

Research paper**MEASUREMENT OF PIG PRODUCTION PROFITABILITY IN ZANGON KATAF AND JEMA'A LOCAL GOVERNMENT AREAS OF KADUNA STATE, NIGERIA****K. P. Duniya, J.G. Akpoko O. Oyakhilome and J.A. Nandi**

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Abstract

The study used structured questionnaire administered to 120 swine producers which were randomly selected from Jema'a and Zangon Kataf Local Government Areas of Kaduna State, Nigeria, for the purpose of studying their socio economic characteristics and profitability.

Descriptive statistics, multiple regression, Z-test of significance and net farm income were used to analyse the data. The study revealed that swine production in the study area was influenced by some selected socio economic characteristics: production experience, household size, herd size

and level of education were significant at 5 percent probability level. The averages of total variable and fixed costs contributed to 96.7 percent and 3.3 percent respectively to total cost of production. Costs of feed, purchase of piglets and family labour constitutes the major variable cost items (81.96 percent of the total cost of production. Net farm income revealed a profit level of 38 percent, implying a return per naira invested of 38 kobo. Z-test also revealed a significant difference between farmers' costs and returns at 5 percent probability level.

Key words: Swine production, socio-economics, costs and returns, constraints.

INTRODUCTION

Nigeria is estimated to have about 4.4 million pigs, 78 percent of which are found in the sub-humid zones of Northern Nigeria. The swine industry in Nigeria has not yet fully developed like the ruminants and poultry industries because pigs are not generally accepted by majority of the population specifically in the Northern states, due to culture and religion which makes it a taboo for pork to be eaten by some people (Adebosin and Malgwi, 1986). Apart from the pig's importance in the national human diet, the urgency of increasing pig production efficiency is highlighted by factors such as stable source of revenue, value added for crop production and the creation of export potential for meat (Oleh, 2005). Decisions about adopting new technologies or entering into pig production contracts should be based on sound economic analysis (Cross et al., 1999). The cost of production usually increases due to disease infestation, high cost of feed and theft, thereby adversely affecting the expected profit of the production. These problems have made most pig producers to keep few pigs because they cannot afford the initial cost of large operation, as such, production is on small scale. The foregoing therefore gave rise to research questions as: Do socio economic characteristics of farmers have influence on their output?; Is pig production profitable?; What problems are associated with the effective production of pigs? This paper aimed at analyzing the cost and returns of pig production while focusing exclusively on: describing and determining the influence of socio economic characteristics of farmers on their output; cost and returns in pig production and identifying the problems associated with pig production. Thus, two hypotheses were tested:

- Socio economic characteristics have no significant influence on the output of swine farmers.

- There is no significant difference between costs and returns of swine farmers.

MATERIALS AND METHODS

Study area:

Sampling: 120 swine producers were surveyed during February to April 2008 to collect detailed information on the various costs and returns from different swine operations. Purposive and random samplings were respectively employed in selecting the farmers. The levels of outputs and inputs vary widely with farm size (number of pigs).

The data: The data used were obtained mainly from primary source, through the use of structured questionnaires. Information collected covered socio economic characteristics, management practices, quantity and cost of inputs such as land, labour use and availability, capital, output and the problems encountered by swine farmers.

Analytical tools: Data obtained were analyzed using simple descriptive statistics (frequencies, means and percentages), farm budgeting technique (Net Farm Income) profitability ratios, likert rating scale, multiple regression analysis and Z-test of significance. Descriptive statistics such as percentages, frequency distribution were used to achieve objective (i) of the study.

Total economic cost and net return, as defined below, were computed per live pig produced. Although a number of other measures, such as net cash income, net farm income, and returns on total assets are also used to determine farm profitability, this study used net farm income as a measure of profitability of swine production. Edwards *et al.*, (2006) also used this approach to determine factors associated with profitability of farrow-to-finish swine producers in Iowa.

The net farm income (NFI) is given by:

$$\text{NFI} = \text{GI} - \text{TC} \dots\dots\dots(1)$$

Where,

GI = gross income in naira

TC = total cost of production in naira.

Total cost is the sum of total variable costs, fixed cash costs, depreciation expenses, cost of owner capital, and cost of family labor.

Total variable costs include all variable operating costs, including feed costs, hired labor expenses, veterinary supplies and services costs, breeding supplies and services cost, repairs and maintenance and other miscellaneous operating costs. Feed costs include purchased feeds (grains or concentrates) and fees paid for garbage.

Total fixed cost/Depreciation costs include capital depreciation and boar depreciation. Capital depreciation was computed as annualized capital by dividing the total value of capital by the estimated total life span in years. The economic life span of swine houses was assumed to be 10 years and the life of other equipment was estimated (based on farmers' responses) at 5 years. Boar depreciation was computed as purchase value minus cull value divided by the breeding life of a boar (assumed to be 2 years). Sows and gilts, even those bought from outside the herd, were not depreciated as their purchase or breeding value and cull value were similar.

Cost of owner capital is the opportunity cost of owner capital used in swine production - the income forgone by not investing the capital in something other than swine production. The average interest rate (12%) paid by swine producers for borrowed capital was used as a proxy for the opportunity cost of owner capital.

Net return is defined as the gross returns less total cost plus non cash income (the value of pigs used for own consumption or given away). Gross returns, also known as gross cash income, are the total cash received by farmers. In swine production, gross cash income includes the returns

from the sales of suckling pigs, roasters, table hogs, and cull breeding animals to the market and of feeder pigs to other herds for finishing.

Net farm income (NFI) was therefore computed as:

NFI = Total cash income - Total variable expenses - Total fixed expenses - Depreciation.

Profit margin (PM) and gross ratio (GR) were computed as:

$$PM (\%) = \frac{\text{net farm income}}{\text{gross cash income}} * 100 \dots\dots\dots (2)$$

$$GR (\%) = \frac{\text{total cash operating expenses}}{\text{gross cash income}} * 100 \dots\dots\dots (3)$$

The 5- point likert rating scale was used to achieve objective (iii). Constraints with mean score of 3.0 and above were considered as positive or major constraints, while those with mean score of below 3.0 were considered negative constraints faced by farmers in the study area. This was achieved as described by Dawes (2008).

The multiple regression model was used to test the first null hypothesis and is specified as follows:

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + e \dots\dots\dots (4)$$

Where,

Y = aggregate value of pigs produced in naira

β_0 = intercept of the function

X_{1i} = production experience of the ith farmer

X_{2i} = herd size (number of pigs) of the ith farmer

X_{3i} = household size of the ith farmer

X_{4i} = level of education of the ith farmer

X_{5i} = age of the ith farmer

$\beta_1 - \beta_5$ = coefficients of explanatory variables

e = error term

Z-test of significance was used to test the second null hypothesis and is given by:

$$Z = \frac{X_1 - X_2}{\sqrt{\frac{\sigma_1^2 + \sigma_2^2}{n_1 + n_2}}} \text{-----(4)}$$

Where:

$\bar{X}_1$ = average return for farmers naira

$\bar{X}_2$ = average cost for farmers in naira

σ_1^2 = standard deviation for farmers' return

σ_2^2 = standard deviation for farmers' cost

n_1 = sample size of farmers' return

n_2 = sample size of farmers' cost

RESULT AND DISCUSSION

Socio economic characteristics of swine farmers

The socio-economic characteristics of the respondents are presented in table 1. The study revealed that majority of the respondents (53%) was women. The age of the farmers ranged between 21 and 60 years. Majority of the respondents (92%) were above 35 years, with a mean age of 40.3 years. This implies that majority of the farmers were youths; an economic active age that can make positive contribution to agricultural production. Most respondents (65%) had major occupation as farming, implying that swine production is just another form of diversification in farming. This contributed widely to the use of family labour by the households as the wives and children constituted the labour force. The literacy level among the farmers in

the study area was low. Njoku (1991) observed that formal education has a positive influence on adoption of innovation. In the study area, 78% of respondents had up to completed secondary education. Majority of the respondents (80%) had between 3-20 years of farming experience. Just as the saying ‘experience is the best teacher’; this shows that the managerial ability of the farmers can be inferred to be reasonably good. The study also revealed that a large proportion of the respondents (88%) had herd size of 1-5 which were mostly acquired through purchase. The household size of most respondents (95%) ranged between 1 and 10 members. A large household size also means more mouth to feed, such that for a given farm size large households could produce a smaller market surplus (Minot *et al.*, 2006). However, in traditional agriculture, the larger the household size the more labour force is available for farm activities.

Table 1: Descriptive statistics of respondents’ socio-economic characteristics

Variables	No of respondents	Percentage
Sex		
Male	56	46.67
Female	64	53.33
Total	120	100
Age		
35 and below	10	8.33
36 and above	110	91.67
Total	120	100
Household size		
1-5	56	46.67
6-10	58	48.33
11-15	6	5.00
Total	120	100
Level of education		
Tertiary	26	21.67
Secondary	46	38.33
Primary	34	28.33
Adult	4	3.33
None	5	8.33
Total	120	100
Production experience		
20 and below	96	80
21 and above	24	20
Total	120	100

Herd size		
5 and below	88	73.33
6 and above	32	26.67
Total	120	100
Major occupation		
Farming	78	65
Otherwise	42	35
Total	120	100

Profitability of swine farmers

The costs and returns structure (table 2) revealed that feeds, piglets and labour costs constitute the major cost components of swine production in the study area. Cost of feeds ranked highest (34.81%), followed by the purchase of piglets (25.27%) and labour (21.88%) respectively of the total cost. This result agrees with Ajala and Osuhor (2004) and Edache and Kudi (1998), that feed cost constitutes the highest cost of the total cost of producing edible pork. It has been reported to be occasioned by the highly exorbitant prices of grains by Olomu and Oboh (1995). The net farm income revealed a percentage profit of 38%, which implies that for every one naira invested, a profit of 38 kobo was made. However, it is of interest to know that this profitability level is less than that obtained by Ajala (2003), who reported a return per naira invested of 64 kobo. Difference could be attributed to study area or location differences alongside proximity of market to production areas.

Table 2: Cost and returns structure of swine producers

Items	Mean Cost/Fig	Mean Percentage
A. Returns		
Sales of Pork		
Sales of live pigs: Weaned piglets	2443.13	18.69
Adult/Matured pigs	9181.64	81.31
Total returns	11624.77	100
B. Variable Cost		
Cost of feed	2987.70	34.81

Cost of piglets/breeding stock	2168.73	25.27
Cost of labour	1878.18	21.88
Cost of drugs/vet services	285.52	3.33
Cost of clipping and castration	72.17	0.84
Breeding/mating cost	496.35	5.78
Transportation cost	274.23	3.20
Total variable cost	8162.88	96.70
C. Fixed Cost		
Depreciation on buildings	199.07	2.32
Depreciation on equipments	45.94	0.54
Repairs and maintenance	38.33	0.45
Total fixed cost	283.34	3.30
D. Total Cost = B + C	8446.22	100
E. Gross Income = A – B	3461.89	
F. Net Farm Income = E – C	3178.55	
Rate of return on investment= 38%		
Benefit – Cost ratio =1.38		
Gross margin ratio =2.36		



Constraints associated with swine production

Table 3 revealed only four (4) items rated above the decision score of 3.0 (high cost of piglets, high cost of feeds, outbreak of diseases and high piglet mortality rate), indicating that they are the major constraints faced by farmers in the study area. This validates claims by Balogun (1981) that livestock enterprises in Nigeria are beset by some problems, major among which is the high cost of production inputs.

Table 3: Constraints encountered by swine producers

Constraints	Mean Score (Xs)	Ranking
High cost of piglets (breeding stock)	4.02*	1 st
High cost of feeds	3.90*	2 nd
Outbreak of diseases	3.21*	3 rd
High mortality rate	3.10*	4 th
High cost of transportation	2.75	5 th
High cost of drugs and veterinary services	2.16	6 th
Inadequate capital/finance	1.50	7 th
Labour availability	1.24	8 th
Poor housing	0.85	9 th

*Major constraints

Hypotheses:

The multiple regression analysis result (table 3) revealed the coefficient of multiple determination (R^2) obtained as 0.63, implying that 63% of the variation in the output of swine farmers can be explained by the selected socio-economic variables. The F-value (18.98) obtained is also significant implying that the overall model is fit. Of the selected socio economic variables used in the model, production experience, herd size, level of formal education and age were significant. Production experience, herd size and level of formal education had positive influence on the farmers output (meaning that a unit increase in each of these variables leads to an increase in output by a magnitude of the coefficient). Age, on the other hand had a negative influence on the farmers' output, implying that the older the farmer, the more experienced he is and hence, the greater the greater the output.

Table 4: Estimated regression coefficients for socio economic characteristics of swine farmers

Variables	Coefficients	Standard errors	t-values
Constant	-14121.290	18759.299	-0.753
Production experience	1372.184	459.749	2.985*
Herd size	12050.323	1561.927	7.715*
Household size	2027.320	1405.287	1.443
Level of education	8746.736	3084.721	2.836*
Age	-778.188	411.245	-1.892**
R	0.798		
R^2	0.637		
Adjusted R^2	0.604		
F	18.976		

** significant at 5%, *significant at 1%

The result (table 5) obtained from the Z- test of significance (two tailed test) revealed a significant difference between the costs and returns of swine farmers. The calculated Z-value

(3.16) was found to be greater than the table value (2.58) at 1 percent probability level. Thus, the two null hypotheses were rejected while the alternatives were accepted; implying that socio economic characteristics of swine farmers have significant influence on their output and that swine

Table 5: t- test of significance for profitability

Variables	Mean	Variance	Calculated Z-value	Tabulated t-value	Level of significance
Returns	52,244.30	1,218,873,439	3.16	1.96	0.05
Costs	36,574.58	252,409,605.9		2.58	0.01

CONCLUSION AND RECOMMENDATIONS

It can be concluded that swine production in the study area is predominantly practiced by women of active age and is profitable as it is not the only farming activity practiced by the respondents. Socio economic characteristics of swine farmers have significant influence on their output. High cost of piglets, high cost of feeds, outbreak of diseases and high piglet mortality rate are the major constraints faced by farmers. Hence, it is recommended that producers should be assisted with financial capital to be able to effectively rear pigs and also expand the scale of production.

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