



Economic assessment of pig production in Ondo State, Nigeria

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Abstract

The study empirically examined the economic analysis of pig production in Ondo State, Nigeria. Primary data were used for this study. The data were collected with the aid of structured questionnaire and 120 respondents were randomly selected through a multistage sampling technique. Descriptive statistics, gross margin analysis and OLS regression were employed to analyze the data. The results show that about 89.2% of the farmers were male and 85.8% of the respondents were married. About 75.8% of the respondents had formal education and majority (70.8%) of them had between 1 and 5 years of experience. About 40.8% of the respondents had 11 to 20 pigs with the average number of pigs reared was 18. The farm income was ₦1,442,500 per production cycle. The gross margin (GM) was ₦756,500 while the net farm income was ₦657,980. The result showed that the enterprise was profitable as indicated in the study. The results of the multiple regression revealed that age, feed cost and farmer's experience were the main determinants of pig production in the area. Also, the result showed that lack of capital and poor access to credit facilities as the major constraints to pig enterprise in the study area. Based on the findings, it is recommended that more funds should be made available to piggery farmers at minimum cost to increase output of the piggery industry.

Keywords: Pig, production, multiple regression, output, return on investment

1. Introduction

Pig meat is in high demand in Nigeria and enjoys high patronage in the market (Aminu *et al.*, 2017; Adesehinwa *et al.*, 2003) ^[7]. Pig reproduces in large number and grow very fast. A single pig gives birth to as much as 15 piglets at a time, making it one of the most reproducing mammals in the world (Ajiehi *et al.*, 2021; Amills *et al.*, 2013) ^[8, 5]. Baby pig is known as piglet. Male pigs are referred to as the boar while females are sows. As a group they are called a herd or drove. Despite the huge profitability of Piggery, many Nigerians have not embraced this goldmine because of ignorance of how it works. A fully grown Pig goes for as high as N30, 000 depending on the weight. Now Imagine for a year you are able to rear hundred to maturity, you will be making N3 Million from the sales. If you can take it higher let's say like 2,000 pigs in year, you will be raking N60 Million Pig farming in Nigeria is becoming very popular day by day (Igwe *et al.*, 2013) ^[14]. It is a wonderful business idea and very profitable. You can get return of your total investment within very short time. The economy of Nigeria is mostly dependent on agriculture. And various types of agribusiness related to agriculture sector are contributing much to the national income and total economy of Nigeria.

Pig farming in Nigeria can play an important role in eradicating unemployment, poverty, malnutrition and etc. By raising pigs commercially, you can both fulfill your family nutrition demands and earn some extra cash. The reproduction cycle of pig is faster than any other livestock like cattle or goats. The modern pig has continued to play a major role in providing food for human consumption due to its tremendous versatility and adaptability to a wide-range of environmental conditions (Donham, 2000) ^[13]. This ability to adapt plays a significant role in how pigs are raised and grown in various countries of the world. Pigs have been described as one of the most prolific and fast-growing livestock species that can convert food waste to valuable products (Vicente *et al.*, 2011) ^[28].

Their annual growth rate (3.8 %) is higher than that of human population (2.3 –2.8 %) (Samuel *et al.*, 2021) ^[25]. Pigs excel other red meat animals, such as cattle, sheep and goats in converting feed to meat (Vicente *et al.*, 2011) ^[28]. Pig production has been recommended as an alternative source of cheap, high quality dietary protein for the escalating human population (Igwe *et al.*, 2013) ^[14]. This is due to the relatively low cost of pig production and fast growth rate (Osaro, 1995) ^[24], short generation interval and high production potential; prolific and fecundity (Chiduwa *et al.*, 2008; Osaro, 1995) ^[15, 24], high efficiency carcass yield (Agbangha *et al.*, 2021) ^[9] and easy adaption to environmental conditions (Adesehinwa *et al.*, 2007) ^[3]. Pig production has therefore been advocated as a short - term measure toward alleviating the animal protein calorie deficit especially in areas where there are no religious edicts preventing their production and consumption. Nigeria's economy is presently poor and there has been incidence of extreme poverty and malnutrition in the country, livestock contribute directly to the economy through employment generation, increase in savings and investment, foreign exchange earnings, contribution to human food and nutrition. In spite of all this livestock production has not been taken seriously as part of the contributor to Nigeria economy as it is supposed to be and this has led to the study of economic assessment of pig production in Ondo State, Nigeria. The specific objectives of the study were to: describe the socio-economic characteristics of pig farmers in the study area; estimate cost and return of pig production in the study area; examine factors affecting pig production in the study area and identify the constraints that affect pig production in the study area.

2. Methodology

The study was conducted in Ondo State, Nigeria. The primary data used for this study was obtained using a well-structured questionnaire. A multi-stage sampling technique was adopted for the study. The first stage of the technique involved the selection of Akure South Local Government Area (LGA) among the 18 LGAs in the State. The area was selected because of the availability of pig farmers and market in the area. The area was noted for rearing of pigs in large quantity. The second stage also involve a purposive selection of five villages (Ologede, Omieye, Aponmu, Okuta Ekan and Ijoka) which was done based on large population of pig farmers in the areas. The third stage was a snowball selection of twenty-four (24) pig farmers each from selected villages. Hence, a total number of one hundred and twenty (120) respondents were used for the research as a sample size. Data collected in this study were analyzed using both descriptive statistics, budgetary and multiple regression techniques. The socio-economic characteristics of respondents and constraints faced were analyzed using the descriptive statistics, while budgetary technique was used to estimate the cost and return to the enterprise.

Budgetary techniques that were employed included Return on Investment (ROI) and Benefit Cost Ratio

1. Return on Investment (ROI) = Net Income/ Investment Cost
2. Benefit Cost Ratio (BCR) = Total Revenue / Total Cost

BCR<1 Investment generates losses

BCR = 0 Investment neither profitable nor loss

BCR > 1 Investment is profitable

Benefit cost ratio; is the ratio of the value of total revenue to the total cost

3. Total cost (TC) = Total Variable Cost (TVC) + Total Fixed Cost (TFC)
4. Total revenue (TR) = Output (Q) × per Unit price (P)
5. Profit /Net revenue = total revenue – total cost
6. Gross margin = Total revenue – total variable cost

The aforementioned profitability ratio helps to explain the extent to which each pig farmer utilizes the factors of production to attain desired expectation which could be output maximization and cost minimization.

Multiple regression analysis was used to establish the relationship between the variables in order to know the factors affecting pig production Four functional forms of the regression model were tried, and they are: simple linear, semi-logarithmic, double-logarithmic, and exponential.

Simple linear form

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \mu_1 \quad (1)$$

Semi-logarithmic form

$$Y = \text{Log}\beta_0 + \text{Log}\beta_1 X_1 + \text{Log}\beta_2 X_2 + \text{Log}\beta_3 X_3 + \text{Log}\beta_4 X_4 + \text{Log}\beta_5 X_5 + \text{Log}\beta_6 X_6 + \text{Log}\beta_7 X_7 + \text{Log}\beta_8 X_8 + \mu_1 \quad (2)$$

Exponential logarithmic form

$$\text{Log}Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \mu_1 \quad (3)$$

Double logarithmic form

$$\text{Log}Y = \text{Log}\beta_0 + \text{Log}\beta_1 X_1 + \text{Log}\beta_2 X_2 + \text{Log}\beta_3 X_3 + \text{Log}\beta_4 X_4 + \text{Log}\beta_5 X_5 + \text{Log}\beta_6 X_6 + \text{Log}\beta_7 X_7 + \text{Log}\beta_8 X_8 + \mu_1 \quad (4)$$

Where Y is the dependent variable = Output of Pig Production (Kg)

$X_1, X_2, X_3, \dots, X_8$ are the independent variable which are thus listed:

X_1 = Age (years)

X_2 = Marital status (married =1 and 0, otherwise)

X_3 = Household size (numbers)

X_4 = Cost of feed (Naira)

X_5 = Cost of labour (Naira)

X_6 = Farm size (hectares)

X_7 = Access to credit (yes = 1 and 0, otherwise)

X_8 = Access to extension service (yes = 1 and 0, otherwise)

U = Error term

The equation (1) was chosen on the basis of correct signing of the explanatory variables, the significance of the regression coefficient and the value of the multiple determinations.

Results and Discussion

Socio-economic Characteristics of the Respondents

This section presented and discussed the results obtained from the analysis carried out in this study. The result in table 1 revealed that majority (51.7%) of pig farmers in the study area falls within the age range of 41-50. The mean age of the farmers was 44, implying that the pig farmers were in the economically active age. The results showed that the pig

farmers were young and energetic and thus can bear the stress and demanding nature of the enterprise. The result is in accordance with Anyanwu *et al* and Aminu *et al.* (2017) ^[10] who reported that people aged 40-50 years are more energetic and have the capacity to use new technologies and innovations. Table 1 also showed that majority (89.2%) of the farmers were male while 10.8% of the farmers were female. This implies that pig farming in the study area was dominated by male. The result could be as a result of few females being unable to bear the stress and the demanding nature of commercial pig production in the area. The result agrees with Uneze and Onugu (2012) ^[27] who reported larger proportions (55.0%) and (63.3%) of male in pig production in both Abia and Anambra States, respectively. The marital status of pig farmers in the study area was shown in Table 1. It indicated that majority (85.8%) of the respondents were married, about 3.3% single, 7.5% were divorced, while (3.3%) were widower. The high level of married population could be a way of increasing household size to assist in the day today running of the enterprise as well as to assist in other activities carried out in the farm. The high percentage of married respondents conforms to Jibowo (2012) ^[18] who reported that majority of the adult population of a society consists of married people. Ani (2015) ^[6] opined that marriage has a direct relationship with family stability; therefore, the high percentage of married respondents suggested that the pig farmers were stable and able to make good business decisions. In Table 1 the result showed that the mean household size of the pig farmers was five persons. This implied that the family members could serve as source of labour and this would help in reducing the cost of hiring labour. This result agrees with Okoedo-Okojie (2015) ^[20] which indicated a mean household size of six persons among pig farmers in Delta State, Nigeria. The years of farming experience of the respondents as shown in Table 1 revealed that 70.8% of the respondents had between 1 and 5 years of experience while only 20.8% had between 6 and 10 years of experience respectively. The mean farming experience was 4 years, implying that the enterprise was relatively new in the area. This could be attributed to environmental pollution common in pig farming. It could also be pointer to the fact that pig production enterprise is cumbersome, too demanding and capital intensive. Chukwuji (2006) ^[11] noted that success and stability of any business depends on the skill and experience of the manager, while Ugwumba (2010) ^[26] and Ijeoma (2012) ^[17] opined that education and experience are veritable tools for acquiring new ideas and skills that reflect positively on scope of enterprising, income and profit. The result in Table also revealed that 40.8% of the respondents had 11 to 20 pigs, about 32.5% of them reared between 21-30 pigs, while only 10.8% had 1 to 10 pigs. The average number of pigs reared was 18. This is an indication that unlike poultry farming most of the pig farms existing in Akure District were still operating on small-scale. This may be due to inadequate capital resource base to expand existing farms and to start new ones, since livestock production is a high capital-intensive venture. The result in the table below revealed that about 75.8% of the respondents had formal education while 24.2% of them had no formal education. This implies that majority of the pig farmers attended secondary school. This does not differ from earlier findings of Oluyole (2005) ^[21] who reported that high literacy level will enable farmers to adopt and use improved practices. A high level of literacy might positively influence the farm business

Table 1: Socio- economic Characteristics of the Respondents

Gender	Frequency	Percentage	Mean
Male	107	89.2	
Female	13	10.8	
Total	120	100.0	
Marital Status			
Single	4	3.3	
Married	103	85.8	
Widowed	4	7.5	
Divorced	9	3.3	
Total	120	100.0	
Age (Years)			
<30	4	3.3	
31-40	35	29.2	44
41-50	62	51.7	
>51	19	15.8	
Total	120	100	
Household Size			
<3	6	21.7	
4-6	73	58.3	5.0
7-10	41	15.8	
>11	4.2	4.2	
Total	120	100.0	
Experience (Years)			
<5	85	70.8	
6-10	20.8	20.8	4
>11	8.4	8.4	
Total	120	100.0	
Farm Size (Number of pigs)			
<10	13	10.8	
11-20	49	40.8	
21-30	39	32.5	
31-40	15	12.5	18
>40	4	3.3	
Total	120	100.0	
Educational status			
No formal education	29	5.8	
Primary education	25	37.5	
Secondary education	39	40.8	
Tertiary education.	27	6.7	
Total	120	100	

Source: Field Survey, 2021

Cost and Returns of Pig Enterprise

The profitability of pig enterprise in this study was assessed using gross margin and net income for profitability in terms of sales and net return on investment. The estimated profitability for pig production enterprise in the study area was shown in the Table 2. The total variable cost (TVC) and the total fixed cost (TFC) were ₦686,000 and ₦98,520 respectively for a production cycle of 12 months. This gives rise to total cost (TC) of ₦784,520 of pig production in the area per annum. On the other hand, the revenue in piggery enterprise was ₦1,442,500 per production cycle. The gross margin (GM) was ₦756,500 while the net farm income was ₦657,980. The result shows that the enterprise was profitable as indicated by the income above fixed cost was positive. The findings were in agreement with Onah (2015) ^[22] who found that the mean profit margin of pig production in Enugu metropolis was ₦3,689,267.98 per year. It also conformed with the study of Oni (2014) ^[23] and Aminu *et al.* (2017) ^[10] in western part of Nigeria in which he reported ₦233,007.50 and ₦147, 857.50 as the gross margin and net farm income of a pig farm per annum respectively. The result is also consistent with the findings of Ibitoye *et al.* (2016) ^[16] who reported an annual gross margin of ₦44,171 for pig producers

in Kogi state, Nigeria. Also; the result on return on investment of 0.84, which implied that for every naira invested in pig enterprise, ₦0.8 kobo was received as profit

by the producers further confirmed the profitability of pig production in the area.

Table 2: Cost and Returns of Average pig Farmer

Variable Items	Unit Cost	Total Cost
Pig/Piglet stock (12)	18,000	216,000
Feed (50 bags)	6800	340,000
Grain (500kg)	50	25,000
Bundles of Hay		3000
Palm kernel grain (2)	21,000	42000
Labour		35,000
Medication		10,000
Transportation		15,000
(A)Total Variable Cost		686,000
Fixed Cost		
Maintenance		8,000
Depreciation (water tank, shovel, buckets, rake, wheel barrow and farm van)		90,520
(B)Total Fixed cost		98,520
Revenue		
5 weaned piglets	20,000	100,000
20 fattened piglets	45,000	900,000
5 culled sows	80,000	400,000
50 empty bags	50	2,500
100 bags of manure	400	40,000
(C)Total Revenue		1,442,500
(D)Total Cost		784,520
Gross Margin (C-A)		756,500
(E)Net Profit (C-D)		657,980
Return on Investment (E/D)		0.80
Benefit Cost Ratio		1.84

Source: Field Survey, 2021

Factors affecting the output of the Pig Farmers

An econometric method of ordinary least square (OLS) regression model was employed in the test for the factors that affect output of pig farmers in the study area. The factors that were identified to affect the output of pig farmers in the study area are presented in Table 3. The R² value of 0.68 showed that the explanatory variables explained up to 68% of the variations in the output of farmers. Thus, the remaining 32% could be due to other factors not accounted for by the model. Three independent variables (age, cost of feed, and experience of the farmer) were statistically significant and thus exerted influence on pig farmers' farm revenue. This implied that the three factors were among the major determinants of pig farmers' revenue in the study area. The result of the factors influencing the output of the pig farmers

agreed with those of other studies in Nigeria; Ibitoye *et al.* (2016) ^[16] found out that cost of feeds and labour, farming experience and age among other variables are significant factors influencing the farm revenue of pig farmers in the various studies across Nigeria. The coefficient of age was positive (1760.148) and statistically significant at 1% level of probability. This implies that a year increase in the farmers age will increase the income by ₦1,760.148. Also, feed cost was significant at 1% level of probability with a negative effect on the revenue, implying that a naira increase in feed cost will reduce the income by ₦19.43. Furthermore, farmers experience was also significant 5% probability level with a positive effect on the revenue. This implies that a year increase in farmers experience will increase the farm income by ₦804.94.

Table 3: Regression Result Showing the Factors Affecting output of Pig Farming

Variables	Coefficient	Std.error	t-value	p-value
(Constant)	36374.942	15381.834	2.365	0.020**
Age	1760.148	434.627	4.050	0.001***
Marital status	-1407.402	2988.958	-0.471	0.639
Household Size	1212.514	1664.871	0.728	0.469
Cost of feed	-19.432	4.752	-4.090	0.002***
Experience (years)	804.944	1223.198	0.658	0.050**
Cost of labour	0.193	0.306	0.632	0.529
Farm size	-0.046	0.044	-1.037	0.303
Access to credit	0.263	0.307	.856	0.395
Access to extension	-0.035	0.065	-.536	0.593
R ²	0.68			
F-value	6.93			
***	Significant at 1%			
**	Significant at 5%			
Dependent Variable	Output(naira)			

Constraints to Pig Production

The result in Table 4 showed that insufficient credit facilities was the major (93.3%) constraint to pig production in the study area. This was in consistence with the result of Onah (2015) ^[22] who indicated that lack of capital and poor access to credit facilities as the major constraints to pig enterprise in their studies. High cost of feed was the second constraint by 70.0% of the respondent, followed by huge capital requirement. Poor state of extension services, poor agricultural research and low application of modern production system could be attributed to negligence on the part of government, that tend to pay lip services to the growth of agriculture. This is as authenticated by the consistent poor and lean Nigeria government budget for agriculture, which is considered as one of the lowest in Africa. It could also be blamed on high level of negligence on the part of extension workers lack motivation and due to poor remunerations and have failed to discharge their duties. The result was corroborated by the findings of Ibitoye *et al.* (2016) ^[16] and Uneze and Onugu (2012) ^[27] who indicated that inadequate extension services and education as well as outdated production system and technologies are the major hindrance to pig production in Anambra and Kogi states respectively. The problems of disease and parasite infestation, cannibalism, infant mortality could be attributed to poor housing, poor feeding system and general poor farm management. The result is in conformity with the findings by Abonyi *et al.* (2012) ^[1] which showed that about 12% of piglets were cannibalized by older pigs; this was attributed to inappropriate farm structures and improper management practice.

Table 4: Distribution of the Pig Farmers by Constraint to Pig Production

Constraints	Frequency	Percentage	Rank
Insufficient credit facilities	112	93.3	1 st
High cost of animal feed	84	70	2 nd
Huge capital requirement	66	55	3 rd
Inadequate extension and farmers education service	49	40.8	4 th
Scarcity of water during dry season	21	17.5	5 th
Poor research on pig production	19	15.8	6 th
Disease and parasite infection	13	10.8	7 th
Poor Housing	9	7.5	8 th
High cost of veterinary drugs	8	6.7	9 th
Technologies in pig farming	6	5	10 th
High mortality	5	4.2	11 th
Cannibalism	4	3.3	12 th

Source: Field Survey, 2021

Conclusion and Recommendations

Pig farming was found to be a profitable enterprise in the study area because it recorded a positive net farm income and a return on investment. The study revealed that a year increase in the farmers age will increase the net income by N1,760.148 in the study area. Also, feed cost was significant at 1% level of probability with a negative effect on the net income, implying that a naira increase in feed cost will reduce the net income by N19.43. Furthermore, farmers experience was also significant 5% probability level with a positive effect on net income. This implies that a year increase in farmers experience will increase the net farm income by N804.94. The study showed that insufficient credit facilities was the major (93.3%) constraint to pig production in the

study area. Therefore, it is recommended that more funds should be made available to piggery farmers at minimum cost to increase the output of the piggery industry.

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