

*Piggery waste management in Imo State*

**PIGGERY WASTE MANAGEMENT AND PROFITABILITY OF PIG FARMING IN IMO STATE NIGERIA**

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**ABSTRACT**

*The indiscriminate dumping of piggery waste especially in areas where pig farms are located necessitated this study which assessed piggery waste management systems and profitability of pig farming in Imo state Nigeria. Piggery waste management systems in the study area were identified and described, the farm profitability were assessed based on these systems. Primary data were collected from 60 pig farms selected using multi-stage sampling technique. Cost-route approach was used to collect information on the income statement of the farmers. Data were analyzed using descriptive statistics, operating net returns and benefit cost ratio. Net profits of the different categories of pig farms based on their waste management systems were compared using ANOVA statistics. The result shows that 75% of the pig farms managed their waste by open dumping, produced an average annual output of 67952.4kg of dung with an average net profit of N863252.98 and a BCR of 1.66. Those that manage their waste by using it for crop and fish production constituted 20% of the farms studied. This group produced an average annual output of 40447kg of dung with an average net profit of N711858.08 and a BCR of 1.67. Also, 5% of the pig farmers dumped their waste into moving streams. They produced an average annual output of 27470kg of dung with an average net profit of N592035.83 and a BCR of 1.74. Statistical analysis indicated that the net profits did not differ significantly across the systems of waste management. Therefore pig farming is profitable in the study area and the profit is not significantly influenced by the waste management systems.*

**KEY WORDS:** piggery waste management, profitability, pig farming, net profit

**INTRODUCTION**

The pig is a major component of livestock especially in Southeastern Nigeria where there are no cultural or religious inhibitions to the production and consumption of pork. The potentialities of pig as an effective provider of protein for human diet have well been recognized (Odo *et al* 2000). The relative advantages of the pig in respect of this include its high survival rate and ability to utilize a host of agro industrial by products and crop residue (Fetuga 1997; Ter meulen and El-Hanth 1985; Twrnamasiko 2001) with little or no processing and at minimal cost (Tewe and Adesehinwa 1995). Pigs are known to be prolific producers, realizing 20-30 piglets from 2 to 3 litters per year (Adesehinwa *et al* 2003), with short generation intervals.

Pig farming is a reliable venture and could generate more profits than other livestock production activities, if properly managed. A comparative study of small scale poultry and piggery farms carried out by Olorinde *et al* (2003), revealed that small scale piggery in its entire ramification generates better profit margins. Pigs are predominantly managed intensively in Southeastern Nigeria as a result of population pressure and the need for controlled production system as in developed countries of the world. This system no doubt is associated with the problem of environmental pollution caused by discomforting odour emanating from the building and waste generated from the farms. Intensification of these pig farms has mainly involved an increase in the animal population, thus generating a huge quantity of waste beyond the normal capacity of the farms to manage conventionally (Liang, 2007). For all pigs housed in confinement, the choice of the method of waste disposal is

*Ewuziem, J.E., A.C. Nwosu, E.C.C. Amaechi, A.O. Aniebo, and P.O. Anyaegbu.*

an important one which affects the building design, the layout of the site and the work force required (Holiness 1991).

Waste could be described as any unwanted or undesired material left over after the completion of a process (USDE 1996). Waste in the context of this paper means substances excreted by animals after the process of digestion. These substances are not useful to the body system at that point and therefore are excreted in form of feces and urine. Waste exists in solid, liquid or gas. The volume of waste tends to grow with increasing population, production and consumption in Nigeria. Adeoke (1990) reported that solid waste collection and disposal have defiled various solutions mainly due to poor infrastructure coupled with low budgetary allocations to them. Odesina and Longe (1996) reported that there is lack of adequate awareness on the part of the general public on the management of waste from domestic, commercial and industrial sources including agriculture. Waste management involves the safe and efficient treatment, storage and disposal of waste generated in a production process. Pigs are capable of generating waste in form of excreta, which must be properly managed in conformity with the environmental laws to avoid conflict. Good manure management will minimize the negative and stimulate the positive effects on the environment. Emissions into the air, of nutrients, organic matter and odour have adverse effects on the environment ([www.virtualcentre.org](http://www.virtualcentre.org)). Good waste management can only be possible through a conscious desire by pig farmers to achieve and demonstrate sound environmental performance by controlling the different aspects and significant impacts of their activities products and services on the environment (Lawal 2003).

Profit according to Amaechi (2007) is the monetary value computed as net income while profitability emphasize the size of the profit relative to size of business or resources used to produce the profit. Sawyer (1981) defined profit as the difference between total revenue and total cost. Since resource utilization is a very important determination of profitability, the decision making process in farm business must consider the level of profit expected after investment. To achieve higher profit a rational farmer will always attempt to minimize cost and maximize profit. Because of this pig farmers manage the waste from their farms in different ways depending on the size of the farm and its location. Since waste management system differs among farmer, the extent to which these systems affect profitability is not yet investigated. Therefore, this study identified and described the piggery waste management system in the study area and assessed profitability of pig farming based on the waste management systems identified. The result will guide pig farmers on their expenditures as it affects piggery farming.

## **METHODOLOGY**

The study was conducted in Imo state, Nigeria. The state has a population of 3,934,899 people, made up of 2,032,286 males and 1,902,613 females (NPC, 2006). It has a population density of 712 persons per sq km and comprises 27 local Government Areas (L.G.A's). Imo state is divided into three agricultural zones namely; Okigwe, Orlu and Owerri. Most of the communities are still rural but with high rate of urbanization.

Data for the study were collected by cost route approach from primary sources. The pig farmers were selected by a multi stage sampling technique. The state was stratified into the existing three agricultural zones. Two local government areas were purposively selected from each zone due to their peculiar interest in pig production, evidenced by easy accessibility and availability of registered pig farmers in the areas. Random sampling technique was used in the selection of ten (10) respondents from each selected L.G.A., making up the 60 pig farms used for the study. A structured questionnaire was used to elicit information from the farmers between the periods of September 1, 2006 to August 31, 2007.

## **Data analyses**

Descriptive statistics and cost return analysis as applied by Amaechi (2007) were used for the analyses of data collected. This method is based on the operating statement or profit and loss account. This is also called income statement and defined as a summary of receipts and gains during a specific period, usually one year less

**Piggery waste management in Imo State**

expenses and losses during the same period with net income or net loss resulting (Lee *et al* 1980). It actually involved measurement of the firm's output and input in monetary value terms. Johnson (1990) adds that operating statement is a profitability statement showing the profit, loss or change in wealth resulting from a business activity over a fixed time period. Also benefit cost ratio was used to relate the income to expenditure. The following analytical model was used in the study.

$$GR = TVP - TVC$$

$$TVP = P_j Q_j + P_n + Q_n + \dots + P_m Q_m$$

$$Q_j = f(x_1, x_2, \dots, X_n)$$

$$TVC = P_1 X_1 + P_2 X_2 + \dots + P_n X_n$$

$$TVC = \sum_{i=1}^n P_i X_i$$

$$TVP = \sum_{j=1}^m P_j Q_j$$

$$GR = P_j f(x_1, x_2, \dots, X_n) - \sum_{i=1}^n P_i X_i$$

Where

- GR = Gross Return
- TVP = Total value of production
- Qj = Quantity of j<sup>th</sup> output
- Pj = Unit price of j<sup>th</sup> output.
- Pi = Unit price of i<sup>th</sup> variable input.
- Xi = Quantity of i<sup>th</sup> variable input
- n = Number of inputs used in production.
- m = Number of pig forms
- f = Function expresses production
- ∑ = Summation

The net profit (Π) was got by deducting the total fixed cost (TFC) from the Gross return (GR)

$$\Pi = TVP - TVC - TFC.$$

Or

$$\Pi = \sum P_j Q_j - \sum P_i X_i - \sum_{k=1} P_k C_k$$

**Where**

- Π = Net profit (N)
- P<sub>k</sub> = Unit price of k<sup>th</sup> fixed input (N)
- C<sub>k</sub> = Quantity of k<sup>th</sup> fixed input

The BCR is gotten by the following model,

$$BCR = \frac{\sum P_j Q_j}{\sum P_i X_i + \sum_{k=1} P_k C_k}$$

ANOVA statistics was used to compare the mean net profits.

This model is specific as;

$$SST = SSB + SSW$$

**Where**

SST = Total Sum of squares  
SSB = Between Group Sum of squares  
SSW = Within Group Sum of squares.

**RESULTS AND DISCUSSION.**

**Piggery waste management systems.**

The study identified three waste management systems in Imo State.

**a. Open dumping and incineration:**

This is the system whereby the pig farmers dump the waste (dung) on daily bases in an open space within the farm premises or outside. Under this system, the pig waste is kept directly under the rains and sunshine. During the rainy season, the dung is heaped together and large heap of dung is formed. This continues until dry season. Then the heap is set on fire. The smoke produced is choking and dangerous to health. The odour emanating from this system, pollute the immediate environment and confirms the report of Akomas (2002) that in most localities, it is easy to detect the presence of a pig farm by the unpleasant odour that emanates from such farms.

**B. Utilized for crops and fish farming:**

Under this system the pig farmers utilize the dung for crop production and fish farming. The dung is spread on crops planted within the premises of the farm and outside. In most cases, neighbours who are interested also collect and spread on their farm lands as organic manure. Also some pig farmers use the dung for fish production. The dung enhances the growth of plantations used as feed for fish thereby reducing the cost of feeding fish.

**c. Stream dumping:**

This system involves the dumping of piggery waste into moving streams. These farmers have their farms located near the banks of rivers/ streams. They just channel the effluents to moving water and deposit the dung into the stream also.

**Table 1: The distribution of farmers according to piggery waste output and management system.**

Average output of waste (kg)		Average stock size	Frequency	Percentage	Waste management system
Annual	Daily				
67952.4	186.17	417.16	45	75	Open dumping/incineration
40447	110.81	305.92	12	20	Crop/fish farming
27470	75.26	176.33	3	5	Stream dumping
Total			60	100	

*Piggery waste management in Imo State*

**Table 2: Income statement of pig farming in open dumping/incineration system of piggery waste management**

Item	Value (₦)	Sub total (₦)	Balance (₦)	% of TC
REVENUE				
Sale of pigs	2172479.1			
Total		2172479.1		
VARIABLE COSTS (Operating Expenses)				
Feeds	827426.22			63.20
Labour/wages	235202.56			17.97
Medication	22990.11			1.76
Water/Utility	37213.35			2.84
Waste Mgt./ Related costs	49947.33			3.82
Transport	44712.44			3.42
Maintenance	30470.89			2.33
Total		1247962.9		
Gross margin			924516.2	
FIXED COSTS				
Depreciation charges	15765.89			1.20
Taxes/L.G.A bills	10404			0.79
Rent	20100			2.63
Interest	14993.33			1.15
Total		61263.22		
Profit			863252.98	
BCR	= 1.66			

**Source: field data, 2007**

The result above shows that farmers in this category of waste management system made an average profit of N863252.98. Their average total cost of production was N1309226.13 out of which N49947.33 was spent on waste management and related costs on matters such as application of odour abatement measures and settlement of disputes etc. This constituted 3.8% of the total cost implying an increase in cost of production by this margin due to waste management. The benefit cost ratio of 1.66 was recorded. This implies that for every N1 invested by the farmer, he records a benefit of 66k.

This study also analyzed the profitability of pig farming by farmers who utilize the piggery waste generated from their farms for crop and fish production. A summary of their income statement is shown on Table 3 below.

**Table 3: Income statement of pig farming in the utilization of piggery waste for crop and fish production**

Item	Value (₦)	Sub total (₦)	Balance (₦)	% of TC
REVENUE				
Sale of pigs	1770154.17			
Total		1770154.17		
VARIABLE COSTS (Operating Expenses)				
Feed	688558.79			65.06
Labour/wages	214193.33			20.24
Medication	9765.83			0.92
Water/Utility	23210.21			2.19
Waste Mgt./ Related costs	33180			3.14
Transport	23300			2.20
Maintenance	19824.17			1.87
Total		1012033.16		
Gross margin			758121	
FIXED COSTS				
Depreciation charges	13924.17			1.32
Taxes/L.G.A bills	8214.58			0.78
Rent	16183.33			1.53
Interest	7937.5			0.75
Total		46262.92		
Profit			711858.08	
BCR	1.67			

**Source: Field data, 2007**

The result indicates an average net profit of N711858.08. The total cost of production was N1058296.08 out of which N33, 180.00 was spent on waste management and related issues such as cost of conveyance to farm and labour used. This constituted 3.14% of the total cost of production. This situation is unlike that of poultry droppings that generate income to the farmers. Again apart from feed cost and wages, piggery waste management and related costs constitute the highest single variable cost in pig production. A BCR of 1.67 was recorded, meaning that the farmers in this category makes 67k profit for every N1 invested.

A summary of the income statement of pig farmers who dump their waste in moving streams is presented in table 4. The result shows that an average net profit of N592, 035.83 was made within the period under review. The average total cost of production was N795964.17, out of which N21333.33 was spent on waste management and related issues. This include the cost of litigation in the local traditional councils Instituted by users of the stream water for domestic activities but could no longer use it due to the pollution caused by activities of the pig farmers. Costs incurred while managing waste in this method increased cost of production by 2.68%. Again the BCR was 1.74 showing that 74k profit was made from every N1 invested in the project while managing waste under this system.

### *Piggery waste management in Imo State*

**Table 4: Income statement of pig farming based stream dumping system of waste management.**

<b>Item</b>	<b>Value (₦)</b>	<b>Sub total (₦)</b>	<b>Balance (₦)</b>	<b>% of TC</b>
REVENUE				
Sale of pigs	1388000			
Total		1388000		
VARIABLE COSTS (Operating Expenses)				
Feed	513983.33			64.57
Labour/wages	164083.33			20.61
Medication	12116.67			1.52
Water/Utility	22027.5			2.77
Waste Mgt./ Related costs	21333.33			2.68
Transport	15680			1.97
Maintenance	13473.33			1.69
Total		762697.5		
Gross margin			625302.5	
FIXED COSTS				
Depreciation charges	8083.33			1.02
Taxes/L.G.A bills	5853			0.74
Rent	16000			2.01
Interest	3333.33			0.42
Total		33266.67		
Profit			592035.83	
BCR =	1.74			

**Source: field data, 2007**

This indicates that profitability of pig farming under the stream dumping system of waste management was higher than the other categories at comparison. The profit levels when subjected to statistical analysis did not differ significantly both at 1% and 5% levels.

### **CONCLUSION AND RECOMMENDATION**

Piggery production is associated with waste generation. Management of this waste involves resource utilization. Pig farming is a profitable venture that is capable of sustaining operators in terms of the provision of basic needs and encourages further investment. The net profit levels are influenced by waste management practices because waste management constitutes over 3% of the total cost of production, therefore issues of waste management should be taken seriously by both piggery operators and policy makes. The already existing systems in the study area are not efficient since they encourage resource utilization instead of income generation. It is therefore recommended that waste management policies of the government should consider piggery farming as a source of waste generation and therefore should be included as a critical area that require urgent attention.

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*Ewuziem, J.E., A.C. Nwosu, E.C.C. Amaechi, A.O. Aniebo, and P.O. Anyaegbu.*

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