Profitability Analyses of Pig Production in Nkanu-West Local Government Area, Enugu State, Nigeria.

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ABSTRACT

The profitability of pig production in Nkanu-West L.G.A. of Enugu State, Nigeria was studied due to the lack of adequate and comprehensive demographic records of pig farmers in the area. This study aimed to identify the breeds of pigs grown in the area, estimate the profitability of pig production, and describe the major problems of the pig farmers. Data was collected from ninety (90) pig farmers using a combination of purposive and random sampling techniques and a structured questionnaire. Descriptive and inferential statistics were used to analyze the collected data. The results showed that the majority of the pig farmers were male (81.1%), with a mean age of 38 years and an average household size of 8 persons. Furthermore, 84.5% of the pig farmers could read and write, with most of them (42.2%) relying on cooperative societies as their major source of capital. Large White was the dominant breed in the area, with an average of forty-three (43) pigs per farmer per production cycle. The profit margin was 58% and the benefit-cost ratio was 2.36. High cost of feed was identified as the major problem faced in the business, and farm experience, level of education, access to credit, and household size were found to have a positive and significant effect on the profit. It was recommended that easy access to credit facilities and improved breeds of pig be provided to farmers

1.0 Introduction

Pig, *Sus scrofa domesticus* is one of the most important animals in Nigeria. This is mainly because of the number of people involved in pig farming and the economic value that is derived from it. Holness (2007) identified over 90 recognized breeds and an estimated 230 varieties of pigs in the world. Some pigs may be referred to as indigenous or unimproved while others may be referred to as modern, exotic or improved breeds. The most prominent breeds in Nigeria include Large White, Duroc Jersey, Land Race and West African Dwarf pigs (Falusi and Adeleye, 2009). The exotic types of pig breed are usually improved types which have high productive performance when generally com-pared to local breeds in Africa (Osaro, 2005). Pigs have high feed conversion efficiency, early maturity, high fecundity, short gestation period and very good utilizers of household waste.

Their unique adaptive characteristics to survive in whatever areas they are found give them an edge over other animals (Ajala *et al.,* 2007). According to Rahman et al. (2008), Pigs are major important non-ruminant animals reared in the de-rived savannah and rainforest areas of Nigeria. Pig and poul-try production are the fastest-growing livestock sectors in the world (FAO, 2012a). Pigs have the ability to convert a wide range of food materials into edible human food, producing

meat that differs from the flesh of other farm animals in texture, flavor and certain nutritive properties (Akinyosoye, 2009). The growth in the sector occurs mostly in developing nations (Olarinde *et al.,* 2013).

There are two major systems of pig production prevailing in Enugu State namely; the traditional/extensive system and the intensive system (Ezeibe, 2010). The pigs under the traditional system are left to scavenge and roam about searching for feeds. This system is characterized by the use of indigenous, unimproved breeds, low-quality feeds and poor management resulting to low productivity (Akinyosoye, 2009). This extensive system appears to be the simplest and cheapest since the pig farmer does not spend much money on feeds and housing. It is usually practiced by peasant, small-scale, subsistent pig farmers.

The intensive pig production system involves total confinement of the pigs which requires huge capital investment. Intensive system is characterized by the use of improved exotic breeds, proper housing, adequate feeding and veterinary services coupled with good management practices (Ezeibe, 2010). The housing comprises modern, permanent structures which encourage easy disposal of feces and effluent, providing maximum comfort and security for the pigs. The selection of breeding stock of pigs will focus on those traits, characteristics or qualities possessed by different breeds which help to promote increased productivity and profitability in pig business (Akinyosoye, 2009). In addition, the choice of breed to be reared and the management system to a large extent determine the success or failure of piggery business in Nigeria.

Apart from pork and lard, pigs give other economically important produce such as pig skin as raw materials for making valuable leather materials. Bristles from pigs are used for making brushes, hooves for making gelatin and glue products are also obtained from pigs (Holness, 2007). Pigs also provide a good source of animal feeds from blood and inedible meat tissues. The pigs provide blood, intestines and offals for making sausage and delicacies for man and animal consumption. The feces and effluents serve as manure to increase the fertility of farmland and to produce biogas used in domestic cooking (Rogerio and Laura, 2006). All these pig products and by-products are potential income earners for the pig farmers.

In pig production, resources or inputs (land, labour, capital and management) are utilized to make goods and services (output)   Production here refers to the process of rearing pigs from farrowing to the finishing stages in a pig farm. The aim of every pig farmer is to increase productivity so as to reap the benefit that is attached to it. Productivity according to Robert and Ben (2009), is the amount of the output per unit of input achieved by a firm, industry or a country. Productivity in economic term is used to describe how well or how efficient an economy's resources are used in the process of production (Arene, 2008). Productivity per worker can be increased by longer hours (man hours), more effort or improved skills on the part of labour force, more capital, equipment, improved technology and better management (John, 2003). Productivity can be physical productivity (physical output) or financial productivity (financial return) of an industry or enterprise. Physical productivity in pig production, include the number of piglets farrowed, adult pigs raised, pork, pig skin, lard, bristles, hooves and pig manure realized from the farm per unit of input. Financial productivity on the other hand, refers to the amount of money (revenue) realized from the sale of physical products. The difference between sales (income) and the input (expenditure) gives either the profit or loss in pig production business.

2.0 Materials and Methods

2.1 Study Area.

The study area is Nkanu- West Local Government Area of Enugu State, Nigeria. Its headquarter is located at Agbani and is one of the seventeen L.G.As that make up Enugu State. The area lies between longitude $6^{o}50'$ and $8^{o}30$ E and latitude $4^{o}30'$ and $7^{o}5'$ N. It has an area of 225 km^2 and a population of 146,695 people who are mainly of Igbo extraction (NPC, 2006). The atmospheric temperature of the area varies between $18^{o}C$ to $34^{o}C$ with a mean annual rainfall of 1300mm to 3000mm.The major communities in the area include: Agbani, Akpugo-Ndiuno Uwani, Akpugo-Obinagu, Uwani, Akpugo-Ogonogoeji, Ndiagu Akpugo-Ogonogoeji, Ndiuno, Umueze, Amodu, Amuri, Obe, Ozalla, Obuofia, Akegbe-Ugwu, and Akpugo Obuno.

Nkanu west LGA hosts a number of hotels, banks, industries, as well as a number of government and privately owned institutions. The LGA is also popular for the cultivation of a number of crops such as oil palm, cassava, yam, and cocoyam. Trade also flourishes in the LGA with the area hosting several markets where a variety of commodities are bought and sold.

2.2 Sampling Technique

Both purposive and random sampling techniques were employed in the selection of pig farmers in the study area. Six communities where pig farming activities are very large and active were purposively selected for the study. From each community selected, a random sample of 15 pig farmers was selected, making the sample size to be 90 pig farmers.

2.3 Data Collection

Data for the study were collected using structured questionnaire and interview schedule. The construction of the research instrument was based on the study objectives.

2.4 Data Analysis

The data collected were analyzed using both descriptive and inferential statistics. Descriptive statistics such as percentages, means, tables, etc were employed to analyse objectives (i) (ii) and (iv). Enterprise budget and profitability ratios were employed to realize objective (iii). The hypothesis was tested using the multiple regression analysis.

The multiple regression model was expressed implicitly as:

$$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8)$$

Explicitly expressed as:

$$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + e_i$$

Where,

Y = Profit (naira)

X_1 = Age (years)

X_2 = Sex (male1 and female 0)

X_3 = Martial status (married= 4, single = 2, widower =1 divorced = 0)

X_4 = Household size (total number of persons living with the farmer)

X_5 = Religion (Christian 1; ATR 2; Islam 3)

X_6 = Level of education (Number of years spent in school)

X_7 = Farming experience (Years)

X_8 = Access to credit (Yes = 1, No =0)

Where Y is the dependent variable

$b_1, b_2........b_n$ are coefficients

e is the error term

3.0 Results and Discussion

The result of the socio-economic characteristics of pig farmers as presented in table 1 shows that majority of the pig farmers in Nkanu West L.G.A. (81.1%) are males

Table 1: Percentage distribution of pig farmers according to socio-economic characteristics

Parameter	Frequency (N=90)	Percentage	Mean
Gender			
Male	73	81.1	
Female	17	18.9	
Age			
19 – 29	22	24.4	
30 – 39	26	28.9	38
40 – 49	33	36.7	
≥ 50	9	10.0	
Marital status			
Single	25	27.8	
Married	65	72.2	
Household size			
≤ 5	22	24.4	
6 – 10	42	46.7	8
≥ 11	26	28.9	
Educational status			
No formal Education	14	15.5	
Primary Education	34	37.8	
Secondary Education	35	38.9	
Tertiary Education	7	7.8	
Religion			
Christianity	65	72.2	
Traditionalist	25	27.8	
Source of capital			
Personal savings	25	27.8	
Cooperatives	38	42.2	
Banks	5	5.6	
Family	20	22.2	
Govt. /Agencies	2	2.2	
Sources of Labour			
Family labour	25	27.8	
Hired Labour	30	33.3	
Both	35	38.9	

Source : Field data 2023

The mean age of the pig farmers is 38 years indicating that pig production in the study area is dominated by active farmers who were within the age bracket of 40 – 49 years. The study further revealed that about 72.3 % of the farmers are married with a mean household size of 8. About 84.5% of them can at least read and write with most of them (38.9%) having secondary education. The main source of capital for the farmers is through cooperative societies (42.2%) with most of them (38.9 %) using both family and hired labour in pig production. Pig production in the area is dominated by Christians who collectively constitute 72.2%.

Table 2 shows the breeds of pigs kept or grown by farmers in Nkanu-west L.G.A of Enugu State.

Table: 2. Percentage distribution of pig Farmers according to the breeds of Pigs kept

Breeds of pigs	Frequency	Percentage
Large White	31	34.4
Duroc Jersey	19	21.1
West African Dwarf pig	12	13.3
Land Race	17	19.0
Large Black	11	12.2

According to the table, 34.4% of the pig farmers, who are in the majority, grow Large White. About 21.1% grow Duroc Jersey, this is followed closely by those who grow land race (19.0%). Most of the pig farmers claim that the breeds of pigs listed in table 2, are suitable for the area since the pigs are high yielding and can withstand the environmental conditions of the area. They equally agree that the breeds do better than most of the local breeds in all comparable ways. These findings support the earlier works of Osundu et.al. (2014) and Ezibe (2010), that Large White and Duroc Jercey are the two major breeds that are mostly grown in the southeast ecological zone.

The data on table 3 shows the number of pigs kept or grown per production cycle by pig farmers in Nkanu-West L.G.A. of Enugu State.

Table 3. Percentage distribution of pig Farmers according to the number of Pigs kept

Average number of pigs grown by farmers per production cycle	Frequency	Percentage	Mean
20	12	13.3	
21 - 40	40	44.4	
41 - 60	19	21.1	43
61 - 80	10	11.0	
81 - 100	7	8.0	
>101	2	2.2	

Source: Field data 2023

According to the table, the mean number of pigs kept per person is 43 pigs per cycle. Specifically, most of the farmers (44.4%), keep about 21 to 40 pigs per cycle. About 21.1% of the farmers keep 41 to 60 pigs per cycle. Only 2.2% of the farmers keep over 101 pigs per cycle. The low number of pigs kept by the pig farmers clearly shows that pig production in the area is still at the small scale level. These findings are in agreement with Osondu et.al. (2014), Oguniyi and Omoteso (2011) and Adetunji (2012), that most pig farmers in Nigeria are small scale famers.

Table 4 shows the average fixed cost of pig farmers who keep about 43 pigs per production cycle.

Table 4 : Average Fixed Cost of Pig Farmers

Items	Qty	Unit cost (₦)	Total cost (₦)	Useful life (years)	Salvage Value (₦)	Depreciation (₦)
Pig House	1	700,000	700,000	20	150,000	27,500
Shovel	2	1,500	3,000	5	1000	400
Bucket	4	2,500	10,000	5	1600	1680
Broom	5	200	1000	0.5	-	-
Head pan	3	4,000	12,000	5	1200	2160
Barrow	1	20,000	20,000	10	3000	1700
Safety wears	2	4,000	8,000	2	-	-
Basin	6	700	4,200	2	-	-
Boot	2	3,000	6,000	3	-	-
Trough	5	500	2500	3	500	400
Total						33,840

Source: Field data, 2023

Data provided on the Table shows that the pig house (₦700,000) , with a depreciation value of (₦ 27,000) constitute the major fixed cost incurred by the farmer. The total depreciated value is ₦ 33,840

Table 5: Average Variable Cost of Pig farmers

S/no	Items	Unit cost (₦)	Qty	Total cost (₦)
	Feed	7,500	50	375,000
	Water	10,000	10	100,000
	Labour	15,000	2	360,000
	Veterinary services / drugs			50,000
	Chemicals			50,000
	Power		-	20,000
	Taxes and Levies			20,000
	Essential services			100,000
	Total			1,075,000

Source: Field data 2023

The average variable cost of pig farmers who keep an average of 43pigs per cycle is shown in table 5. According to the table, the costs of feed (₦ 375,000) and labour (₦ 360,000) constitute the two major variable cost incurred by the pig farmer. Other important variable cost items are water and essential services that are ₦ 100,000 each. This finding is in line with that of Adesehinwa and Ogunmodele (2005) that cost of feed is one major cost item incurred in pig production.

Revenue

On the average, the cost of a fully grown pig is ₦ 60,000.00

Revenue realized after selling 43 fully grown pigs is ₦ 60,000.00 x 43 = ₦ 2,580,000.00

Revenue from pig waste = ₦ 40,000.00

Total Revenue (TR) = ₦ 2,620,000.00

Total Cost (TC) = Total Fixed Cost (TFC) + Total Variable Cost (TVC) = 33,840.00 + 1,075,000.00 = 1,108,840.00

Gross Margin (GM) = Total Revenue (TR) – Total Variable Cost (TVC) = 2,620,000.00 - 1,075,000.00 = 1,545,000.00

Net Farm Income (NFI) = Gross Margin (GM) – Total Fixed Cost (TFC) = 1,545,000.00 – 33,840.00 = 1,511,160.00

Profit Margin (%) = $\dfrac{NFI}{TR}$

= $\dfrac{1,511,160.00}{2,620,000.00}$

= 0.58 = 58%

Return per Naira outlay (₦) = $\dfrac{NFI}{TC}$

= $\dfrac{1,511160}{1,108,840}$

= 1.36

Operating Expense Ratio (%) = $\dfrac{TVC}{TR}$

= $\dfrac{1,075,000}{2,620,000}$

= 0.41 = 41%

Benefit Cost Ratio (BCR) = $\dfrac{TR}{TC}$

= $\dfrac{2,620,000}{1,108,840}$ = 2.36

From the analysis done, the pig production enterprise generated a gross margin of ₦ 1,545,000.00, which indicates a huge benefit. Further analysis on the profitability gives a net farm income of ₦ 1,511,160.00 and a profit margin of 0.58, suggesting that the enterprise is able to convert 58% of the generated revenue into profit. According to the analysis, the return per naira invested in pig production is 1.36, which means that each pig producer earns 136% profit on every naira utilized in production or that the pig farmer makes ₦ 1.36 for every Naira outlay in pig production. The investment is profitable because it increases at the rate of 1.36 times. The operating Expense ratio of 0.41 implies that variable cost consumed about 41% of the generated revenue. The analysis shows a benefit cost ratio of 2.36 and this by implication means that for every ₦ 1 committed in pig production, ₦ 2.36 is realized. Based on the profitability analysis, the findings infer that pig production is a profitable venture in Nkanu-West L.G.A. of Enugu State. These findings are in complete agreement with the works of Adetunji and Adeyemo (2012) and Ezibe (2010) who asserted that pig production is a profitable venture when managed efficiently.

Table: 6. Rank distribution of pig Farmers according to major problems faced

Problems of pig farmers	Rank
High cost of feeds	1st
Diseases and pests	2nd
Poor credit facilities	3rd
Lack of improved breeds	4th
High cost of tax, rates and fines	5th
High cost of available breeds	6th
Shortage of Vets and high cost of drugs	7th

Source: Field data 2023

Table 6 shows the rank distribution of pig farmers according to the major problems faced in pig production. From the table, high cost of feeds ranked first among the major problems pig farmers face in Nkanu-west L.G.A. Diseases and pests ranked second among the major problems faced by the pig farmers in the study area. The third major problem faced by the farmers in the study area is poor credit facilities. Lack of improved breeds, high cost of tax, rates and fines, high cost of available breeds and shortage of Vets & high cost of drugs ranked 4th, 5th, 6th, and 7th respectively among the major problems pig farmers face in Nkanu-west L.G.A. of Enugu state.

Table: 7 Summary of Regression Results

		LINEAR	SEMI LOG	DOUBLE LOG	EXPONENTIAL
Constant		302662	176014	5.342	5.491
		(1.943)	(.340)	(12.5260)***	(42.505)***
Age	X_1	4653	138895	.159	.004
		(1.160)	(.382)	(.528)	(1.310)
Sex	X_2	44619	126623	.145	.039
		(1.193)	(.361)	(.501)	(1.272)
Marital Status	X_3	-18828	-53986	-.007	-.009
		(-1.142)	(-.642)	(-.102)	(-.622)
Household Size	X_4	6274	-8807	.012	-.003
		(3.556)**	(-.078)	(.129)	(-.340)
Religion	X_5	-35168	-100033	-.103	-.034
		(-.984)	(-.788)	(-.983)	(-1.163)
Level Of Education.	X_6	32577	126334	.104	.028
		(2.120)**	(1.612)	(1.601)	(2.173)
Farm. Experience	X_7	154862	191314	.114	.101
		(4.46)***	(1.339)	(.338)	(4.065)**
Access To Credit	X_8	135717	189234	.119	.108
		(3.36)**	(1.132)	(.001)	(3.245)**
R		.720	.308	.292	.463
R^2		.518	.095	.085	.215
F- Ratio		3.043	1.449	1.289	2.767

Figures in parentheses are 't' values,   ***Highly significant at 1%,   **significant at 5%

The data on table 7 shows the results of the regression analyses done using four functional forms of the regression model. The linear model gave the best line of fit and thus, the lead equation, as it has the highest coefficient of multiple determination (R^2 = 51.8%) and the highest number of significant variables. Farming experience was highly significant at 1% and has a positive correlation with the profit. Household sizes, level of education and access to credit were significant at 5% and have positive correlation with profit of the pig farmers. Age and sex have positive correlation while marital status and religion have negative correlation with profit. Age, sex, marital status and religion were not significant. An F-ratio of 3.043 indicates that the socioeconomic variables considered have significant influence on the profit of the pig farmers. However, these variables (independent) accounted for 51.8% of the variations in the profit of the pig farmers.

According to Anukwu and Ebong (2011) and Ezibe, (2010), experience, credit and level of education are very important variables in pig production and when utilized effectively, have significant and positive correlation with profit.

4.0 Conclusion

Pig production in Nkanu-west L.G.A. of Enugu state is a very profitable venture, with a profit margin of 58% and a benefit-cost ratio (BCR) of 2.36, intending pig farmers should be courageous enough to join the lucrative business. However, efforts should be put in place to provide improved breeds of pigs as the economic benefits cannot be quantified. Most of the pig farmers in the area are small scaled farmers because they lack the necessary credit for expansion. Cost of feed and labour are the two major cost items in pig produc-

tion.

5.0 Recommendation

Easy access to credit will enhance pig productivity in the area. Joining of cooperative societies will go a long way towards alleviating the financial constraints faced by the farmers. Pig farmers should at all times, arm themselves with the latest scientific and technological discoveries in pig production in terms of breeds, feeds and other animal husbandry techniques that are suitable and conducive in their environment.

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