Esxon Publishers

International Journal of Applied Research and Technology
ISSN 2277-0585

Publication details, including instructions for authors and subscription information:
http://www.esxpublishers.com

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Available online: March 31, 2014

To cite this article:

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.

International Journal of Applied Research and Technology
Vol. 3, No. 3, March 2014. 3 – 10.

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(Received: 16 February 2014 / Accepted: 03 March 2014 / Published: 31 March 2014)

Abstract

This study analyzed the economics of pig production in Abia State Nigeria. Multi stage random sampling technique was used for this study. Data was collected through a structured questionnaire which was administered to 120 farmers. Data collected was analyzed with descriptive and inferential statistics such as mean, frequency and percentages, net return and regression analysis. Socio-economic characteristics of the farmers revealed that a proportion of the farmers (35.00%) fell within the active age that can effectively withstand the rigors and strains involved in pig production. 35.00% had secondary education while 23.33% had no education. The results showed that majority (78.33%) of the farmers were married while 21.66% were still single. Majority of the farmers (78.33%) had no access to credit. The result of the cost and return analysis revealed that pig production was profitable since the net farm income of the farmers was positive. The result of the multiple regression using the linear function as the lead equation revealed that Age, farming experience, farm size, educational level, and access to credit were positive factors that influenced the production of pig. Constraints of pig production identified include; fluctuations in the prices of pig, pest and diseases, problem of pig marketing, housing and management problems, lack of improved species and implement, and inadequate extension service. Recommendations were made that the government should promulgate policies on pig production that would help ease farmers Asses to credit facilities with little interest rate and also provide the farmers with extension service so that farmers enlightenment on innovative pig production techniques may be a reality, It is also recommended that pig farmers in the area should form and belong to cooperative societies as this will improve their economies of scale. This will bring about increase in production output and returns and also increase in dietary protein supply from pig.

Keywords: Economic Analysis, Pig production, Abia State, Nigeria

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Subject: *0214-0226*

Introduction

Over the years, there has been clarion call to improve the nutritional status of developing countries in the intake of animal protein. Food and Agricultural Organization (FAO) recommended an average of 200 grams of animal protein per day for healthy living in developing countries (FAO, 2003). However, according to Ademosun, (2000) per capita consumption of animal protein in Nigeria is 22grams. Efforts are being made by developing countries to increase livestock production to meet demand. Efforts are currently being made to address these defects through the new national policy on agriculture (FMARD,2003).The new national policy focus its attention among other issues to integrate National Agricultural programmes in Agriculture, fisheries and livestock development with the rest of the world (okojie,2003). These are aimed at ensuring food security and repositioning agriculture for achieving the first goal of the sustainable millennium developments goals (MDG's) which essentially is to reduce hunger and poverty by half by 2015 while ensuring environmental sustainability (NEPAD, 2001).

Pig *Sus scrofa* is one of the sources of animal protein, it's production which is both in the hands of government institutes and private individuals represents a fast way of increasing animal protein since pigs grow at a faster rate and reproduce sooner with larger litter size than cattle, goats and sheep. Sanchez (1982),in his own view posited that the rapid piggery development in different parts of the world is based not only on fecundity of the specie but on growth potentials as well as intensive production which has more than any other thing played a significant role in meeting the demand of meat. Pig meat (pork) is a very important source of animal protein in human diets. The F.A.O quarterly bulletin of statistics, 1989 reported that there is a greater output of meat from pigs (63.9million metric tons/year) than the combined output of meat from cattle, sheep and goats (58.9 million metric tons/years). Pig rearing is popular in many parts of Nigeria which has the highest pig population in Africa (Adebambo, 2000) even in the far north, it has been demonstrated that pigs can be reared successfully as exemplified by the existence of the biggest pig farm in Africa in Kano between 1955-1965 (Adebambo, 1995). In the area where pigs are reared on free range, they are most valued as a kind of savings to the farmer from where he can tap in times of cash shortage and emergency needs. Commercial production under semi-intensive conditions is becoming more popular because of its favourable rate of return on investment.

According to Eusobio, (1980) there are 3 systems of producing pigs. These are the large scale production system, medium scale production system and the subsistent or background production system. In his view, backyard pig farming and large scale pig production are more profitable than the medium scale pig production, this is because large scale pig producers enjoy economics of scale which lowers the cost of production and on the part of the small scale producers the cost of feeding is skipped. Feed cost account for 55-85% of the cost of commercial pig production depending on the level of intensification of the production system. Feed is therefore the major operational cost item in a pig enterprise. Pigs require feed to meet biological needs for maintenance, growth, and reproduction. Feeding pigs for optimum production require that feed stuffs be combined in proportionate amount that will produce the quantities of nutrients needed by the animals. It is worthy of note that most meat consumed in Nigeria comes from the northern part of the country but religious addicts constrain the optimum production of pigs in Northern Nigeria, as such pig production is mainly undertaken in the southern part of Nigeria. This sole situation has made pig production not being as important as sheep, goat and cattle production not only in Nigeria but in West Africa as a whole (Komolafe, *et al.,* 1999)

The population of Nigeria is growing at the rate of 3.3% annually while livestock production is growing at the rate of 2.0% (Larmode, 1997; Mbanasor, 2000). This situation calls for urgent redress through re-orientation in livestock production in order to free its citizens from the pangs of hunger and malnutrition. Despite the shortfall in protein intake and the imminent need to raise productivity, production of pigs in Nigeria has remained low. Feed is a major constraint in pig production. Consequently some are vouching for small scale production as a tool for increased productivity due to reduced cost of feeding. The demand for pork in Abia State had continually remained higher than its supply. In order to correct this trend, there is a need for increased livestock production. Pig production will increased animal protein output to address the attendant shortfall in dietary protein intake in Nigeria. The main objective of this study were to describe the socio-economic characteristics of pig producers in the study area, determine the cost and returns associated with pig production in the study area, determine the factors influencing the net income of pig producers in the study area and identify the constraints militating against increase in pig production in the study area.

Materials and Methods

The study was carried out in Abia State, Nigeria. Abia State is one of the five states in South East Geo-political zone of Nigeria. The State lies between latitudes 4^0 47^1 and 6^0 12^1 North of the Greenwich meridian and longitudes $7^0 23^1$ and $8^0 02^1$ East of the equator. It is bounded by Enugu State in the North, Rivers State in the South, Akwa Ibom and Cross River States in the East and Imo State in the west. Abia State occupies a land mass of 5833.11 square kilometers (ABSPC,2006), with an estimated population of 2,833,999 persons (NPC, 2006), The land area of the State is approximately 432,290 square kilometers. Abia State, Nigeria is made up of seventeen (17) Local Government Areas namely UKwa East LGA, Ukwa West LGA, Obingwa LGA, Osisioma LGA, Aba South LGA, Aba North LGA, Ugwunagbo LGA, Isiala Ngwa South LGA, Isiala Ngwa North LGA, Ikwuano LGA, Umuahia South LGA, Umuahia North LGA, Bende LGA, Arochukwu LGA ,Ohafia LGA, Isuikwuato LGA and Umunneochi LGA

Multi stage random sampling technique was used for this study; in the first stage, 6 Local Government Areas (LGA's) were randomly selected from the 17 Local Government Areas that makeup Abia State. The selected Local Government Areas were Umuahia North LGA, Isi Ala Ngwa North LGA, Ukwa West LGA, Isi ala Ngwa South LGA, Ohafia LGA and Isuikwuato LGA. In the second stage five communities were randomly selected from each of the chosen

LGA's. Lastly 4 pig farmers were randomly selected from each of the chosen 30 Communities. This brought the sample size to 120. Questionnaire was used to elicit and collect information. The data generated was mostly demographic and those related to their production costs and return.

Descriptive statistics, net return and multiple regression were used in the analysis of data.

Results and Discussion

Table 1 presents the socio- economic characteristics of the respondents. It is evident from the table that 35.00% of the pig farmers were within the ages of 41 and 50 years, while 30.00%, 22.33% and 11.67% of the pig farmers were between ages 21 and 30 years, 31 and 40 years and 51 and above years respectively. The mean age of the respondents was 44.38 years. This is an indication that the pig farmers in the study area were mostly middle aged farmers. The implication of this is that young people engage more in pig farming business than older people. This is as a result of the demands of the enterprise. This finding is in consonance with those of Durno and Stuart, (2005) who stated that the risk bearing abilities and innovativeness of a farmer, his mental capacity to cope with the daily challenges and demands of farming business decreases with advancing age (Durno and Stuart, 2005).

Table 1also shows distribution of the respondents according to gender. The table reveals that more than three quarters (81.66%) of the respondents were males. Although this result shows that pig farming is mostly carried out by males probably because of the stressful nature of the enterprise, it does not mean that females were not highly involved in pig production in the study area. Females in this study area were usually involved as helpers or suppliers of labour in light farm operations such as serving of feed and water, and cleaning of the piggery.

The distribution of the respondents according to marital status as shown in table 4.3 reveals that 21.66% of the respondents were single, while 78.33% of the respondents were married. This implies that the married classes were more involved in pig production. The high percentages of married respondents conform to Ogunniyi and Omoteso (2011) study that majority of the adult population of a society consists of married people. The implication of this is that housewives were still used as family labour for light farm operations.

The distribution of the respondents according to educational level is also shown in Table 1. The table revealed that the literacy level of the respondents is very high, 23.33% of the pig farmers had no formal education; others (76.67%) had formal education ranging from primary to tertiary. This probably implies that pig farming requires certain level of education in terms of management to ensure productivity. This also suggest positive implication for increased productivity and sustainability because the number of years a farmer spent in pig production business may give an indication of the practical knowledge he had acquired on how to overcome certain inherent problems in pig production (Okolo, 2007).

The distribution of the respondents according to farming experience is shown in table 1. The table revealed that 36.67% of the farmers had 6-10 years of farming experience, while 28.33% had 11-15 years, 20.00% had 1-5 years and 15.00% had above 15 years of experience. The mean years of farming experience was 7 years. This implies that the sample of respondents was well established in their pig production activities.

The table result shows the frequency distribution of the respondents according to household size. The household size of the respondents showed that 46.67% of the farmers had between 6 and 10 persons in their family. This indicates moderate household size. This had implication on the provision of labour for farm work (Okolo, 2007). This result indicates that these respondents have moderate family sizes. This implies that farmers could hire labour to augment family labour. Households with fewer members are less efficient compared with larger sized households. In the absence of well-functioning labor markets, larger households face fewer labor bottlenecks at critical points in the farming cycle such as land preparation and harvest (Ezeh, *et al.*, 2012).

Table 1 further shows the frequency distribution of the respondents according to access to credit. Data in Table 4.7 shows that majority 78.33% of the respondents did not receive any agricultural/ production credit. Only 21.67% which were mostly male respondents received agricultural credit. Inadequate capital is a major problem confronting small-scale enterprises including farmers in Nigeria. However lack of access to credit facilities constitutes a constraint in purchasing raw materials and other enterprise inputs. Meanwhile, access to credit is regarded as one of the key elements in raising agricultural productivity (Anyiro and Oriaku, 2011). The cost and return associated with commercial pig production in the study area is shown in table 2. The cost components are divided into variable and fixed costs. The variable cost component include feed, spent grain, bundles of hay, cassava, labour, medication and transportation while fixed cost components include salaries, maintenance and depreciation cost. The return associated with commercial pig production in the study area include the sales of weaned piglets, fattened piglets, culled sows, empty feed bag and manure.

Furthermore, table 2 shows that the breeding animals were twenty one on the average comprising sixteen breeding sows and five breeding boars. The depreciating values of equipment such as wheel barrow, weighing scale, knife, pincer, water tank and pig catcher), were calculated using the straight line method. The values of the houses and breeding stock were also calculated using the same method. For one production year (2013) 1000 bags (25kg bag) of manufactured feed was consumed and each cost ₦1,800.00 giving a total of ₦1,800,000.00. The feeds were substituted with locally spent grain, cassava and hay. Total quantity of grain spent was 50,000kg at ₦750,000.00. Twenty five metric tons of cassava at ₦15,000.00 per ton was also used and that gave ₦375,000.00. Bundles of hay cost ₦3,000.00. The salaries were ₦83,730.00. Medical cost incurred in vaccination, deworming treatment of pigs was ₦10,000.00. Transport was also ₦10,000.00.

Each sow produced in the survey year with average litter of 9 piglets. Total piglets produced were 256 on the average. Sixteen died before weaning so total piglets weaned in the year was 240. Sixty piglets were sold at weaning age at the average price of ₦5,000.00 each that gave ₦300,000.00. One hundred and eighty pigs were fattened and sold at

average price of ₦29,850.00 each at average weight of 120kg each. Hence, sales of 180 pigs amounted to ₦5,373,000.00. Five culled sows were sold at average price of ₦22,000.00 that gave ₦110,000.00. Seven hundred bags of manure were sold at ₦400.00 per bag that gave ₦ 280,000.00. Two thousand empty bags were also sold at ₦30.00 each which gave ₦60,000.00. The outputs are summarized on Table 2. The result shows that under one production year, the variable cost was ₦3,168,000.00, the gross margin was ₦2,955,000 whereas Net Revenue was ₦2,777,750.00 while the Benefit Cost Ratio (BCR) was 1.83 which shows that the enterprise is profitable since the BCR is greater than 1. This agrees with Olorinde, *et al.,* (2003) in their comparative study of small scale poultry and piggery farms, it was revealed that piggery generates better profit margins.

The profitability of the enterprise was also as a result of the high demand of pork in the area. Most of the people in the study area are Christians and there was no religious restriction to the consumption of pork. The result further shows that cost of feed was the most expensive resource in pig production enterprise. This is in agreement with Westerrnbrink (1995) that cost of feed is higher when pigs are kept under intensive management system. He reported that the high cost of feed is one of the major problems in pig production enterprise. However, it is profitable to feed pigs fully balanced concentrates. The result of the multiple regression analysis on the factors that influence the profitability of pig producers in Umuahia North Local Government Area of Abia State, Nigeria, is shown in Table 3. The result shows that all the functional forms were statistically significant at 1.0% probability level implying that any of the functional forms is adequate in estimating and explaining the variations in the profitability equation of pig production in the study area. However, the profitability equation was best estimated and explained using the linear functional form which explained 92.3% of the total variation at 1.0% risk level. Furthermore, other statistical and econometric considerations such as the number of significant coefficients and the a priori expectations were in favour of the linear functional form.

Specifically, the coefficient of production cost (-5.261) was negative and statistically significant at 1.0% alpha level. The sign is in accordance with a priori expectation. This implies that the higher the price of the variable costs, the lower the use of input in order to maximize profit. This result supports the findings of Nwaru and Ekumankama (2002) that as the input prices increases, reduced inputs are used. The coefficient of the price of product (75.489) was positive and statistically significant at 1.0% alpha level. This suggests that the profit arising from the sale of pig would increase as the price of the product increases. This result is in consonance with Kadurumba (2008) who obtained similar result in his study of economic efficiency of processed palm oil in Imo state, Nigeria.

The coefficient of education level (1102.444) was positive and statistically significant at 1.0% probability level. This implies that as the literacy level of pig farmers increases, there will be proper management of pig farms which will result in large production and in turn result in high income (Onyebinama, 2004). These results conform to a priori expectation. The coefficient (-0.088) of scale of production (farm size) was negative and statistically significant at 10.0%. This implies that this variable have negative influence on the profitability of pig production in the study area. This finding is at variance with a priori expectation though it may suggest need for efficiency in the use of land rather than expansion of land areas as a necessary requisite that could increase chances of increasing net return.

Table 4 indicates the major constraints influencing pig production in the study area. The constraints include: inadequate extension service (40.00%), lack of credit facilities (26.67%), inadequate implement (11.67%), low productive breeds (36.67%), problem of pig marketing (33.33%) , fluctuation in prices of pig purchase (26.67%), Housing and management problem (11.67%) and others like transportation, lack of water, High cost of feed (33.33%). In fact, there is a strong case for arguing that without credit, implement and improved pig breeds it is difficult for smallholders pig producers to increase efficiency, productivity and generate incomes that can sustain an adequate livelihood (Durno and Stuart 2005; Anyiro and Oriaku, 2011; Ezeh, *et al,* 2012).

Conclusion and Recommendations

From the regression result, it was discovered that variable cost (x_2), price of product (x_5), educational level (x_6), farm size (x_3), were significant factors that affected profitability of pig production in the study area. From the cost and return analysis, it was revealed that pig enterprise is a profitable enterprise that should be encouraged and invested in. Problems such as poor extension service, access to credit facilities, fluctuations in the price of pig, pest and diseases, inadequate implements, low yielding breeds, problems of pig marketing. Housing and management problem, transportation problem, lack of water, high cost of feed were also identified as posing constraint to pig farmers in the study area. Based on the findings of this study, the following recommendations were made policies should be made that will encourage and promote extension service among the pig farmers as this will boost the knowledge and practical skills of pig production and make production more efficient. Adequate incentives to extension agents will be useful in achieving this, Government needs to revitalize the pig production industries by bringing out appropriate polices to guide and regulate the marketing system in order to ensure effectiveness and efficiency, Policies aimed at encouraging experienced people to remain in the enterprise should be formulated. Experienced educated pig farmers will be better able to find a means of increasing the efficiency of underutilized resources in pig production, Focused research should be made to breed new and improved breeds of pig that will be resistant to the various diseases constraining pig production and government needs to make policy that will encourage intensified research for greater efficiency. Although the study has no gender implications, it still revealed that the number of males in the business is far more than females. Policy should be made to encourage female participation in pig production. This can be achieved by mobilizing extension agents especially women to educate women in the study area on the potential prospects of participating actively in pig production. Most pig producers in the study area have no access to credit facilities. Since pig production is capital intensive, intending pig farmers and other farmers still active in pig business should form cooperatives. The essence of this is that they will be better able to access credit facilities and pull

their financial resources together for bulk purchase this will reduce cost considerably and increase the profit margin realized. The advantage of this also is that they cooperative will create a steady market price for produced pig in order to overcome the problem of fluctuations in the price of pig. Government should also encourage intending pig farmers by providing credit with little interest during repayment.

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Tables

Table 1: Socio-economic characteristics of the respondents

Variable	Frequency	Percentage
Age (Years)		
21-30	36	30.00
31-40	28	23.33
41-50	42	35.00
Above 50	14	11.67
Gender		
Male	98	81.66
Female	22	18.34
Marital status		
Single	26	21.66
Married	94	78.33
Educational level		
No formal education	28	23.33
Primary	34	28.34
Secondary	42	35.00
Tertiary	16	13.33
Working experience (years)		
1-5	24	20.00
6-10	44	36.67
11-15	34	28.33
Above 15	18	15.00
Household size		
1-5	30	25.00
6-10	56	46.67
11-15	30	25.00
15-20	4	3.33
Access to credit		
Yes	26	21.67
No	94	78.33

Source: Field Survey Data, 2014

Table 2. Net return analysis of pig production

Output and value of output income	Unit cost(₦)	Quantity	Value(₦)
Weaned piglets	5000	60	300,000
Fattened piglets	29850	180	5,373,000
Culled sows	22000	5	110,000
Empty feed bags	30	2000	60,000
Bags of manure	400	700	280,000
Sub total			6,123,000
Input and values of Variable cost			
Feed (bags)	1800	1000	1,800,000
Spent grain (kg)	15	50,000kg	950,000
Bundles of Hay			3000
Cassava (ton)	15,000	25 tons	375,000
Labour			220,000
Medication			10,000
Transportation			10,000
Sub total			3,168,000
Fixed cost			
Salaries			83,730
Maintenance			3,000
Depreciation			90,520
Sub total			177,250
Gross margin			2,955,000
Net revenue			2,777,750
Benefit cost ratio			1.83

Source: Field Survey Data, 2014

Table 3. Estimate of factors that affect the profitability of pig production

Independent variable	Linear	Exponential	Double log	Semi log
Constant	-75155.514***	9.961***	0.260	-1154296.1***
	(-3.381)	(30.200)	(0.109)	(-4.377)
Age (x_1)	-447.226	0.012	0.069	-14752.070
	(-0.490)	(0.377)	(0.373)	(-0.723)
Variable cost(x_2)	-5.261***	-8.603E-5***	0.080	-1167.185
	(-7.327)	(8.075)	(-0.726)	(-0.096)
Farm size (x_3)	-0.088*	-3718.756	-0.233	-15261.477
	(-1.703)	(-1.064)	(-0.751)	(-0.444)
Extension Contact (x_4)	138.464	-0.014	0.025	1096.034
	(0.191)	(-1.270)	(0.102)	(0.040)
Price of product (x_5)	75.489***	0.000	0.838**	123679.396***
	(4.833)	(1.323)	(2.812)	(3.744)
Educational level (x_6)	1102.844***	0.017***	1.291	95457.077***
	(5.035)	(5.108)	(4.653)	(3.105)
Credit access(x_7)	-5480.396	-0.122	-0.161	-17975.296
	(0.870)	(-1.302)	(-0.650)	(-0.654)
Household size(x_8)	1247.974	-0.022	-0.024	16692.227
	(0.895)	(-0.872)	(-0.199)	(1.232)
Farming Experience	0.123	0.834	1.089	1.78
	(0.987)	(0.985)	(0.987)	(1.523)
R square (R^2)	0.923	0.872	0.910	0.854
Adjusted R^2	0.906	0.844	0.876	0.798
F-ratio	53.818***	30.656***	26.678***	15.361***

Source field survey data, 2014. * - significant at 10.0%. ** - Significant at 5.0%. *** - significant at 1.0%
Figures in parenthesis are t-ratio

Table 4: Production problems of pig production

Constraints	Frequency*	Percentage*
inadequate Extension Services	48	40.0
Inadequate implement	14	11.67
Low yielding breeds	44	36.67
Problem of pig marketing	40	33.33
Fluctuation in prices of pig purchase	32	26.67
Housing and management problems	14	11.67
Others(transportation, lack of water, High cost of feed, inadequate implement)	40	33.33
Lack of credit facility	32	26.67

Source: Field Survey Data, 2014. *Multiple responses recorded