



Analysis of Waste Management and Profit Efficiency in Pig Production in Owerri Agricultural Zone of Imo State

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Abstract

The study examined waste management and profit efficiency in pig production in Owerri Agricultural Zone of Imo State, Nigeria. A sample of sixty-six (66) pig farmers were randomly selected from the study area and data collected through structured questionnaires. The data analysis was based on complete responses from a cross sectional survey of the respondents. The data were analyzed using frequency distribution and frontier profit function. Results showed that pig production was dominated by males (62%) and majority (75.8%) were below 50 years of age. About 98.5% of the poultry farmers had minimum of primary education while 83.3% had less than 10 years of farming experience. The result also revealed that 68.1% of the household had up to 6 members in their family while 31.8% had between 7-12 members. Statistics showed that 93.9% of the respondents collected their pig waste manually using shovel and spade. Majority (74.2%) of the farmers did not treat their farm waste before or after disposal thereby polluting their environment. The pig 'waste' was not considered useful by 63.6% of the farmers. However, the mean level of efficiency for pig production in the study area was 66.33. Meanwhile, age, experience and sex significantly contributed to inefficiency in pig farming in the study area at 5% and 10%, respectively. The major constraints to waste management in pig production in the study area were poor access to credit, poor road network, water problem and high cost of labour. The results also revealed that the pig farmers can further increase their profit efficiency. The economic use of the pig waste would also help in maximizing the farm's profit in addition to improvement in technical, allocative and scale efficiencies. It is therefore suggested that livestock farmers should be trained through workshops, conferences and extension services on the conversion and utilization of livestock waste or manure into organic fertilizers which can easily be made available to the numerous small scale crop farmers to augment the scarce and very expensive inorganic fertilizer. Effective monitoring services should be operated by government to sensitize pig farmers to reduce environmental pollution and incidence of disease outbreak. Government should reduce import duties on pig drugs so as to enhance increased production and profitability.

Key words: Profit, efficiency, waste, pig, management, Owerri

Introduction

The socio-economic benefits of livestock cannot be over emphasized (Bradshain *et al.*, 2004; FAO, 2009). Livestock usually provide essential commodities and services to man in form of animal by-product (like meat, milk, hides and skins,) source of draught power, manure to enhance soil fertility and serves as a capital reserve available during hard times ((Kadurumba, 2012; Tewe *et al.*, 2009). Amongst the livestock that is used to alleviate man's animal protein deficiency particularly in rural areas of most developing

countries of sub - Sahara Africa is pig (Tewe *et al.*, 2009). Nigeria is the second largest pig producer in Africa after South Africa, but pork contributes only about 4.5% of meat consumed. (Ter meulen Udo and E-Harinth, 1985; Tijani *et al.*, 2006; Dafwang *et al.* 2011; Ka²ankuka, 2012). Today, the world population of pigs runs into billions. For example, in the United States of America alone where one million farmer's rears as much as 4,000 to 5,000 sows, more than ten million pigs are slaughtered each year (Bruno *et al.*, 2008; Machete and Chabo, 2020). The

report from Asian countries is not different. For example, in Vietnam with a human population of 80 million, pig population has shot up to a recognizable 19 million pigs within a decade (Gerd'de and Tondeur, 2001). There is commensurate increase in pork demand over the years and continuous expansion is expected via increasing number of pig per farms. In Nigeria, Owerri Agricultural zone, of Imo state is home to the largest pig farm in South East, hosting 2400 farmers, more than 2000 attendants and 22 cooperatives societies (Kadurumba, 2012). The area has its own monumental manure disposal challenges for which the farmers have cried out to the world bank FADAMA programme for help, through the Imo State government. Throughout the country, especially in many southern Nigeria, the challenges of handling pig waste is recognized as a major issue in sustaining the growth of the industry (Kadurumba, 2012). Historically, the growth of pig industry began as a result of its high level of energy and protein, rapid turnover rate and short incubation period which are advantages of piggery (Kadurumba, *et al.*, 2019).

Nigeria is one of the developing Countries that is affected by hunger, deprivation and abject poverty by its citizenry inspite of its enormous natural and human resources (Alamu, *et. al.*, 2004). With the prevailing economic situation in the country, there is need for farmers to engage in result oriented farming systems that would guarantee and sustain adequate food security, create employment and raise incomes. In Imo State, pigs are reared for both social and economic purposes. However, it improves the income sources of the families that engage in its production. As a result of lack of records, illiteracy or refusal to keep them, it becomes difficult to work towards maximizing profit and maintaining efficiency. Furthermore, most small scale farmers use only family labour to produce (Adegeye and Dittoh, 1995). Thus, it becomes difficult to assign costs in the production process to enable them know exactly the amount expended. For

instance, matured pigs may not be sold when they have reached market size and the farmers would continue to spend on feeding and medication, thereby increasing cost. Researchers like Ajala *et al.*, (2008), Oga *et al.*, 2016), Ogundari *et al.*, (2006) and Duniya, *et al.* (2013) have come up with findings that pig production is profitable. There are lack of records to justify the efficiency of this profit. This is what this study sets out to establish. This study therefore aims at examining the methods of waste disposal and utilization as well as the profit efficiency of the poultry farms in Owerri Agricultural Zone of Imo State, Nigeria .

Profit efficiency is defined as the ability of a farm to achieve highest possible profit given the prices and levels of fixed factors of that farm and profit inefficiency in this context is defined as the loss of profit from not operating on the frontier (Ali and Flinn, 1989). Lau and Yotopoulos (1971) and Yotopolous and Lau (1973) therefore popularized the use of the profit function approach, in which farm- specific prices and levels of fixed factors are incorporated in the analysis of efficiency. The advantage of using this approach is that input and output prices are treated as exogenous to farm household decision making, and they can be used to explain input use. Adeleke (2008) defined profit efficiency as the ability of a firm to achieve potential maximum profit, given the level of fixed factors and prices faced by the firm. Aigner, *et al.* (1977), however, showed that profit function models do not provide a numerical, measurable firm-specific efficiency and popularised the use of the Cobb Douglas production frontier approach. The stochastic frontier approach has gained popularity in firm- specific efficiency studies. Example of recent application includes (Ali and Flinn, 1989). The stochastic profit frontier function is an extension of incorporating farm level prices and input use in the frontier production function. The incorporation of the farm-specific level prices leads to the profit function approach formulation (Ali and

Flinn, 1989; Adeleke, 2008). A production approach to measure efficiency may not be appropriate when farmers face different prices and have different factor endowment (Ali and Flinn, 1989). Hence the use of stochastic profit functions to estimate farm-specific efficiency directly (Ali and Flinn, 1989; Tijani, *et al.* 2006). The profit function approach combines the concepts of technical, allocative and scale inefficiency in the profit relationships and any errors in the production decision translate into lower profits or revenue for the producer (Kadurumba, 2012).

Materials and Methods

The study data and sampling technique

This study was based on primary data, obtained in a cross-sectional survey of pig farms in Owerri Agricultural zone of Imo State, Nigeria. The study area is one of the three zones that make up the State in the southeast rainforest zone of Nigeria, others being Orlu and Okigwe agricultural zones. The study area, Owerri Agricultural zone of Imo State, consists of Nine local governments namely; Aboh Mbaize, Owerri North, Owerri Municipal, Ngor Okpala, Ikeduru, Ahiazu, Owerri West, Ezinihitte and Mbaitolu local government areas. The zone is located in the south eastern part of Nigeria. The zone lies between latitude $5^{\circ}10'$ and $6^{\circ}35'$ North of equator and longitude $7^{\circ}10'$ E of the Greenwich Meridian. Owerri zone has a population of 1,482,864 on a total land area of 2,323 Sqkm (NPC, 2006). The state is culturally homogenous, predominantly inhabited by the Igbo ethnic group of Nigeria. Farming is the main occupation of the people on Owerri zone. They also engage in domestic livestock production. Livestock

predominantly reared in the zone include, poultry, pig, sheep, goat and rabbit. Majority of the pigs raised in the zone are through intensive method. Data on the socio-economic characteristics of the farming households, waste management procedures, the quantities and values of inputs and output was obtained through structure questionnaires administered personally on a target sample of sixty-six (66) pig farmers. Simple random sampling technique was used for the study. The farms were drawn in two-stage sampling process. In the first stage, three (3) rural based pig farms viz Ezinihitte, Ahiazu and Ngor Okpala Local Government Areas were selected because of the intensity of piggery business in the areas. In the second stage, a total of twenty-one (22) pig farms drawn from each of the three local government areas based on pig farms that had large stocking capacity were selected.

Method of data analysis:

Frequency tables and percentages were used to describe the socio-economic characteristics of the pig farmers, their farm settings and waste management procedures. Frontier profit function was fitted to the production data to determine the profit efficiency of the pig farms. The frontier profit function approach in measuring efficiency combines the concepts of technical, allocative and scale inefficiencies in the profit relationship and errors in the production decision are assumed to be translated into lower profits or revenue for the producer. The general form of the profit frontier, dropping the i th subscript for the farm, as defined by Coelli, (1996) is given as:

$$\ln P = a_0 + \sum_{j=1}^5 a_j \ln P_j^1 + \frac{1}{2} \sum_{j=1}^5 \sum_{k=1}^5 s_{jk} \ln P_j^1 \ln P_k^1 + \sum_{j=1}^5 \sum_{l=1}^2 j_l \ln P_j^1 \ln Z_l + \sum_{l=1}^2 b_l \ln Z_l + \frac{1}{2} \sum_{l=1}^2 u_{ll} \ln Z_l \ln Z_l + v - u \quad (1)$$

and

$$U = d_0 + \sum_{d=1}^5 d_d W_d + X \quad (2)$$

Where;

P^1 = Restricted profit (total revenue minus total variable cost normalized by output price)

P_j^1 = Cost of j th variable input normalized by the input price ($j = 1, 2, \dots, 5$),

P_1 = Normalized cost of piglet

P_2 = Normalized cost of labour

P_3 = Normalized cost of feeding (i.e. feeds and water)

P_4 = Normalized cost of drugs/veterinary

P_5 = Normalized cost of waste disposal

W_d = Variable representing socio-economic characteristics of the farmer and the farm to explain the factors that are responsible for inefficiency such as age, education, farming experience, sex and flock size.

The Maximum Likelihood (MLE) estimates of the parameters of the Cob-Douglas stochastic frontier profit function were defined by equation (1) given the specifications for inefficiency effects defined by equation (2) (Coelli, 1996). The hypothesis that the efficiency effects jointly estimated with the profit frontier function were not random errors was tested. The key parameters $C = r^2u / (r^2u + r^2v)$ is the ratio of the errors and the value is between zero and one. If $C = 0$, inefficiency is not present and if $C = 1$, there is no random error. The parameter C is not equal to the ratio of the variance of the efficiency effects and the total residual because the variance of U_i is equal to $[(p-2)/p]r^2$ and not r^2 . The relative contribution of the inefficiency effects to the total variance term (C^*) is equal to $C^* = C/[C + (1-C)p/(p-2)]$ (Coelli *et al.*, 1998).

Results and discussion**Socio Economic Characteristics of the Pig Farmers**

The frequency distribution of socio-economic characteristics of the pig farmers are presented in Table 1.

The result shows that 75.8% of the respondents were below 50 years and maximum likelihood estimates were presented in years of age. This implies that majority of the respondents were in active age group. Nwaru (2004) noted that the ability of a farmer to bear risk, be innovative and be able to do manual work decreases with increasing age. This finding has relevance

with respect to labour productivity in pig farming. This is based on the fact that enough energy and drive is required to effectively manage a piggery (Adeshinwa *et al.*, 2003). Majority (93.9%) of the farmers were male while 6.1% of them were female. This is probably because pig farming requires more of physical strength that can be provided by men. About 68.1% of the household had maximum of 6 members in their family while 31.9% had up to 12 members. This determines the quantity of family labour supply to individual pig farm. Though, larger family consumes more of the farm products at home and this may reduce farm income.

A larger proportion of the pig farmers (98.5%) had, at least, primary education. This is a reflection that pig production requires some levels of formal education to be able to cope with the technical aspects such as drug administration and dosage, fumigation, specifications and other new technology. Formal education according to Ewuziem *et al.* (2009) enhances the farmers managerial ability of record keeping, rational decision taking, cost reduction and maximization of opportunities. Meanwhile, 83.3% of the pig farmers were in operation for less than 10 years ago while 16.7% had between 10-25 years of experience. The low level of experience in pig production might be due to high rate of withdrawal from pig business in the past years. Effiong (2005) opined that fresher's in farming business are prone to inefficiencies in utilization of available resources. However, 57.6% of the farmers were engaged in pig production only while

42.4% combined pig production with other jobs. This implies that pig production is not only profitable but also requires time and commitment.

Waste Management characteristics of pig farmers

The result of the Waste Management characteristics of pig farmers in the study area is presented in Table 2.

Table 1: Characteristics of the pig farmers (N = 66)

| Characteristics | Frequency | Percentage (%) |
|-------------------------------|------------------|-----------------------|
| Age (years) | | |
| Below 30 years | 10 | 15.2 |
| 30- < 40 | 25 | 37.9 |
| 40- < 50 | 15 | 22.7 |
| 50- < 60 | 13 | 18.2 |
| 60 years and above | 6 | 6.1 |
| Gender | | |
| Male | 62 | 93.9 |
| Female | 4 | 6.1 |
| Household size | | |
| 1-3 | 9 | 13.6 |
| 4-6 | 36 | 54.5 |
| 7-9 | 15 | 22.7 |
| 10-12 | 6 | 9.1 |
| Education | | |
| No schooling | 1 | 1.5 |
| Primary | 4 | 6.1 |
| Secondary | 22 | 33.3 |
| Tertiary | 39 | 59.1 |
| Experience (yrs) | | |
| below 5 years | 39 | 59.1 |
| 5- < 10 | | 24.2 |
| 11- < 15 | 6 | 9.1 |
| 16- < 20 | 3 | 4.5 |
| 21- < 25 | 1 | 1.5 |
| 25 years and above | 1 | 1.5 |
| Job combination | | |
| Pig farming only | 38 | 57.6 |
| Pig farming and trading | 15 | 22.7 |
| Pig farming and craftwork | 1 | 1.5 |
| Pig farming and transport | 2 | 3.0 |
| Pig farming and civil service | 10 | 15.2 |

Source: Computed from field survey data, 2019

Table 2: Waste Management characteristics of pig farmers (N = 66)

| Characteristics | Frequency | Percentage(%) |
|--|-----------|---------------|
| Farm acquisition | | |
| Constructed | 30 | 45.5 |
| Purchased | 21 | 31.8 |
| Leased | 15 | 22.7 |
| Flock size (Pig) | | |
| 1-50 | 12 | 1.8 |
| 51-100 | 21 | 31.8 |
| 101 and above | 33 | 50.0 |
| Waste collection | | |
| Manual scrapping with shovels | 62 | 93.9 |
| Slopped floor system | 4 | 6.1 |
| Waste disposal | | |
| Deposited on land surface within farm | 38 | 57.6 |
| Buried inside pit within farm | 6 | 9.1 |
| Deposited in bush | 20 | 30.3 |
| Deposited in river | 2 | 3.0 |
| Waste treatment | | |
| No treatment | 49 | 74.2 |
| Chemical treatment | 2 | 3.0 |
| Burning | 10 | 15.1 |
| Chemical treatment and burning | 5 | 7.6 |
| Waste utilization | | |
| No utilization | 42 | 63.6 |
| Fish feeding | 2 | 3.0 |
| Manure and compost | 21 | 31.8 |
| Sold | 1 | 1.5 |
| Constraints to waste utilization/disposal | | |
| Lack of utilization skill | 45 | 68.2 |
| Irritation and labour scarcity | 6 | 9.1 |
| Lack of vehicle and transportation cost | 5 | 7.6 |
| Difficulty to burn during rainy season | 4 | 6.1 |
| High cost of pit and chemical | 6 | 9.1 |

Source: Computed from field survey data, 2019

The frequency distribution in table 2 also revealed that 81.8% of the farmers rear more than 101 pigs while 1.8% had more than 50 pigs on their farm. The implication of this result is that the quantity of waste generated by pig farmers and managed by this system will inevitably pose environmental problems. As stock size increases, more waste are generated and the environmental media is distorted and conflict are abounding, if adequate management practices is lacking. About 93.9% of the farmers used shovel and

spade to remove the pig waste from the pen house i.e. manual method while 6.1% flushed the droppings out through a specially constructed sloppy floor system. This shows that the level of technology in pig farming in the area is low. However, about 90.9% of the pig farms deposited their pig waste either on their farm, inside bush or rivers while 9.1% buried their waste inside pit. This decision resulted to conflicts, pollution and nuisance to the environment. This result supports the findings of Oladejo (2003) who stated that

farm animal wastes cannot be avoided, however their presence possess serious problem of odour to and water pollution. In addition, 74.2% of the farmers did not treat their farm waste before or after disposal while 25.8% treated it with chemical or burn during dry season to reduce air pollution, flies' prevalence and disease outbreak. The results further showed that majority (63.6%) does not make economic use of the pig waste; a few (34.8%) utilized the waste for making compost, organic manure and to feed fish while 1.5% sold the manure to gardeners and

other users. Majority (68.2%) of the respondents acclaimed that the constraints to pig waste utilization was lack of utilization skill. Other constraints include labour scarcity and high cost of disposal, high cost of chemical and difficulty to burn during wet season.

Determinants of profit efficiency:

Results of the stochastic profit function i.e. maximum likelihood estimates for pig farmers in the study area were presented in Table 3.

Table 3: Estimates of the frontier profit function for pig enterprise

| Variables | Parameter | Coefficient | T-ratio |
|-----------------------------------|----------------|-------------|------------|
| Constant | "O | 12.3544 | 11.6465 |
| InP ₁ (Stoking) | "S | 0.3043 | 1.5684 |
| InP ₂ (Labour) | "L | 0.0922 | 3.6400*** |
| InP ₃ (Feeding) | "F | 0.4821 | 4.2144*** |
| InP ₄ (Medication) | "M | -0.2523 | -2.5857*** |
| InP ₅ (Waste disposal) | "W | -0.6146 | -0.5259 |
| Variance parameters | | | |
| $R^2 = r^2u + r^2v$ | R^2 | 2.0114 | 3.0626*** |
| $C = r^2u/(r^2u + r^2v)$ | C | 0.8662 | 29.4533*** |
| Log likelihood | - | -81.19 | - |
| Inefficiency factors | | | |
| Constant | M ₀ | -0.5442 | -05188 |
| Age | M ₁ | 0.0440 | 1.7888 |
| Education | M ₂ | -0.0363 | -0.4483 |
| Experience | M ₃ | -0.1456 | -1.4633 |
| Sex | M ₄ | 1.8322 | 2.1244** |
| Flock Size | M ₅ | -0.0003 | -1.3216 |
| Efficiency | Mean = 66.34 | | |

Computed from field survey data, 2019. *Significant at 1%, **Significant at 5%, ***Significant at 10%.

Note: A negative coefficient of an inefficiency factor indicates positive impact on efficiency

The MLE coefficients for cost of pig/stocking, labour and feed were positive and significant at 1% and 1% respectively. This implies that additional cost to use more of these variables would earn higher profit i.e. increase profit efficiency. Medical cost has a negative coefficient significant at 1%. This indicates that medical cost had declining effect on amount of profit made. Perhaps, this was as a result of high cost of drugs and veterinary services. However, the estimated average value of profit efficiency is 0.663

implying that an average pig farm can still increase profit level by 33.6%.

Hence, further improvement is required to improve on technical, allocative and scale efficiencies in pig production in the area. However, the socio-economic factors that accounted for inefficiency among the pig farmers are age, experience and sex. The coefficients of these variables were significantly different from zero with *a priori* expectations. The hypothesis that $C = 0$ was rejected at 5% level of significance

confirming that inefficiencies exist and indeed stochastic. The result shows that experience plays an important role in reducing inefficiency in pig farming at 5% significance level. Thus, increase in years of experience is favourable to making increased profit in piggery business. This result corroborates with the findings of (Ojo and Ajibefun, 2000, Ume *et al.*, 2013). Age has a positive and significant relationship with inefficiency at 10%. Therefore, profit efficiency would continue to decline as

farmers grow older in age. Sex is also positive and significant to inefficiency at 5% meaning that the few female pig farmers were more efficient than their male counterpart.

Profit Efficiency Estimates from Cobb-Douglas Stochastic Frontier Model of Pig farmers

The profit efficiency estimates from Cobb-Douglas stochastic frontier model of pig farmers is shown in Table 4.

Table 4: Profit Efficiency Estimates from Cobb-Douglas Stochastic Frontier Model of Pig farmers in Owerri Agricultural zone of Imo State.

| Efficiency Range | Frequency | Percentage (%) |
|------------------|-----------|----------------|
| $0.01 \leq 0.30$ | 13 | 19.7 |
| 0.31-0.60 | 32 | 48.50 |
| 0.61-0.90 | 16 | 24.20 |
| ≥ 0.91 | 5 | 7.6 |
| TOTAL | 66 | 100 |
| Mean Efficiency | 0.5344 | |
| Minimum | 0.01 | |
| Maximum | 0.99 | |

The result showed that majority (48.50%) of the farmers operated within a profit efficiency range between 0.31-0.60, while 24.2% producers operated at 0.61- 0.90, with 19.7% at 0.30 or less and a few (7.6%) at 0.91 or more. It was deduced that 0.31.8 or 31.8% had a profit efficiency 0.61 and above. This implies that 31.8% of pig producers had 31.8% profit inefficiency or less and this is the value that would be required to attain its frontier. The minimum profit efficiency was 0.01 while the maximum profit efficiency was 0.99. The mean profit efficiency of producers was 0.5344 or 53.44% (Table 4). This implies that in order to raise the profit

efficiency in the study area to maximum, there should be an increase of 46.56% of technical and allocative efficiency. The result is similar with findings by Abu, *et al.* (2012) and Tsue, *et al.* (2012) who reported that there is a scope for increasing sesame and catfish output by 33.3% and 16% respectively in the short – run with improved technology.

Waste Management Constraints in Pig Production Among Farmers.

The result of Constraints to waste management in pig production in the study area were presented in Table 5.

Table 5. Constraints to waste management in pig production in the study area.

| Constraint | Frequency | Percentage |
|-----------------------------------|-----------|------------|
| Poor access to credit | 56 | 84.8 |
| Poor road network | 38 | 57.6 |
| Veterinary posts | 45 | 61.2 |
| Water problem | 38 | 57.6 |
| Housing | 35 | 53.0 |
| Poor access to extension Services | 52 | 78.9 |
| High cost of Labour | 35 | 53.0 |
| Feed and Feeding | 26 | 39.4 |
| Water | 24 | 36.4 |

*Multiple Responses Source: Field Survey, 2019

Table 5 showed that poor access to credit constituted the greatest hindrance to waste management in pig production in the study area and accounted for 84.8% of the total respondents. Iheke (2010) reported that credit facilities adoption of innovations in efficient waste management and payment of labour in implementing the technologies. As well, 78.9% of the respondents reported the problem of poor extension services as barrier to wastes management in pig production. Extension services are needed to disseminate information as well as technical assist to farmers on how best to curb environmental challenges associated with wastes mismanagements (Asiabaka, 2003; Adeschinwa, 2003; Sudahmed, 2008).

Also, 61.2% of the sampled farmers encountered the problem of veterinary posts being cited in urban areas. Most veterinary posts are urban based in the study area and access to their services on information regarding precision feed management to reduce animal wastes and drugs to reduce nitrogen (N) and hydrogen sulphide (H₂S) contents of animal wastes which constitute significantly the odour observed in animals' wastes is often limited (Bradshain *et al.*, 2004). Moreover, 57.7% of the sampled pig farmers were faced with the problem of poor road network. The deplorable conditions of our roads especially in our rural and farm road are of great concern and very pathetic. The roads in many of the areas are impassable especially during rainy season, thus constitutes a clog in wheel of disposing

pig wastes to farmers' farms in the neighbouring vicinity for usage. Consequently, such indisposed waste(s) could constitutes source of odour as many pig farms' have accommodation problem and poor technologies to adequately conserve such wastes to avoid polluting the environments (Rogers, 2003; Ume *et al.*, 2013). The other problems of wastes management in pig poultry were water problem (36.4%), problem of housing (53.0%) and high cost of labour (53.0%)

Conclusion and policy implications

Result of the empirical analysis showed that there is no effective management of pig waste in the study area in terms of utilization and method of disposal, leading to environmental pollution at increasing rate. The major constraints to wastes managements to pig production were poor access to credit, poor road network and location of veterinary post, high labour costs, and poor housing problems and poor road network. The results also revealed that the pig farmers can further increase their profit efficiency. The economic use of the pig waste would also help in maximizing the farm's profit in addition to improvement in technical, allocative and scale efficiencies. Therefore, pig farmers should be trained through extension services, workshops and conferences about effective utilization of pig manure or waste. Stakeholders should develop appropriate technology for the conversion of pig waste particularly pig manures into organic

fertilizers to augment the scarce and very expensive inorganic fertilizer. Effective monitoring services should be operated to sensitize pig farmers on the need for environmental friendly waste management that would reduce environmental pollution and incidence of outbreak of disease. The positive and significant relationship of feed with profit suggests that increased production of feedstuff e.g. maize, sorghum, palm kernel cake etc should be encouraged by granting financial assistance to the producers. This would also reduce the competition in demand for the crops between man and livestock. More so, government should reduce import duties on pig drugs to encourage increased production and farm profit since cost of medication was significant and negative to profit efficiency.

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