PROFITABILITY AND DETERMINANTS OF PIG (*Sus Scrofa*) PRODUCTION IN ANAMBRA STATE, NIGERIA

[1]Uloh, EV, [2]Ano, K U , [2]Ivoke, G E and [2]Okonkwo, IE
[1]Federal College of Education. Eha-Amufu, IsiuzoLGA of Enugu State, Nigeria.
[2]Department of Agricultural Extension and Management. Federal College of Agriculture, Ishiagu, Ivo Local Government Area of Ebonyi State, Nigeria
Corresponding umesmilesi@gmail.com

ABSTRACT
Profitability and determinants of pig (Sus scrofa) production in Anambra State, Nigeria, were studied. A multistage random sampling technique was used to select sixty (60) respondents for the study. A questionnaire and an oral interview schedule were used to collect primary data. Percentage response, budgetary analysis, and multiple regression models were used to address the study's objectives. Most of the respondents were aged members of the organization with moderate years of experience and were mostly educated. *Also, pig production in the study area was profitable with gross revenue, gross margin, and net farm income of ₦820,000, ₦5468,542 and ₦468,542, respectively. The return per investment was 1.8. T*he determinants of pig farmers' output were rearing experience (1.008), extension services (1.337), membership of organization (3.120), and herd size (3.106). Also, the major constraints to pig production in the study area were a lack of capital, pests and diseases, access to extension services, high cost of labour and poor road network. *The need to enhance farmers' access to credit facilities, good road network and access to extension services was recommended.*
Keyword: Profitability, Determinant, Pig, Production, Anambra State, Nigeria

INTRODUCTION
Agriculture is crucial in the economy of most countries, as it plays significant roles in food security and poverty alleviation of the citizenry, provision of employment, enhancing nations' total gross domestic product (GDP) and labour force (FAO,2020). In the livestock subsector of agriculture, pig production is gaining prominence (Tewe, Ogodgo and Adesehinwa, 2009; Abiola *et al,* 2015). The roles of pig production in economic development are well acknowledged (Ajala and Osuhor, 2004; Bamiro, 2008; Okolo, 2011). Pig is a vital source of animal protein, income, employment labour, manure, foreign exchange earnings, cooking gas through the manure and pigskin and bristle are used in the manufacture of light leather and brushes (John, 2011, Okolo, 2011, Ezeibe, 2010). Pigs are raised through extensive, intensive and semi-intensive systems in most localities in the tropics (Osondu, Ijioma, Anyiro and Obike, 2014).

Pig is endeared to the farmers through possession of certain inherent characters not limited to display a unique ability to adapt and survive in areas where they are found, high survival rate and high prolificacy (having 10-15 piglets per litter and ability to farrow two times per annum) (FAO, 2022, Rahman et al; 2008, Ewuziem, et al; 2008), thus making its production more economically viable compared to other farm animals.

Despite the inherent features, economic and nutritional qualities of pig, the production in Nigeria is relatively low compare to other livestock. For instance, in the year 2020, pig production was 7.1 million compared to that of poultry (chicken), goat, sheep and cattle, which are 145 million, 72.5 million, 41.3 million and 19.5 million, respectively (Okolo, 2011; Ume, Jiwuba, Okoronkwo and Okechukwu, 2018; Adetunji and Adeyemo, 2012). It is imperative to note that pig farmers in the study area are not getting maximum returns from the resources committed to their enterprise, leading to a decline in per capita food production. In effect, there is an urban drift of able-bodied farmers seeking white-collar jobs.

The low production of the animal may perhaps be linked to poor quality feeds, poor access to veterinary services, illiteracy of the farmers, diseases and pest poor access to credit, poor housing, poor breeds, high cost of feed, poor infrastructure facilities, poor market for piggery products and the absent of pig product processing industry (Dietze, 2011; Duniya, Akpoko, Oyakhilomen, Nandi, 2013). However, scanty of literature have opined low productivity in livestock, notably broiler could be correlated to socioeconomic factors of the farmers. Among the factors according to Onyekuru et al; (2020) are age of the farmers, rearing, membership of cooperative society, farm size, cost of labour and educational level. In Anambra State, pig production is commonly because of among, the ever growing of acceptability of pork and many agro processing industries who's by products could serve as feed to the animal(Okolo, 2011). Therefore, there is need to access the farmers' socioeconomic characteristics as it affects their performance in farming and their productivity in terms of profit accruing from their production. Available literature show that limited researches were conducted along profitability and its determinants in pig enterprise . This could tend to fill this literature gap in the study area. This study is imperative as information obtained could aid in among reference for further research work and as source of research information for scholars for further studies in related subjects. The specific objectives are to;

i. describe the socio-economic characteristic of pig farmers ;
ii. estimate the costs and return in pig production,
iii. access the determinants to pig farmers' output and
iv. identify the limiting factors to pig production in the study

METHODOLOGY

Anambra State is in the South East Agro ecological zone of Nigeria is located between latitude 5038 'N and 6047 'E of Equator and longitude 6036 'N and 7021 'E of the Greenwich Meridian. The state is bounded in the east by Enugu State, in the West by Delta State, in the South by Imo State and in the North by Kogi State. Anambra State has Awka as its capital, with a population of 4.184 million people (National Population Commission (NPC), 2006). Anambra State has an annual rainfall range of 1600-1700 mm and an average temperature of 27 °C. Anambra State comprises four agricultural zones: Onitsha, Aguata, Otuocha and Awka. The inhabitants of the state are into crops and animal production such as pigs goat etc. The off-farm employment opportunities in the state are trading, hair dressing, vulcanizing and tailoring.

Purposive and multi-stage random sampling techniques were used to select zones, blocks, cycles and respondents. First, two agricultural zones were purposively selected from the four zones because of intensity of pig production in the areas. The selected zones were the Anambra and Aguata zones. Second, three blocks were randomly selected from each of the selected zones. This brought to the total of six blocks. Thirdly, ten circles were randomly selected from each of the six blocks, for a total of 60. Finally, one respondent was selected from each of the sixty circles. These brought to the total of sixty farmers for detailed study.

A structural questionnaire and oral interview were used to collect primary data. The descriptive statistics, budgetary analysis, and multiple regressions model were used to achieve the stated specific objectives.

Model Specification

The budgetary analysis

Gross margin analysis is the difference between the total revenue (TR) and the total variable cost (TVC)

G.M. = TR – TVC……..…… (1)

i.e. G.M = $\sum_{1-1}^{n} P_1 Q_1 - \sum_{j-i}^{m} r_i x_i$ …….. (2)

The net farm income can be calculated by gross margin less fixed input. The net farm income can be expressed as thus:

NFI = $\sum_{1-1}^{n} P_1 Q_1 - \left[\left(\sum_{j-i}^{m} r_i x_i \right) + k \right]$ ……. (3)

Where:

GM = Gross margin (₦), NFI = Net farm income (₦), P_1 = Market (unit) price of output (₦), Q = Quantity of pork (N), r_i = Unit price of the variable input (kg), Xi = quantity of the variable input (kg), K = Annual fixed cost (depreciation) (₦), i = 1 2 3 …….. n, j = 1 2 3 ……..m

Multiple regression model

Multiple regression model would be specified as follows:

$Y = \beta o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \mu$ …… (1)

Where Y is Output (Kg). X_1 = Age (years), X_2 = Educational Level (years), X_3 = Access to extension services (Access ; 1, non access 0), X_4 = Rearing experience(Years), X_5 = Farm Size(ha), μ is error term, and β is coefficient of explanatory variables.

Four functional forms (linear, double log, semi;log and exponential functions) of production function were tried. The choice of the best functional form was based on the magnitude of the R^2 value, the high number of significance, size and signs of the regression coefficients as they conform to *a priori expectation*.

RESULTS AND DISCUSSION

Farmers' socioeconomic Characteristics

The farmers' socioeconomic characteristics considered were age of the farmers, educational level, extension services, farm size, rearing experience and membership of organization, is shown in Table 1

Table 1: Distribution of Respondents According to Socioeconomic Characteristics

Variable	Frequency	Percentages
Age		
30 – 40	15	25.00
41 – 50	22	36.67
51 -61	17	28.33
62 -72	6	10
Educational Level		
No formal	5	8.33
Primary	7	11.67
Secondary	27	37
Tertiary	21	35
Access to extension service		
Yes	10	16.67
No	50	83.33
Farm Size		
Less than 20	41	68.33
20 – 30	10	16.67
31 – 41	6	10.00
42 and above	3	5.00
Rearing Experience		
1 – 10	3	5.00
11 - 20	8	13.33
21 years and above	49	81. 67
Organization		
Member	40	66.67
Non- member	20	33.33

Source; Field Survey, 2025

Table 1 shows that 61.67% of the respondents were below 40 years and dominated pig farming , in the study area, while 38.33% were above 40 years old. Age plays significant impact in pig farming, mainly where the animal is reared under nearly zero mechanized condition, hence needed able-bodied individuals to accomplish its husbandry for good animal welfare and clean environment devoid of odour (Osondu, *et al;* 2014). Also, Table 1 shows that most (91.67%) of the respondents had formal education, while 8.33% had not. The educational status of the farmers enhances his/her information search and ability to understand and evaluate new pig production in order to improve their production (Ajala and Osunhor, 2004). Further, the majority (83.33%) of the sampled farmers had no access to extension services, while 16.67% had access. Extension services aid in disseminating improved pig production innovations to farmers to enhance their output through increased productivity (Bamiro, 2008).

Moreover, the majority (68.3%) of respondents had farm sizes of less than 20 pigs, while the least (5%) had farm sizes of 42 or more. This result aligns with the a priori knowledge that farmers in most developing countries are largely small-scale operations. The capital and labour intensiveness of the enterprise made it less suited to poor resource farmers (Ume, Onwujiariri and Nnadozie, 2020). Moreover, the majority (81.7%) of the sampled pig farmers had rearing experience above 21 years, while the least, (5%) had rearing experience of 1 – 10 years. Farmers who have long years of farming experience could set a more realistic target than novices in the vocation(Ajayi, 2005). Besides, 66.67% of the respondents were members of an organization, while 33.33% were not. Farmers who belong to an organization have access to inputs subsidized price, hence improving farmers' output (Ume, *et al*; 2020).

Costs and Return for 10 Pigs for 6 Months

The costs and return for 10 pigs for 6 months is shown in Table 2

Table 2 ;Costs and Return for 10 Pigs for 6 Months

Item	Quantity	Unit Cost	Total Cost	Percentage
Return				
Sales of manure	70bags (100kg bag)	1000	70,000	
Sales of pig	10	75,000	750,000	
Total			820,000	
Variable				
Cost of piglet	10	25000	250,000	64.9
Cost of labour	1	10,000	80,000	20.8
Medication			60,000	15.6
Cost of Feed			225,458	58.5
Cost of Water	4 Motor Tanker	12, 000	48, 000	12.5
Miscellaneous			30,000	7.9
TVC			351,458	91.2
TFC			34,000	8.9
Grand Total			385,458	
N F I			434, 542	
Gross Margin			468,542	
Return on Investment			1:1.8	

Source; Field Survey, 2025

Table 2 shows that the average total cost of production of 10 piglets to table size at about seven months by the respondents were ₦ 385,458. The total cost comprises the variable and fixed costs. From the table, variable costs accounted for 91.2% of total production costs, while fixed costs accounted for 8.9%. Additionally, among the variable costs considered, the cost of improved piglets was the highest, accounting for about 64.2% of total production costs. The high cost of improved piglets could be related to the dearth of farms of improved pigs for sale in the study area; in effect, the few available ones are costlier to procure. This was followed by the high feed cost (58.5%). The high cost of feed and feeding materials such as grains for feeding pigs could be related to the competition with man and other livestock (Ume*, et al*; 2018). The gross revenue was ₦820,000, gross margin was ₦5468,542, and Net farm income was ₦468,542. The ratio of returns to total expenses (return per naira invested) was 1.8. This implies that for every ₦ 1 expended, there is a return of ₦ 1.8 to the enterprise. This finding agrees with Ume *et al* (2020), who found 1.7 in their study. Therefore, from all measuring indices, pig production is profitable as they were all positive.

Farmers' Socio-economic Characteristics on their Output

The effects of farmers' socio-economic characteristics on their output are shown in Table 3.

Table 3. Farmers' Socio-economic Characteristics on their Output

Variables	+Cobb Douglas	Exponential	Linear	Semi Log
Constant	17.339	12.007	10.009	16.002
	(8.311)***	(6.809)***	(4.003)***	(5.117)***
Age	-2.181	-2.590	-0.338	-7.500
	(-4.336)***	(-0.522)	(-1.011)*	(-1.548)
Educational Level	-13.009	-6.604	-0.711	-0.501
	(-0.227)	(3.444)***	(-2.116)**	(-0.077)
Rearing experience	0.510	0.277	0.0185	3.890
	(1.008)*	(3.409)***	(6.773)***	(3.004)***
Farm size	0.043	-0.444	0.047	7.338
	(3.106)***	(-0.008)	(0.661)	(5.588)***
Organization	9.021	-0.775	0.331	12.809
	(3.120)*	(-0.335)	(-0.600)	(4.336)***
Extension Services	3.001	0.098	0.4789	6.400
	(1.337)*	(-3.012)***	(5.457)***	(-0.2528)
R^2	0.9004	0.704	0.8801	0.8632
F-value	15.234***	8.337***	6.986***	12.387**

Source: Field Survey, (2025)

***, ** and *** implies significance at 10%, 5% and 1% respectively**

The figure in parentheses is the t-ratio

Based on the statistical and econometric criteria, the Cobb-Douglas production function was chosen as the lead equation. The coefficient of determination (R^2) was 0.9004, implying that 90.04% of the variation in the output of the pig farmers was accounted for by various inputs included in the model. In comparison, the remaining 9.96% were due to error. The coefficient of age was negative and significant at 1% probability level. This relationship could imply that youthful farmers dominated the study area. This class of farmers often has attributes, including having formal education than the aged, hence could access information easily to boost their production feast (Ajala and Osunhor, 2004). However, the finding of Ajayi, (2008) had positive sign to the coefficient off age. He attributed that to long years of experience gained by aged farmers, which could propel their farm output.

Also, the coefficient of rearing experience was positive and significant at the 10 % of alpha level. Studies show that pig farmers with long years of rearing experience are often have efficient resources as relates to technical and allocative efficiency with resultant high productivity and net farm income (Ewuziem, Onyenobi, and Dionkwe, 2008). The above assertion concurred with Abiola, et al; (2018), however differ from Ume, et al; (2020). They reported that experienced farmers often deride the efforts of extension agents in discharging their duties , hence affecting their farm income through low productivity. As expected, the coefficient for farm size was positive and significant at the 5% level. John (2011) was of the view that farm size plays a vital role in farm success, since it reflects the availability of capital, access to credit and even good managerial ability.

The coefficient of organization was positive and significant at 10 % probability level. Farmers who are members of cooperatives enjoy manpower development, access to credit with no collateral, and access to improved farming inputs, leading to higher production and productivity. This finding concurs to finding of Bamiro, (2008), who opined that members of association through interaction could exchange ideas that could in enhancing their farm outputs and income.

Table 4 Constraints to Pig Production in the Study Area

Constraints	**Frequency**	**Percentage (%)**
Poor access to credit	55	91.67
Location of veterinary posts	22	36.67
Lack of extension services	39	65.00
Poor breed	16	26.67
High cost of labour	46	76.67
Problem of diseases and pests	42	70.00
Poor road	35	58.33

*Multiple Responses

Source: Field Survey, (2025)

Table 4 shows that about 91.67% of the respondents had no access to credit facilities. Credit aids farmers in boosting their production through the purchase of broiler farm inputs (such as feeds, drugs and vaccines, poultry facilities like drinking and feeding troughs) and payment of labour (Ume, *et al'* 2020). In addition, 65 % of the respondents were faced with the problem of poor extension services. Extension services are needed to equip the pig farmers technically as well disseminate information to farmers on source of inputs such as feed, improved piglets and drugs and vaccines (Ogbonna, 2019, Tewe, et al;1998). Moreover, 70% of the sampled farmers faced problems with veterinary posts. Most veterinary posts are urban-based, which means that access to their services by most poor-resourced pig farmers is limited, to the detriment of their livestock's health. This finding is synonymous with John (2011). As well, 58.33 % of the pig farmers were faced with the problem of poor roads for transporting swine products. The deplorable conditions of our roads, especially our rural and farm roads, are of great concern. The roads in many areas are impassable, especially during the rainy season. This situation does not only impair greatly the evacuation of agricultural products and inputs to rural and urban areas respectively but as well cost of conveyance (Ogbonna, 2021, Ume, *et al*; 2018) Further, 70% of the respondents were faced with the problem of disease, leading to high piglet morality. These diseases include: mastitis, agalactia, brucellosis, swine fever, dysentery and coccidiosis. Tewe, et al; (1998) reported that African swine fever is a major disease threat to piggery production in the tropics as substantial decimation in pigs has been associated to that.

CONCLUSION AND RECOMMENDATIONS

Pig production in the study area was profitable with gross revenue, gross margin, and net farm income of ₦820,000, ₦5468,542 and N468,542 respectively The return per investment was 1.8. The determinants to pig farmers' output were rearing experience, extension services membership of organization and farm size. The major constraints to pig production in the study area were a lack of capital, pests and diseases, access to extension services, high cost of labour and poor road network.

Based on the results, the following recommendations were proffered:

(i)There is a need to provide a production incentive package for the swine farmers at all production levels. This would help to encourage both old and new entrant farmers.

(ii)There is a need to ensure standard veterinary drugs for the farmers and ensure the availability of standard and genuine drugs to the farmers at the right time. The veterinary personnel should be encouraged to establish veterinary posts in rural areas through the provision of regular electricity to keep their vaccines in a cold chain, for optimal efficacy to be maintained.

(iii). Ensure farmers' access to credit through microfinance banks, commercial banks and other credit facilities.

(iv)Extension services in the country should be boosted through employing more extension agents and motivating them.

(v) There is a need to encourage farmers to form or join a cooperative society or any other farming organizations, such as a young farmers club.

REFERENCE

Abiola J. O., Omotosho O. O., Adeniyi O. M., Ayoade G. O. (2015): Socio-demographic Characteristics of Swine Producers and Swine Management Practices in Ibadan, Oyo State, Nigeria. Alexandria. *Journal of Veterinary Sciences* 47(1):18–23.

Adetunji M. O., Adeyemo K. E. (2012): Economic efficiency of pig production in Oyo State, Nigeria: a stochastic production frontier approach. *American Journal of Experimental Agriculture* 2(3): 382 – 394.

Ajala M. K.,and Osuhor S. A. (2004): Economic analysis of returns and cost structure in swine production in Kaduna State, Nigeria. *Tropical Journal of Animal Science* 7(11): 11 – 18.

Bamiro O. M. (2008): Technical Efficiency in Pig Production in Ogun State, Nigeria. Research *Journal of Animal Sciences* 2(3): 78 – 82.

Dietze, K. (2011). Pigs for Prosperity. FAO Diversification booklet number 15

Duniya K. P., Akpoko J. G., Oyakhilomen O., Nandi J. A. (2013): Measurement of Pig Production Profitability in ZangonKataf and Jema'a Local Government Areas of Kaduna State, Nigeria. *British Journal of Applied Science and Technology* 3(4): 1455 – 1463.

Elifadhili, D. (2013). Assessment of agricultural extension services in Tanzania. A case study of Kyela, Songea Rural, and Morogoro Rural Districts. [http://www. parasite-project.org/wp-content/uploads/2013/12/Elifadhili-2013-Internship-report-final.pdf] site visited on 18/03/2015.

Ezeibe A. B. C. (2010): Profitability analysis of pig production under intensive management system in Nsukka Local Government Area of Enugu State, Nigeria. *International Journal of Economic Development Research and Investment* 1(2): 48 – 54.

Ewuziem, J.E., Onyenobi, V.O. and Dionkwe, A. G. (2008). Piggery waste management and profitability of pig farming in Imo State, Nigeria. Nigeria *Agric. Journal 40(1)*: 29-36.

F.A.O. (2020). FAOSTAT Statistics Division of the food and agriculture organ. http://FAO.Stat:FAC.org.

F.A.O. (2022). FAOSTAT Statistics Division of the food and agriculture organ. http://FAO.Stat:FAC.org

FAO (2011). Pig for prosperity. [http://www.fao.org/docrep/015/i2471e/i2471e00.pdf] site visited on 07/2/2014.

John, G. (2011). Modern pig production technology. Nottingham: Nottinghom University of Press. Pp. 137-139.

National Population Commission (NPC, 2006). National Population Census Figure, Abuja, Nigeria.

Ogbonna S. I. (2019). Analysis of Production and Profitability of Broiler Production in Umuahia Metropolis of Abia State, Nigeria. Proceedings of "Building a Resilient and Sustainable Economy through Innovative Agriculture in Nigeria" 53th Annual Conference of Agricultural Society of Nigeria. 21st -25th October, 2019. NCRI, Badeggi, Nigeria.

Ogbonna S. I. (2021). Effect of Value Addition on Profitability of Snail Agripreneurs in Abia State for Sustainable Economic Development. Agricultural Society of Nigeria (ASN) Proceedings of "Unlocking the Potentials of Agricultural Value Chains for Sustainable Economic Development in Nigeria"55th Annual Conference | 25-29 Oct., 2021 | Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria.

Okoli, C., Ogechi, R., Opara, M. N., Uchegbu, M. C., Ezeokeke, C. T., Durunna, C. S., Nnadi, F. N., Iheukwumere, F. C. and Okeudo, N. J. (2009).Socio-cultural Characteristics of Educated Small Holder Pig Farmers and the Effects of Their Feeding Practices on the Performance of Pigs in Imo State,Nigeria.Http://www.sciencepub.net/report/0104/11_0994_TERISTICS_pub_report0104.pdf] site visited on 24/05/2015. 94 .

Okolo, C.I. (2011). Tropical Tips on Intensive Pig Production: Animal Management and Health Issues. Technical Notes: Tapas Institute of Scientific Research and Development. Pp 240-246.

Onyekuru N.A., Ukwuaba I.C. and Aka E.O. (2020). Economics of piggery enterprise in Nigeria: a case study of Udi Local Government Area of Enugu State, Nigeria. *Agro-Science*, **19 (2)**, 6-12. DOI: https://dx.doi.org/10.4314/as.v19i2.2

Osondu C. K., Ijioma J. C., Anyiro C. O., and Obike K. (2014): Economic Analysis of Pig Production in Abia State, Nigeria. International Journal of Applied Research and Technology 3(3): 3 – 10.

Rahman S., Barthakur S., Kalita G. (2008): Pig production and management system in Aizawl district of Mizoram, India. *Healthcare* 95, 5 p.

Tewe O, O, Ogodgo, M.W and Adesehinwa, A.O.K., (2009). Resources requirements for profitability pig farming in Nigeria. In: National. Pig prod. Training Manual, NAERLS/ABU. Pp 16-26.

Ume Smiles I, Jiwuba, Peter–Damian, C. M. O. Okoronkwo and S. O. Okechukwu (2018) Economics of Pig Production in Ezza North Local Government Area of Ebonyi State, Nigeria *Asian Journal of Agricultural Extension, Economics & Sociology; 29(1): 1-11,*

Ume S I Onwujiariri E B and Nnadozie AKO(2020)Pig Farmers' Socioeconomic Characteristics as Determinant to Pig Production and Profitability in the Tropics *International Journal of Research and Review Vol.7; Issue: 4; April 2020 Website: www.ijrrjournal.com*

Ume SI, Ezeano CI, Onunka BN, (2018). Technical efficiency of pig production in Enugu north agricultural zone of Enugu state, Nigeria. International Journal of Research and Review. 2018; 5(9):61-69.