in the study area only the adult and aged are involved in poultry feed enterprise.
Poultry feed farmers are more concentrated in the village than in the town. Finding shows that 65.0% of poultry feed farmers were located in the village while 35.0% were located in the town. It implies that markets for indigenous poultry feed product are readily available in the village, this may be due to availability of raw materials and local patronage. Sex determines the ability to perform some physical work. It is a popular belief that men are more efficient in farming than women; this is perhaps because they are more energetic and can handle more tedious work than their female counterpart.

Majority of poultry farmers (90%) were male while only 10% were female. This reveals that more male are more involved in poultry production than female.

Years of experience of poultry feed farmers can be a useful guide in taking management decision. 40% of the poultry feed farmers had above 20 years of production experience. More years of experience may cause farmers to have more understanding of poultry feed production risk and in adjusting the factors used. Table 1 revealed that majority (65%) of the poultry feed farmers were married while 25% were single and 10% were separated. The high level of married respondents implies that most of the farmers earned their living and cater for their families from the business. It also implies that the respondents made the effective use of their family labour and this affected the productivity positively. Formal education is a widely known avenue for improving knowledge and rate of skill acquisition. Formal education is also important in business because it determines the level of adoption of innovation and new technologies. Majority of the farmers (60%) had tertiary education which has positive implications on poultry feed business.

The total household size of poultry feed farmers comprises of their wife(ves), children and dependants as shown in the Table 1. Majority of the respondents had their household size between 4 – 6 persons which is 60.0%. This implies that the labour requirements of poultry feed production can be easily obtained from family source. Majority (95.0%) of poultry feed farms were owned by individual while just few (5.0%) of the enterprises were owned by families. This implies that majority of the poultry farms were financed by individual and bore all the risks and benefits alone. Most poultry farmers (65%) were full time poultry feed farmers while 35.0% were part time farmers. This implies that poultry feed production business in the study was majorly on practice on full time basis due to time-demanding nature of the job.

Budgetary analysis

Budgetary analysis was done to estimate the profitability of poultry feed production in the study area. The fixed inputs identified were land, milling machines, generators, water pump, wheelbarrow, shovel, motorcycle, cars, and so on. The fixed inputs were depreciated to know their present and total value recorded. Moreover, the components of variable cost includes cost of raw materials, labour cost, water bill, electricity bill, transportation and other cost (maintenance). In addition, the cost and return structure of the feed farms were based on four types of production i.e chick mash, grower mash, broiler and egg production mash, layer mash and starter mash.

Cost and return structure of indigenous poultry feed production in the study area.

Cost has several components which include variable cost and fixed cost which make up to total cost. Analysis in Table 2 showed that Total Variable Cost was N3,535,608.91 accounting for 55.11% and the Total Fixed Cost based on depreciation was N2,880,431.428 accounting for 44.89%.

Total Revenue was N10,208,367.80 and the Gross Margin was N6,672,758.89 while the Net Income was N3,792,327.462, which implies that indigenous poultry is viable and profitable in the study area.

Table 2: Distribution of Cost and Return Structure of Poultry Feed Production

Item(s)	Mean	Percentage cost
Variable Cost	13,200.00	
Family labour cost	224,077.84	0.21
Maintenance cost	11,250.00	3.49
Administrative cost	3087638	0.18
Raw materials	3,890.00	48.12
Electricity bill	24,150.00	0.06
Water bill	17,884.25	0.38
Hired labour cost	28,105.56	0.28
Transportation	7,203.00	0.44
Marketing	21,820.00	0.11
Others	3,535,608.91	0.34
Total Variable Cost	2,880,431.42	55.11
Total Fixed Cost	6,416,040.33	44.89
Total Cost		100.0
Revenue from output	2,640,000	
Chick's mash sold	13,900	
Grower's mash sold	9,467,074	
Layer's mash sold	463,393.8	
Broilers finisher	10,208,367.80	
Total Revenue	6,672,758.89	
Gross Margin (TR – TVC)	3,792,327.46	
	1.306	
Net Income (GM – TFC)	0.453	
Profitability Index (NI/TR)		
Capital Turnover (TR/TC)		

Source: Field Survey, 2015.

Profitability Analysis of Poultry Feed Production

As shown in Table 3, the Profitability Index of poultry feed production in the study area was 1.306, the rate of return on investment (59.107%), the rate of return on variable cost (207.26%) and the operating ratio (0.346). The profitability index of 1.306 indicates that out of every naira incurred about ₦1.31k return to the feed farmers as net income, also the farmer earned N0.59k profit on every naira put into the production, however, the rate of return was estimated as N2.07k, that is per production every one naira cost incurred on variable input will generate about N2.07k which can be deduced that improving profitability in production in the study area required that more effort should be put into increasing the efficiency of use of variable input.

Operating ratio that is less than one indicates a good efficient and profitable business. Therefore, from the table, the operating ratio was 0.346, but it is still left for the feed farmers to achieve lower operating ratio and this can be achieved by preventing waste and exploring avenue for wider market outlet which will increase the total revenue and bring down the operating ratio.

Table 3: Distribution of Profitability Analysis of Poultry Production

Profit index (NI/TR)	Rate of return on investment (RRI %) (NI/TC x 100)	Rate of return on variable cost (RRVC %) TR-TFC / TVC x 100	Operating ratio (OR) TVC/TR
1.306	59.107	207.26	0.346

Source: Field Survey, 2015. Where: NI = Net income; TR = Total revenue; TC = Total cost
TFC = Total fixed cost; TVC = Total variable cost

Estimate of the determinants of production efficiency

Data in Table 4 showed both the OLS (Ordinary Least Square) and the MLE (Maximum Likelihood Estimate) of the stochastic production frontier function of the poultry feed farmers in the study area. The coefficient number of the amount of raw material used for production and labour were positively-signed and amount of raw material was statistically significant at 10% level of significance and labour was significant at 1% level of significance. The operating expenses were negatively significant at 1% level of significance while the coefficient of all the fixed capital was not significant from the OLS estimate. The significance of raw materials means that the higher the quantity of raw material used by the farmers, the higher the output of the feed farmer i.e a unit increase in raw material added to production led to 0.424 unit and 5.332 unit increase of output respectively. The coefficient of operating expenses and fixed capital were negatively signed. This implies that as operating expenses increases there is a reduction in output of the farmers, equally the more the number and cost of fixed capital used in production the higher the output of the feed farmers in the area.

The estimated coefficient of inefficiency function provides explanation of the relative technical efficiency level among the individual feed enterprises. Among the listed inefficient variables such as year of experience, cost of raw materials and operating expenses were the statistically significant causes of inefficient in poultry production in the study area. The coefficient of year of experience was positively significant at 5% level of significant. Cost of feed was negatively significant at 1% level of significant. Operating expenses was also negatively significant at 5% level of significant. The sigma-square and gamma were positively significant at one 1% significant level. (This is also line with the study of Ojo, 2003).

The coefficient of cost of raw material was negative and this implies that the higher the cost of raw material the higher the technical inefficiency that will be encountered. Again the coefficient of operating expenses is also negatively significant meaning that high cost of operating expenses is capable of increasing technical inefficiency i.e. reducing technical efficiency. The $\delta^2 = 0.966$ which is statistically different from zero; this indicates the goodness of fit and correctness of the specified distribution assumption of the composite error term also the variance ratio define as γ is estimated as 0.7174 meaning that the existence of technical inefficiency among the feed farmers account for about 71.7% of the variation in the output level of the poultry feed farmers in the area.

Table 4: Estimate of Determinants of poultry feed production efficiency

Explanatory Variables	Parameters	OLS Coefficient	MLS Coefficient
Production function	-	-	-
Constant	β_0	11.92 (14.97)	15.21(15.89)
Raw materials	β_1	0.203*** (1.959)	0.138 (1.354)
Labour	β_2	0.424* (5.332)	0.354* (4.377)
Operating expenses	β_4	-0.235* (-0.028)	-3.846* (-4.537)
Fixed capital	β_5	-0.002 (-0.011)	-0.0971*** (-1.695)
Inefficiency model		-	-
Constant	δ_0	-	4.578* (2.187)
Age of the farmer	δ_1	-	0.0211 (1.151)
Sex	δ_2	-	-0.404 (-0.572)
Years of formal education	δ_3	-	-0.0598 (0.8111)
Years of experience	δ_4	-	1.587** (2.322)
Cost of labour	δ_5	-	0.000090 (1.041)
Cost of raw materials	δ_6	-	-0.0000916* (-2.883)
Operating expenses	δ_7	-	-0.0000512** (-2.199)
Variance Parameters			
Sigma square	δ^2	-	0.966* (3.129)
Gamma	γ	-	0.717* (5.972)
Log of likehood function		-122.72	-113.88
LR test			-17.67
Mean Tech. Efficiency			0.714

Figures in parenthesis are t-value. * - 1% significant level; ** - 5% significant level;
*** - 10% significant level
***Source*:** Field Survey, 2015.

Distribution of Decile Range and Mean of Farm Technical Efficiency

In Table 5, the poultry feed farm with the highest technical efficiency had decile range of 0.8 – 0.89 with 30.0% and the feed farm with lowest technical efficiency had decile range of 0.30-0.39 with 1.7% while total mean of the feed enterprise technical efficiency was 0.7014.

Table 5: Decile Range and Mean of Enterprise Technical Efficiency

Decile Range	Frequency	Percentage	Minimum	Maximum	Mean
0.1-0.19	1	5	-	-	-
0.2-0.29	1	5	-	-	-
0.3-0.39	1	5	-	-	-
0.4-0.49	2	10	-	-	-
0.5-0.59	4	20	-	-	-
0.6-0.69	6	30	-	-	-
0.7-0.79	2	10	-	-	-
0.8-0.89	2	10	-	-	-
0.9-0.99	1	5	-	-	-
Total	20	100.0	0.11	0.93	0.7014

Production Constraints Encountered by Poultry Feed Farmers

Data in Table 5 showed major constraints faced by poultry farmers were unstable power supply, disease problem, excess market supply and spoilage, inadequate fund and capital, pilferage and theft. The findings shows that all (100%) the farmers were facing the problem of incessant power supply which has great effect on their output followed by 80% of inadequate fund and capital due to inaccessibility to production capital by poultry feed farmers.

Table 5: Distribution of Respondents by Constraints Faced

Constraints	Frequency	Percentage
Inadequate fund and capital	16	80%
Excess market supply and spoilage	15	75%
Pilferage and theft	16	80%
Packaging problem	13	65%
Unstable power supply	20	100%
Others	1	5%

***Source*:** Field Survey, 2015.

Conclusion

The study concluded that poultry feed mill production is highly profitable in the study area, as shown by the findings of the study. The budgetary analysis showed that the net income was N3, 792, 327.462, the profitability measurement used also showed that the poultry business was profitable with Profitability Index (PI) of 1.306. The regression analysis using stochastic production frontier showed that raw materials and quantity of labour have significant effect on poultry feed farms. The result also indicated that poultry feed farm output increases with increase in the number of labour used and amount of raw materials. The study data observed the technical efficiency with the presence of technical inefficiencies. However, efforts were made by the poultry feed mill owners to overcome inefficiencies arising from inputs used, through the use of modern equipment and machines.

Recommendations

1. The policy implications of the findings in this study that there are ample opportunities to raise the production efficiency level of poultry feed production enterprises in the study area giving the wide variation in the level of production efficiency.
2. An analysis on the cost and returns indicated an improvement in the gross margin of large scale. In view of each capital outlay required to establish and maintain large scale production, credit institutions should continue to support the indigenous poultry feed production sector in the interest of all and sundry. Poultry feed farmers should be allowed to have access to loanable funds from financial institution such as banks, cooperative and so on.
3. Since the feed farmers are faced with inadequate funds and capital, credit facilities should be readily made available by micro credit institution for poultry feed farmers.
4. Government should help in providing adequate power supply by providing all the necessary needs required by the power holding company of Nigeria (PHCN) to help the farmers to make appreciable profit and spend less on other source of power supply and fuel.

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