

# Pig Farmers' Socioeconomic Characteristics as Determinant to Pig Production and Profitability in the Tropics

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## ABSTRACT

Socioeconomic characteristics of pig farmers as determinants to their production and profitability in Imo State of Nigeria were studied. The specific Objectives will be to; describe the socioeconomic characteristics of pig farmers, identify the pig production systems in the study area; determined the effect of socioeconomic characteristics of pig farmers on their profit; estimate the costs and returns in pig production; identify and analyze the constraints to pig production in the study area. Multi-stage random sampling technique will be used to ninety (90) pig farmers for detail study. The information used for this study were derived from structured questionnaire and secondary sources from conferences papers, seminar, journals, published and unpublished thesis and workshop.. The objectives i, ii and vi were captured using percentage response and frequency distribution table. The objective iii and iv were addressed using Gross margin analysis and Cobb Douglas production function respectively. The result of the socioeconomic characteristics were the sampled farmers were males, aged, educated, used more of family labour, large household size and experienced, most pig farmers engaged in intensive rearing and the least was use of extensive method and most farmers were into Farrow to finish enterprises, while the least was animal breeding. The results of Cobb Douglas production function that had positive relation to pig farming profitability were piglet type, rearing experience, membership of organization and cost of medication. The pig farmers in the study

area were operating in stage 1 (irrational stage), which is not at optimum scale of their production, as they had return scale, 3.0141 which is greater than unitary. Pig production was profitable in the study area with gross revenue was ₦740, 000 per sampled farmer and Net farm income of ₦334, 542. The limiting factors to pig production in the study area were high cost of feed, high cost of housing, problems of marketing of the products, high cost of labour and poor access to credit Among the recommendations proffered were the need to enhance farmers access to credit through commercial banks, motivation of extension agent through paying them their local transportation incurred while discharging their duties is very import and ensure that farmers have access to genuine drugs

**Key word;** Socioeconomic Characteristics; Pig Farmers; Determinant; Pig Production; Profitability

## INTRODUCTION

In many countries in sub-Saharan Africa, hunger and malnutrition as result of deficit in animal protein intake are prevalent by significant proportion of the rural population and this scenario is well documented in many literatures (Ajala, et al;2007; Food Agriculture Organization, FAO, 2008, Ume, *et al*; 2019). For instance, the daily animal protein intake in many rural area of Nigeria was 38 grams per caput per day which is below the recommended minimum level of 65 gm per caput per day

by Food Agriculture Organization (FAO). The above scenario has a far-reaching to their health status and chiefly often reported health challenges among literatures are lowly mental capability, labour productivity and depressed national economic growth(FAO, 2008, Ewuziem, *et al*; 2010)

Pig is one of the fastest means of increasing animal protein in order to battle animal protein dearth in the diet of most people in rural areas of the developing Countries. This could be because of intrinsic features possessed by pig including has adaptive characteristics to survive in situations other animals fail to thrive, good utilizers of household waste and by product to fresh meat, high litter size per sow, more efficient carcass yielder than cattle, sheep and goat, high dressing percentage of about 70% compared to 52.5% for cattle and about 50% for sheep and goat and efficient conversion of feed energy to body energy (Okolo, 2011, Osondu, *et al*; 2014). Furthermore, pig carcass has a smaller proportion for bones and higher proportion of edible meat, has high fecundity, high feed conversion efficiency, early maturity, short generation interval and relatively and small space requirement (Steinbach, 1997, Bamiro, *et al*; 2008). However, the important of pig is centrally on its meat (bacon) which is a vital animal protein, source of income and foreign exchange earnings, pigskin and bristle are used in the manufacture of light leather and brushes (John, 2007), pig manure is a valuable fertilizer, its manure can be aerobically digested to produce cooking gas, its' manure could enhance the growth of microorganisms and plants for consumption by aquatic animals (Osondu, *et al*; 2013) source of employment and labour (Umeh, *et al*, 2015). In livestock sector, poultry and pig enterprises have the fastest growth, whereas static or decreasing in most of the developing world (FAO, 2008). The dwindling in pig production which could adversely affect profitability the profitability of the enterprise could be a function of poor quality feeds resulting from unbalanced rations, poor access to veterinary services,

illiteracy of the farmers, poor access to credit to be used in procuring material inputs, poor housing as result of high cost of building materials and as result pigs are at times housed in an improviser (Pond and Manr; 1998; Ume, *et al* 2018). Furthermore, lack of adequate supply of genetically sound breeders, high cost of feed, poor infrastructure facilities, the fear of inadequate market for piggery products and the absent of pig product processing industry in the country (Ewuziem, *et al*, 2008, Getara, 2009, Ume, *et al*; 2017). The above aforementioned problems have the capacity of reducing the pig farmers' production output, leading to reduction in profit margins. In effect, successive governments both in the States and Federal levels have initiated programmes such as the farm settlement scheme, Agricultural Development Programme (ADP), better life program, and microcredit scheme for livestock parent/foundation stock and among others in order to propel animal production but these efforts yielded little dividends (Ironkwe and Amefule, 2008). In effect, lots of farmers have jettisoned the business, thus complicating more the protein intake deficit among the nation citizenry. However, literatures show that adequate pig growth and profitability could be attained through adequate disease control method through proper medication, sufficient feed and feeding (drugs), good breeding selection and good housing practice (Agada, 1991, Ajala, *et al*; 2007). This paper therefore aims at assessing the socioeconomic characteristics of pig farmers as determinant of pig profitability in the study area. This could be helpful, since with proper understanding of the socio- economic characteristics of farmers and attendants involved in swine production, the management options they adopt or have access to and the likely effects on production, be could transcend to profitability, may assist stakeholders and policy makers in being focus the area that needed prompt intervention to enhance on the production and productivity of piggery

enterprise and bridge the protein intake deficit in the menu of most Nigerians particularly in the rural areas. The specific Objectives are to; (i) describe the socioeconomic characteristics of pig farmers, (ii) identify the pig production systems in the study area; (iii) determine the effect of socioeconomic characteristics of pig farmers on their profit; (iv) estimate the costs and returns in pig production; (v) identify and analyze the constraints to pig production in the study area.

## **MATERIALS AND METHODS**

### **The Study Area**

Imo State of Nigeria was studied and the state is located between latitude  $7^{\circ}56''$  and  $6^{\circ}64'N$  of Equator and longitude  $6^{\circ}46'$  and  $5^{\circ}49'E$  of Greenwich Meridian. The state is bounded in the north by Anambra State, in the East by Abia State and in the south and west by Rivers and Imo State respectively. It has rainfall range of 1500-2800mm, temperature of  $26-44^{\circ}C$  and moderate relative humidity of 65%. Imo comprises of twenty seven Local Government Areas (LGAs), many autonomous communities and many villages. It covers an area of  $5100\text{ km}^2$  with population of 3,934 million people (11). The Imo people are mainly farmers and engage in cropping of yam, cassava, maize and cocoyam. The farmers were involved in the rearing of animals such as pig, poultry, goat, sheep, rabbit and snail production. The other economic activities engaged by the farmers were trading, auto mechanics, saloon, civil services and hostelling.

### **Sampling Procedure and Sample Size**

Purposive and multi-stage random sampling techniques were used to select Local Government Areas (LGA), communities, villages and respondents. Firstly, three LGAs noted for pig production because of nearness to three – three (3-3) breweries were purposively selected. The selected LGAs were Okigwe North, Ideato North and Ideato South. Second, three communities out of five were randomly selected from each of the selected LGA.

This brought to a total of nine communities. Third, ten villages were randomly selected from each of the nine communities. This brought to a total of ninety villages. Finally, one farmer each was selected from each of the ninety villages, totaling ninety farmers for detailed study.

### **Method of Data Collection**

The information used for this study was obtained from primary and secondary sources. The primary data was deduced using structured questionnaires and informal or oral interview of respondents. The questionnaires were used to collect information on cost of labour, cost of medication (Drugs, disinfectants and vaccines), years of rearing experience of the farmers, educational level of the farmer, quantity of water in pig production and household size and flock size of the household, access to credit from institutional and non institutional.

### **Method of Data Analysis**

The objectives i, ii and vi were captured using percentage response and frequency distribution table. The objective iii, iv and v were addressed using Gross margin analysis and Cobb Douglas production function and factor analysis respectively.

### **Model Specification**

#### **Cobb Douglas**

The Cobb-Douglas theory of production has provided important framework for the measurement of productivity and employment of factors of production since 1930s. Cobb and Douglas have modelled the growth of output in American manufacturing sector between 1899 and 1922 in which output of goods were determined by combination of two factor inputs, namely labour and capital under the assumption of constant returns to scale production. Cobb-Douglas production function is popularly used in signifying the technological relationship between the quantities of two or more inputs (particularly physical capital and labor) and that of output that can be produced in a

production process. The preference of Cobb-Douglas in both developed and developing countries lie on its use in analyzing various policies in the economic field and for function in different sectors of economy of a country. For instance, it is used in making rational decision on the quantity of each factor inputs to employ so as to minimize the production cost. It's mathematically expressed as:

$$Y = AL\alpha K\beta \quad (1)$$

Where Y = total output, L = units of labour, K = units of capital, and  $\alpha$  and  $\beta$  are elasticity of labour and capital, and A is an efficiency parameter. The parameter A is the efficiency parameter. It serves as an indicator of the state of technology. The higher the value of A, the higher would be the level of output that can be produced by any particular combination of the inputs. The Cobb Douglas production function A, a and b are positive parameters where  $a > 0$ ,  $b > 0$ . The equation describes that productivity depends directly on L and C and that part of output which cannot be explained by L and C are explained by A which is the residual, often called technical change (Hajkova and Hurnik, 2007).

The function was criticized from three fronts by economics scholars, namely on assumption of constant returns to scale which the model built its analysis, on the omission of technical change, thereby having the notion that technology is static within the duration of the study which is not possible in realities (Fraser, 2002). Furthermore, the neoclassical economists criticized the model on the basis that the productivity theory centered more of an pensiveness than a proven.

In Logarithms, the equation is:

$$\log Y = \log X_0 + \log X_1 + \log X_2 + \dots + \log X_n \quad (2)$$

Where;

$X_1$  = Quantity of feed consumed in kilogram,  $X_2$  = Labour ( Mandays),  $X_3$  = Cost of Medication (Drugs, disinfectants and vaccines) (N),  $X_4$  = Years of rearing experience (Years),  $X_5$  = Educational level (Years),  $X_6$  = Quantity of water(Litres),  $X_7$

= Household Size (No),  $X_8$  = Flock Size(No),  $X_9$  = Credit (N)

### Benefit cost Ratio:

This was used to estimate farm net revenue for pig production. Theoretically, net revenue (NR) is the total revenue (TR) less the total cost(TC);

$$NR = TR - TC \quad (3)$$

Total cost is the addition of the entire variable cost(VC) and fixed cost (FC) items;  $TC = TVC + TFC$ ..... (4)

Total revenue is the total amount of money that a farmer received from the sale of stock;

$$TR = \sum P \times Q \quad (5)$$

$$\text{Gross margin (GM)} = TR - TVC \quad (6)$$

$$\text{Net farm income (NFI)} = GM - TFC \quad (7)$$

The rate of return is a performance measure used to measure the amount of return on an investment relative to the investment cost. It is given by:

$$\text{Rate of Returns (ROR)} = NR/TC \quad (8)$$

$$\text{Gross Ratio (GR)} = TC/TR \quad (9)$$

$$\text{Benefit Cost Ratio (BCR)} = TR/TC \quad (10)$$

P = price per pig

Q = quantity of pig sold

Pig production is profitable if its  $BCR \geq 1$ . The higher the BCR, the more profitable the pig production business is. Depreciation was calculated using the straight line method

### Factor analysis

Factor analysis was used to analysis the constraints to pig production in the study area using principal component factor analysis with varimax -rotation with factor loading of 0.3 was used. The constraints to pig production in the study area were categorized into three factors using varimax rotation and factor loading of 0.30. The principal component factor analysis model is stated thus

$$R_1 = Y_{11} M_1 + B_{12} M_2 + \dots + Y_{n1} M_n \quad (11)$$

$$R_2 = Y_{21} M_1 + B_{22} M_2 + \dots + Y_{n2} M_n \quad (12)$$

$$R_3 = Y_{31} M_1 + B_{32} M_2 + \dots + Y_{n3} M_n \quad (13)$$

$$R_n = Y_{n1} M_1 + B_{n2} M_2 + \dots + Y_{nn} M_n \quad (14)$$

**Where;**

$R_1 = c_n$  = observed variable /constraints in pig production pdts

$Y_1 = Y_n$  = Factor loading or correlating coefficients

$M_1 = M_n$  =unobserved underlying challenging factors facing pig production

**RESULTS AND DISCUSSION**

**Socioeconomic Characteristics of the Farmers**

Table 1 shows that 58.9 % of the respondents were more than 41 years and above, whilst 42.1% of them were within the age range of less than 41 years.

**Table 1: Distribution of Respondents According to Socioeconomic Characteristics**

Variable	Frequency	Percentage	Mean
Age			
21- 30	15	27.5	
31 – 40	22	24.4	42
41 – 50	20	22.2	
51 and above	33	36.7	
Educational Level			
Non formal education	15	16.7	
Primary education	25	27.8	
Secondary education	17	18.9	
Tertiary education	8	6.7	
Household size			
1 – 5	18	20	
6 – 10	35	39.9	7.2
11 -16	30	33.4	
17 – 21	7	7.8	
Farming Experience			
1 – 10	20	22.2	
11- 20	56	66.2	
21 and above	14	15.6	11.4
Drug/Vaccine Usage			
Yes	90	100	
No	-	-	
Labour Source			
Family	41	45.6	
Hired	17	18.9	
Communal	6	6.7	
Hired & Family	26	28.9	
Water Usage			
Yes	90	100	
No	-	-	
Rearing Method			
Intensive System	59	65.6	
Semi Intensive	21	23.3	
Extensive	10	11.1	
Enterprises			
Farrow	23	25.6	
Farrow - Finish	40	44.4	
Finishing operation	20	22.2	
Breeding	7	7.8	

Source; Field Survey; 2018

This implied that aged farmers dominated pig production in the study area and this age class is always an embodiment

of knowledge and good manager to handle the business for high profit to accrue (Duniya *et al*; 2013). This finding did not concur with the Rahman, et al; (2008), who reported youth domination in their study area. This farming group is usually innovative and motivational to enhance pig production frontier and high profitability, they observed.

Also, majority of the pig farmers had primary education (27.8%), followed by those that had secondary education (18.7%), while the least, 6.7% had tertiary education . The educational status of the farmers enhances his/her receptivity to innovation, managerial ability and ability to comprehend and assess new production technologies in order to enhance the profitability of the business through improved farm productivity (Ironkwe and Amaefule, 2008). Table 1 shows that 22.2% of the sampled farmers had farming experience of below 11 years, whilst 77.8% had above 11 years. This implied that the farmers in the study area were well experienced in pig production. Ume, *et al*; (2018) remarked that years of rearing experience enables farmers to set a realistic goal and manage their resource prudently to enhance their output, which may possible translate to high profit. Furthermore, all the sampled pig farmers in the study area used drug and vaccine in treatment and prevention of pig production ailment respectively. The major problem in the use of these drugs and vaccines are its scarcity at farm level, substandard drugs and most of the vaccines are not kept in cold chain, thus losing viability. The consequences are high mortality, low productivity and low profitability (Ewuziem, *et al*; 2009)

Table 1 above shows that majority (38.9%) of the respondents had household size of 6-10 persons, while the least (7.8%); 16-20 persons. Larger Farming households with large members of labour age are usually employed in pig production to reduce cost of production emanating from high labour cost with resultant high profit accruing (Ezeibe, 2010). Besides, the table

reveals that 45.6% of the sampled farmers used family labour in pig production, 28.9%; used family and hired labour, while the least, communal labour(6.7%). The use of family labour is peculiar to small scale farmers in sub-Saharan Africa in curtailing high cost of production, which may possibly correlate to high profitability.

Also, all the sampled pig farmers in the study area used water in pig production. Studies revealed that water is the single largest constituent of the body making up of about 82 percent of young pigs and 55% of market hog body weight (Ewuziem, et al, 2010). Nevertheless, Holness, (1999) reported that high concentration of water in the pig manure (86-98%) increases the cost of storage and disposal. In addition, majority (65.6%) of the respondents reared their pigs under intensive system, followed by those that raised their pigs under semi intensive system (23.3%) while the least (11.1%) reared under extensive system of management. Studies showed that rearing

method plays a significant role in swine production as good and efficient housing makes management easier and helped the farmer to successfully rear 85% or more of all the shortest possible time (Pathraja and Oyedipe, 1990).However, pigs reared under extensive management has the following characteristics irregular breed of sow, slow growth, pests and disease infestation, high mortality of piglets, low productivity as result of erratic of seasonal feeding (Getara, et al; 2009). Table 11 shows that most (52.2%) of the respondents engaged in farrow and finish enterprise operation, whilst the least, 22.2% was into finishing operation. The farrow and finish operation needed more facilities than other enterprises and as well more profitable (Pond and Manar, 1998)

### Results of Cobb Douglas Production Function

The Results of Cobb Douglas production function is presented in Table 2

**Table 2.Results of Cobb Douglas Production Function**

Variable	Coefficient	Standard Error	t- value
Age	-0.8924	0.4302	-2.0743**
Piglet Type	0.6591	0.2094	3.1475***
Cost of feed	-0.48632	0.3901	-1.2466*
Rearing Experience	0.6984	0.23345	2.9916**
Cost of Capital	0.5430	0.6590	0.8224
Membership of Organization	0.7998	0.2643	3.0261***
Cost of Medication	1.4390	0.5219	2.7572**
Cost of Water	0.5741	0.6354	0.9035
Flock Size	0.8444	0.4990	1.6921*
Education	0.6691	0.2665	2.5106**
Household Size	0.236	0.0091	25.9340***
Cost of Labour	-0.5591	0.4094	-1.3656*
Constant	0.9032	0.1189	7.5962

Source: Field Survey, 2018

As usual, the coefficient of age of household head was negative to the profitability of pig enterprise and in accord with the finding of Ume, et al.( 2018). The sign identity of the variable could be correlated to diminishing in strength associated with old age in contrary to the strength required in pig production. The effect is that such household head hire labour in accomplishing the pig production activities to the detriment of the farm profit. Additionally, the coefficient of the piglets breed type correlates positive with the

profitability of pig farm at 1% significance level, connoting that piglets with characteristics of having good litter sizes, leanness, muscle, current growth rates, and high feed conversion to pork efficiency has high propensity of giving high profit to piglet that has nature in contrast to the earlier mentioned features (Bamiro, et al; 2008).Also, the coefficient of cost of labour had a negative sign to pig farmers' profit and statistically significant at 5 % significance level. Pig production is labour intensive and only fewer labourers could

offer themselves to work there but at exorbitant prices. The low labourers acceptability could be owing to phobia that pig will bite them and problem of being allergic to odour associated with its production. This result concurred with the finding of Ogunfowona, *et al*; 1990) who reported that pig rearing is strenuous and needed good management to reduce odour associated with its production. Furthermore, the coefficients of rearing experience had a positive association with the farmers' level of profit, signifying that a unit increase in the years of farming household farming experience by one year could result to an increase in the profit by the magnitude of the coefficient. This finding of Mpofu and Makuza, (2003) corresponded to the above assertion. They opined that farmers with many years of experience have more odds of making optimal combination of resources for higher productivity, which may possible translate to high profit. Still, the coefficient of household size was positive in agreement with a priori expectation and statistically significant at 5% alpha level. The implication is that the more the household head has more household members of labour age and available, the more the likelihood of using them to implement pig husbandry management technologies and save the money that could have paid to hired labourers as part of the business profit (Ume, *et al*; 2017). They posited that families with large and mature household members have more odds in carrying out labor intensive technologies associated with pig production, thus relaxing the labor constraints common in agricultural production especially during peak season of the farming season when labour is scarce and expensive

Moreso, the coefficient of cost of feed had indirect relationship with farm profit in pig production at 95% confidence interval. This could connote that the more pig feeds constitute of more of concentrates in contrast to domestic and crop residues, the more outputs but the lesser the likely profit that may accrue as result of high cost

of the resource (concentrates). This finding is in agreement with several studies ( Bama, *et al*; 2004, Rahman, *et al*; 2008, Okolo, 2011) on negative effect of feeding pigs on grains especially in most countries in sub Saharan Africa where grains are scarce in supply and is in serious competition with man, leading to low farm production and meager profit. Additionally, as expected, the coefficient of educational status of the pig farmer was positive, implying that a unit increase in the number of years of schooling by the household head will lead to increase in the profit by a magnitude of the coefficient. The positive sign of the variable could be related to the fact that education impacts into the farmers the aptitude to comprehend and react positively to new and improved innovation in order to boost their production and profit in their farms than their counterpart with lesser educational attainment. Nevertheless, literatures show that educational deficit by the farmers could be counteract with adequate extension delivery system, especially as regards technologies adoption (Rahman, *et al*; 2008). Also, the coefficient of flock size was positive and statistically significant at 10 % alpha level. The sign of the coefficient corresponded with a priori expectation, signifying that the larger the farmers' flock size the higher the propensity of generating higher profit from the sales of the pig. This finding is in agreement with Ume, *et al* (2018) on the study of economics of pig production in Ezza North Local Government Area of Ebonyi State, Nigeria. As well, the coefficient of cost of medication was positive and significant at 5 % alpha level. The result could necessitate that the more pig farmers have access medications such as drugs, disinfectants and vaccines the higher the likelihood of increasing their level of their output and profit generated. In contrary, the finding of FAO, (2008) reported that adulteration and substandard of drugs and vaccines flooding many markets in most developing countries of Africa and as well, high cost of these medications to the reach of farmers could

lead to high mortality of the animal and low profit accruing. Besides, the coefficient of membership of organization was positive to pig profitability in the study area and significant at 1.0 % risk level. This implies that farmers that are members of organizations such as cooperative have higher probability of making more profit than non members. This may possible be explained by the fact that cooperative have ability of inculcating into her members better attitude to innovation adoptions through training and interactions among members and through access to information (Osundu, et al; 2014)

**Production Elasticity and Return to Scale**

The return to scale of the production function is shown in Table 2

The elasticity of production measures the degree of responsiveness of output to changes in inputs. The estimates for the parameters of stochastic frontier production are the direct elasticity of production for the various inputs given the Cobb Douglas specification of the model.

The value of the return to scale of pig production in the study area was 3.0141. This figure is greater than unity, indicating increasing return to scale. This implies that the farmers were operating in stage 1 (irrational stage), which is not at optimum scale of their production. Therefore, the farmers need to inject more inputs or resources into their production in order to propel their outputs.

**Table 2: Production Elasticity and Return to Scale**

Variable	Elasticity
Piglet Type	0.6591
Cost of feed	-0.48632
Cost of Capital	0.5430
Cost of Medication	1.4390
Cost of Water	0.5741
Flock Size	0.8444
Cost of Labour	-0.5591
Return to Scale	3.0141

Source; Field Survey; 2018

**Costs and Returns in Pig Production**

Table 3 showed that the average total cost of production incurred by the respondents was ₦101,810.

**Table3. Costs and Returns for 10 Pigs for 8 Months**

. Item	Unit	Quantity	Unit price	Cost/ value	Percentage
Returns					
Sales of manure	bag	120	350	42,000	
Sales of live pigs	No	10	70,000	700,000	
Total			12350	742,000	
Variable					
Cost of apiglet	No	10	7,000	70,000	17.2
Cost of labour	Manday	1	5000	40,000	9.8
Cost of Medication				6,000	1.5
Cost of Feed	Kg			230,458	56.6
Cost of Water	Tanker load	4	6,000	24,000	5.9
Miscellaneous				13000	3.2
Total Variable Cost (TVC)				383,458	94.1
Total Fixed Cost				24,000	5.9
Grand Total				407,458	
Net Farm Income (TR – TR)				334, 542	
Rate of Return of Investment (TC/TR)				55%	
Benefit – Cost Ratio (TR/TC)				1:1.8	
Gross Margin (TR –TVC)				356542	
Gross Margin Ratio				; 0.40	

Source; Field Survey; 2018

The total cost comprises of the variable and fixed costs and from the table, the variable cost represents 86% of the total costs of production, while fixed costs accounted for 5.29%. Additionally, feed cost represents 50.5%, labour cost; 28.97%, while the cost of drugs, disinfectants and vaccines represent; 6.83%. The average

gross revenue was ₦444, 000 per respondent. The average gross margin per respondent was ₦350, 330. The average Net farm income per respondent was ₦342, 190. Therefore, the average Net farm income per pig was ₦19, 010. 6. This indicated that pig production is a profitable venture. Table shows that the total cost of production,



which comprise of total variable cost and total fixed cost for ten (10) pigs in the study area was ₦ 383,458

The total variable costs signify 86% of the total costs of production, while fixed costs accounted for 94.1%. In addition, feed cost represented 56.6% of total cost of production, followed by cost of piglets; 17.2%, while the least was cost of medication, 1.5%. The high cost of pig feeds could be related to competition of the same ingredients with humans for consumption. The low cost of medication may perhaps be ascribed to most of the poor resource farmers' use of Indigenous Known Technologies (IKT) owing to high costs and their substandard as commonly seen in African Markets (Okolo, 2011). The average gross revenue was ₦740, 000 per sampled farmer with Net farm income of ₦334, 542.

The rate of return on investment in pig production was 55%, implying that for every ₦1.00 invested, 54K is gained. The result of the Benefit-Cost Ratio (B C R) shows that pig production is a profitable business, as it is greater than 1. The same thing applied to gross margin ratio (G M R). The expense structure ratio (E S R) results also indicated that pig production has good financial strength. Conclusively, the various profitability ratio techniques used to analysis, revealed that the business is profitable. .

### Varimax-Rotated Factors Against pig production

Table 4, three factors were taken out based on the reaction of the respondents to the questionnaire issued to them,

**Table 4 Varimax-Rotated Factors Against pig production in the Study Area.**

Variable	Factor 1	Factor 2	Factor 3
Feed	-0.115	0.312	0.171
Poor breed	0.216	0.320*	0.003
Housing	0.236	0.093	0.339
Marketing of products	-0.308	0.414	-0.367
Lack of capital	0.346*	-0.137	0.212
High labour cost	0.232	0.329*	-0.119
Poor extension contact	0.318*	-0.028	0.140
Disease	0.122	-0.304	0.322*
Veterinary posts	0.007	0.128	0.349*
Inadequate equipment	0.307	0.190	0.326*
Lack of drugs	0.118	0.439*	0.127

Source: computed from SAS 2018.

Factor 1 = economic/institutional factor, Factor 2 = infrastructural factor and Factor 3 = socio-financial factor (Ikani and Dafwang, 1995). Only variables with factor loading of 0.30 and above at 10% overlapping variance were used in naming the factors. The factor loading of less than 0.30 and variables that loaded more than one factor were discarded. The variables that loaded more than one factor like inadequate equipment and marketing of product were revealed. In identification of the factors, Ume, *et al*; (2018) opined that each factor is assigned a value considering their disposition. The limitations underneath the economic /institutional factor include Capital problem (0.346) and poor access to extension services (0.318). The problem of poor access to credit has been a bane to agricultural development in Nigeria and this could be correlated to lack of collaterals, high interest rates, short-term repayment and ignorance of loan source by the farming population (Ume, *et al*; 2018). In addition the problem of poor extension services to most pig farmers could be associated to high extension – farmers ratio, lack of technological information in pig farming and inadequate incentives to the change agents (Ezeibe, 2010)

Variables that loaded under factor 2 (infrastructural factor) include; high cost of labour(0.329), feed (0.312), disease (0.304), and drug (0.439). The high cost of labour has resulted in as asserted by Okolo, ( 2011) high cost of production and as well reduction in their flock size as most poor resource farmers resort to use of family labour in their pig business.

Additionally, high cost of feed especially those of commercial ingredients and in this situation, farmers particularly poor resource ones are forced to use domestic or local food ingredients available to them to feed their pigs with resultants of stunted growth (Duniya, *et al*; 2013). Besides, high cost of medicines (drug) and vaccines, poor knowledge of the use of these medications and inaccessibility of these medicals at the

farm level by the farmers have resulted most farmers jettison their farms because of low productivity to other economic activities as farm proceeds cannot longer sustain them (Ume, *et al*; 2019). As well, use of poor breeds of pigs in most pig producing societies in developing countries still use local breeds of pigs, with the reasons of their being tolerant to adverse weather condition, low cost of piglets, tolerant to pest and diseases, hardy in nature and could be reared with low inputs through extensive rearing (Bama, *et al*; 2008).

The variables under socio-financial factors were housing (0.339), disease (0.322) and veterinary post (0.349). Problem of poor housing has resulted in environmental pollution to both immediate and surrounding environment with proliferation of odour, flies and rodents. For instance in most rural areas,, pigs are housed in incomplete residence, near to living houses and local materials such as bamboos to that effect that most a times pigs are unrestrained and cause damages to households' economic things and his environment ( Ajala, *et al*; 2007). The poor access to veterinary posts in most rural areas, has compelled most farmers to undergo self medication of which they are not knowledgeable enough and as well go for the services of the quacks, leading to total or partly annihilation of considerable number of the farmers' flocks (Agada, 1991). In addition, disease like brucellosis, Africa swine fever, dysentery and coccidiosis may possibly lead to high mortality rate in pig production particularly to piglets (Adesehinwa, *et al*; 2003).

## CONCLUSION AND RECOMMENDATION

### Conclusion

Based on the findings, the following conclusion were drawn

The result of the socioeconomic characteristics showed that most of the respondents were males, aged, educated, used more of family labour, large household size and experienced, most pig farmers

engaged in intensive rearing and in farrow to finish enterprises. In addition, the following factor affected pig farming profitability in the study area were piglet type, rearing experience, membership of organization, cost of medication, flock size, household size and educational level. As well, the limiting factors to pig production in the study area were high cost of feed, high cost of housing, problems of marketing of the products, high cost of labour, poor access to credit and poor extension contact.

### Recommendation

The following recommendations were construed;

Farmers' level of education should be enhanced through adult education, workshops and seminars. Also, new and old farmers could be encouraged to stay in pig business through provision of improved breeds to boost their productivity, In addition, pig farmers should be encouraged to form or join cooperatives for ease of access pig material inputs such as feed, veterinary drug and vaccines. As well, households with large family size are encouraged to use them as source of labour in order to curtail cost of production.

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