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Comparative Analysis of Profitability Drivers of Pig Production Systems in Northern Uganda

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Abstract

Pork consumption has risen significantly in many emerging nations, with producers using various systems to meet demand. However, the profitability of these systems remains largely unexplored. Therefore, the drivers of profitability of pig production systems in Northern Uganda were examined. Data were collected using a pretested structured questionnaire through a cross-sectional survey of 240 randomly selected pig farmers. Data were analyzed using descriptive statistics, gross margin analysis, and ordinary least squares model. Results revealed that the cost of initial stock ($p < 0.1$), cost of feed ($p < 0.05$), cost of vaccines ($p < 0.01$), output ($p < 0.05$), and quantity of feed ($p < 0.05$) were drivers of profitability in the farrow-to-finish pig production system. Further, profitability in the farrow-to-weaner pig production system was influenced by access to credit ($p < 0.1$), household size ($p < 0.1$), access to extension service ($p < 0.01$), and cost of initial stock ($p < 0.05$). In the weaner-to-slaughter pig production system, drivers of profitability included access to extension service ($p < 0.1$), cost of feed ($p < 0.1$), cost of vaccines ($p < 0.05$), and cost of initial stock ($p < 0.05$). Researchers recommend that the government arrange sufficient capacity-building initiatives and training, particularly on the farrow-to-weaner pig production system to increase the output and profitability of this production system. Further, the government and non-governmental organizations should make inputs such as vaccines, drugs, and breeding stock available to pig farmers at competitive market prices to enable farmers to make price-responsive decisions.

Keywords: animal production; farrow-to-finish; ordinary least squares; pork; returns on investment

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INTRODUCTION

Today's world has a growing appetite for meat, which has increased livestock production generally, with developing countries accounting for most of this growth (Parlasca and Qaim, 2022; Gbordzoe et al., 2024). Pig production is a typical illustration of how livestock production is crucial to the agricultural economy in developing countries. The global meat output has been greatly impacted by pork production in several countries (Szűcs and Vida, 2017). Scientifically known as *Sus scrofa*, domesticated pigs are the source of pork. They are members of the family Suidae and the Artiodactyla order (Rekiel et al., 2019). Pig farming plays a significant role in diversifying risk and securing the livelihood of smallholder farmers, as they are an essential means of generating revenue for farmers (Bharati et al., 2022). The small-scale pig farming enterprise

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has been discovered to give high returns provided proper husbandry practices and good management skills are adopted (Micheni et al., 2020).

In most countries of sub-Saharan Africa, malnutrition problems due to a deficiency in animal protein assimilation are common among most rural households (Ume et al., 2020). Pork is an adequate source of high-quality protein that meets nutritional needs and ensures the food security of several households (Mondal et al., 2022). Pigs have tender meat, which is highly nutritive and has higher protein and vitamin B components than other livestock (Aminu and Akhigbe-Ahonkhai, 2017). Furthermore, they have high litter sizes, an early maturity period, small space requirements for rearing, and the adaptive ability to thrive in environments where other livestock fails (Ume et al., 2020). Their carcass contains a smaller percentage of bones and a higher percentage of edible meat (Aminu and Akhigbe-Ahonkhai, 2017). Pig production provides other benefits, such as being a valuable source of income and a foreign exchange for any nation (Umeh et al., 2015). Also, pig waste is a good source of manure for crops and can be converted to cooking gas for domestic uses (Onyekuru et al., 2020). Pig production is gaining ground and thus in response to the high demand for pork, different production systems are being employed by farmers.

Pig production systems are the various operations that farmers practice to raise pigs. They are categorized according to the developmental phases of pigs (Kithinji, 2018). The farrow-to-finish, weaner-to-slaughter, and farrow-to-weaner production systems are 3 prominent production systems practiced in Uganda, each with distinct characteristics and economic implications. The farrow-to-finish production system involves raising pigs from birth (farrowing) to full maturity. This system has a long production duration of approximately 6 to 7 months, during which pigs reach a market weight of 90 to 100 kg (Mbuthia et al., 2015). This system offers significant flexibility and long-term potential but demands substantial labor, capital, and a solid commitment to the swine business (Jerlström et al., 2022).

In contrast, the weaner-to-slaughter production system, also known as fattening, entails purchasing weaners weighing between 13 to 25 kg from other farmers and raising them to market weight. This system has a shorter production cycle, typically lasting 4 to 5 months (Kithinji, 2018). Pigs are reared to full maturity and sold at the farm gate or in the market. The weaner-to-slaughter system requires lower labor and overhead costs than the farrow-to-finish system. It also allows farmers to utilize local feeds to finish pigs and use pig dung as manure and fertilizer for crops (Chibanda et al., 2020). The farrow-to-weaner, or breeding, system focuses on raising pigs from farrowing until the piglets are weaned, typically after 1 to 2 months, at an average weight of 20 kg (Mbuthia et al., 2015). These weaners are then sold to other farmers for fattening or breeding purposes. This system requires fewer facilities, lower operating capital, and reduced feed compared to other production systems (PennState, 2016).

Pig farmers practice any production system of their choice depending on the expertise and resources available. The profitability of the 3 production systems may seem to vary depending on the various combinations of inputs used to maximize output and the characteristic features of these systems (Duvaleix-Tréguer and Gaigne, 2016). To achieve the desired profit margins, farmers must consider the production cost structure (Keraru et al., 2021). Pig production systems contribute to sustainable agriculture by efficiently converting feed into protein, enhancing food security, and utilizing agricultural by-products (Rauw et al., 2020). Furthermore, pig production systems support sustainable agriculture by optimizing resource use, recycling organic waste, and integrating with crop production to enhance soil fertility and biodiversity (Alvarez-Rodriguez et al., 2024).

Even though many production techniques are used worldwide in pig farming, smallholder pig farmers only make a small profit from their businesses. This condition is due to the smallholder pig farmers' inability to use practical management strategies that would help them make better profits from their production. Additionally, the various pig production systems being implemented offer untapped financial potential. Farmers in Uganda lack knowledge about the pig production techniques that provide the best return rate, which could guide their decision-making. Several studies have been done to estimate costs and returns as well as ascertain the drivers of profitability of pig production among pig farmers in several parts of the world from a general perspective (Duniya et al., 2013; Aspile et al., 2016; Nabikyu and Kugonza, 2016; Okojie et al., 2019; Onyekuru et al., 2020; Ume et al., 2020; Fakudze et al., 2021; Keraru et al., 2021) without focusing on the different production systems. While Keraru et al. (2021) and Mbaso and Kamwana (2013) investigated the profitability of various pig production systems, they did not explore the factors influencing this profitability, leaving a gap in the literature. There is a noticeable gap in the comparative analysis of the factors affecting the profitability of pig production systems, particularly in Northern Uganda. Therefore, this study sought to ascertain the drivers of the profitability of pig production systems in Northern Uganda. Understanding these factors is essential for boosting productivity and improving economic outcomes for smallholder farmers in the area.

MATERIALS AND METHOD

Study area

The study was conducted in Kole (32°45'47.9" E and 2°22'12.4" N) and Lira (32°53'14.6" E and 2°15'29.2" N) Districts within the Lango Sub-region, Northern Uganda (Figure 1). The Lango Sub-region, with an estimated population of 2 million, comprises 9 districts: Oyam, Alebtong, Dokolo, Amolatar, Apac, Kwania, Kole, Otuke, and Lira. It is a relatively developed area with 2 municipalities where trade, manufacturing, and services thrive. The region experiences unimodal rainfall (1 long rainy season) from March to October.

Sampling design

The study utilized a cross-sectional design from November 2021 to August 2022, employing a multi-stage sampling technique. Initially, Kole and Lira Districts were purposively selected due to the high concentration of pig farmers and their proximity. Subsequently, 10 sub-counties were chosen within these districts: Bala, Akalo, Ayer, Alito, and Aboke in Kole and Ngetta, Barr, Adekokwok, City West, and Ayago in Lira, all selected based on their relevance to the study. Pig farmers (240) were randomly selected between the 2 districts across the sub-counties. This was aided by a list obtained from the agricultural officers in the 2 districts.

Data collection

A pretested structured questionnaire was employed to gather data on the pig production systems and their profitability. The questionnaire included open- and close-ended questions to obtain comprehensive insights from the pig farmers.

Data analysis

Gross margin analysis

Gross margin analysis was used to calculate the gross margins generated by the pig production systems (Equation 1).

$$\text{Gross margin } (GM_{ij}) = TR_{ij} - TVC_{ij} \qquad (1)$$

Where subscripts ij refers to the j^{th} farmer of the i^{th} production system. TR or total revenue is the total amount of money that a farmer receives from the sale of an output. TR = ΣPx Qx by farmer per production system (P is the price per pig, Q is the number of pigs sold). TVC is the cost that varies with the production.

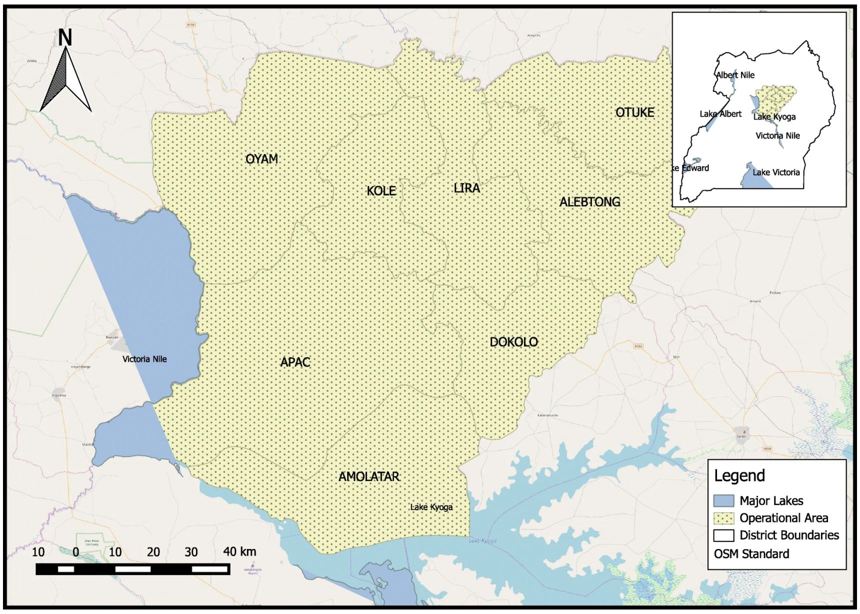

Figure 1. Map of Kole and Lira Districts (Lango Sub-region) (Wangoola et al., 2019)

Table 1. Description of variables in the multiple linear regression model of the drivers of profitability of pig production systems

Variables	Description	Expected sign	Sources
Y = Profit	Amount in UGX		
X1 = Age	Number in years	+	Etim et al. (2014)
X2 = Household size	Number in years	+/-	Duniya et al. (2013)
X3 = Years of farming experience	Number in years	+-	Raja et al. (2022)
X4 = Access to credit	1 = yes, 0 = no	+	Obayelu et al. (2017)
X5 = Access to extension service	1 = yes, 0 = no	+	Fakudze et al. (2021)
X6 = Cost of initial stock	Amount in UGX	+/-	Adewale and Belewu (2022)
X7 = Cost of feed	Amount in UGX	+/-	Aminu and Akhigbe-Ahonkhai (2017)
X8 = Cost of vaccines	Amount in UGX	+/-	Ume et al. (2020)
X9 = Output (No of pigs produced)	Number of pigs	+/-	Uddin and Osasogie (2016)
X10 = Quantity of feed	Weight in kg	+	Aminu and Akhigbe-Ahonkhai (2017)

The rate of return (ROR) is used to measure the amount of return on an investment (ROI) relating to the cost of investment (Equation 2).

Rate of returns = (ROR) or

$$(ROI) = NR/TC \quad (2)$$

Where NR = net return, TC = total cost.

Analysis of variance (ANOVA) was used to ascertain whether there were statistical differences in the average gross margins of the different pig production systems.

Ordinary least square

Ordinary least square (multiple regression) was used to ascertain the drivers of profitability of pig production systems (Equation 3).

$$Yi = \beta_0 + \beta_i X_i + \mu_i \quad (3)$$

Where Yi = profit, β_0 = intercept, and β_i = slope of the regression line (regression coefficients), X_i = explanatory variables (Table 1), μ_i = random disturbance or error term.

RESULTS AND DISCUSSION

Socio-demographic characteristics of pig farmers

The results of the socioeconomic characteristics (Table 2) indicated that the mean age (38 years) of pig farmers in Lira District was lower (p < 0.1) compared to Kole District, which had 41 years. However, the age brackets imply that most pig farmers in both districts were youthful, agile, and physically capable of managing pig production, a venture that is typically labor-intensive and capital-intensive (Ume et al., 2020). More than half of the pig farmers were male, and more than three-quarters of pig farmers were married. It could imply that pig farmers ventured into the farming business to meet family needs. Similar results were reported by Adetunji and Adeyemo (2012) that most pig farmers were married.

The chi-square result for marital status indicated an association (p < 0.01) between marital status and pig production in the 2 districts. Further, pig farmers in Kole had 6 household members on average, which was higher than that of Lira (p < 0.05) with 5 household members on average. It suggests that household members could provide labor for the pig production enterprise, significantly reducing the costs of hiring external labor. This agrees with the findings of Onyekuru et al. (2020), which indicated a mean household size of 5 members among pig producers in Enugu, Nigeria. Three-quarters of pig farmers in both districts reported having ready access to markets (p < 0.01), likely due to the proximity of their farms to the marketplaces. Most pig farmers in Lira District are not members of any farming association or cooperative society.

In contrast, over half of the pig farmers in Kole District belong to either a farming association or a cooperative society. A study by Umeh et al. (2015) similarly found that most pig farmers were members of farmers' associations. These associations and cooperatives can offer pig farmers greater bargaining power and bulk sales. Additionally, less than three-quarters of pig farmers had access to training on pig production

Table 2. Summary of socio-demographic characteristics of pig farmers (N = 240)

Variable	Overall mean (±SD)	Lira mean (±SD)	Kole mean (±SD)
Age	39.56 (11.67)	38.27 (11.98)*	40.92 (11.23)*
Gender	0.55 (0.50)	0.50 (0.50)	0.59 (0.49)
Household size	5.74 (2.50)	5.39 (2.05)**	6.11 (2.86)**
Marital status	0.85 (0.36)	0.77 (0.42)***	0.92 (0.27)***
Access to market	0.76 (0.43)	0.82 (0.39)***	0.69 (0.46)***
Membership of association	0.29 (0.46)	0.04 (0.20)***	0.56 (0.50)***
Access to training on pig production	0.07 (0.26)	0.04 (0.20)**	0.11 (0.32)**
Access to credit	0.40 (0.49)	0.24 (0.43)***	0.56 (0.50)***
Pig breeds	0.41 (0.49)	0.40 (0.49)	0.42 (0.50)
Distance to the nearest market	6.27 (7.85)	2.13 (1.77)***	10.61 (9.31)***

Note: ***, **, and * represent significance at $p < 0.01$, $p < 0.05$ and $p < 0.1$, respectively. Independent sample T-test was performed to separate means between districts

in both districts ($p < 0.05$). Extension services are crucial in the pig industry as they equip farmers with essential knowledge, skills, and up-to-date techniques to optimize production. Experienced extension agents with a solid understanding of pig production systems can help farmers grasp the specific needs and challenges associated with these systems. A study by Nabikyu and Kugonza (2016) reported that most pig farmers had access to extension services in the form of veterinary support.

Furthermore, three-quarters of pig farmers did not have access to credit in Lira District; on the other hand, more than half of the pig farmers in Kole District had access to credit. A similar study by Fakudze et al. (2021) in Swaziland indicated that most pig farmers had access to credit. Conversely, Obayelu et al. (2017) reported that most pig farmers could not access credit. Access to agricultural credit is essential for enhancing agricultural productivity and expanding farming enterprises. Regarding the type of pig breeds reared, large white and local breeds were the most common breeds of pigs across the production systems. They were mostly raised independently, with only a few pig farmers having large white and local breeds. Large white was predominant in the farrow-to-finish and weaner-to-slaughter production systems. This could be justified technically because of the high prolific rate and the disease's resistance ability of the large white breeds. The large white breed also produces pigs with better characteristics through cross-breeding with local breeds. This finding conforms with those of Fakudze et al. (2021), who reported that most pig farmers in Swaziland reared large white pig breeds.

Profitability of pig production systems

Table 3 shows the average cost and returns of 3 pig production systems, namely farrow-to-finish, weaner-to-slaughter, and farrow-to-weaner, having a gross margin of 3,251,934 UGX (867.52 USD), 1,567,921 UGX (418.28 USD), and 302,311 UGX (80.65 USD), respectively. The farrow-to-finish production system recorded the highest amount of revenue generated in the value of 5,006,438 UGX (1,335.57 USD), followed by the weaner-to-slaughter production systems (3,331,351 UGX/888.71 USD). The farrow-to-weaner had the lowest revenue generated at 1,219,139 UGX (325.23 USD). Consequently, the farrow-to-finish had the highest return on investment of 2.85%, implying that every 1 UGX invested in pig business in this production system would yield a return of 2.85 UGX. The weaner-to-slaughter production system recorded a return on investment of 1.89%, implying that every 1 UGX invested in pig business in this production system would yield a return of 1.89 UGX.

In comparison, the farrow-to-weaner production system had the lowest return on investment of 1.33%, implying that every 1 UGX invested in pig business in this production system will yield a return of 1.33 UGX. The return on investment of the 3 production systems in the current study is higher than those of pig production in Ekiti State, Nigeria (Aminu and Akhigbe-Ahonkhai, 2017), Oyo State, Nigeria (Adetunji and Adeyemo, 2012), and Vietnam (Tuan et al., 2020) where the return on investments were 0.82, 0.34 and 0.24, respectively. Further, it can be inferred that the farrow-to-finish production system is the most

Table 3. One-year average cost and returns in pig production by production systems in Ugandan shillings

	Farrow-to-finish (N = 73)	Farrow-to-weaner (Breeding) (N = 93)	Weaner-to-slaughter (Fattening) (N = 74)
Number of mature pigs/weaners sold	9	11	5
Selling price per pigs/weaners (UGX)	472,054	100,107	417,567
Revenue	5,006,438	1,219,139	3,331,351
Cost of initial stock	309,931	260,967	462,364
Cost of feeds	1,102,393	446,393	1,044,983
Cost of vaccines and drugs	221,506	140,306	170,959
Labor cost	26,630	4,193	6,486
Transportation cost	73,815	43,118	53,729
Transaction cost/tax duties	15,369	12,516	19,000
Other cost (brokers/damages)	4,856	9,333	5,905
Total variable cost	1,754,503	916,828	1,763,429
Gross margin/profit	3,251,934	302,311	1,567,921
Rates of return (ROR)	2.85	1.33	1.89

Note: On average, farrow-to-finish = 2 production cycles, farrow-to-weaner = 5 production cycles, and weaner-to-slaughter = 3 production cycles. Figures in the table represent the average figures for each farmer

profitable of the 3 production systems. The lower gross margin of the farrow-to-weaner pig production system could result from the small weight and few live piglets sold. Mbaso and Kamwana. (2013), in a comparable study, reported that the farrow-to-finish pig production system was the most profitable of the 3 production systems. On the contrary, Keraru et al. (2021), in a study conducted in Indonesia, reported the weaner-to-slaughter pig production system to be the most profitable of the 3 production systems.

One-way ANOVA was used to ascertain if there was a significant difference in the average (mean) gross margins of pig production systems (Table 4). *P*-value was significant at 1%.

Table 4. One-way ANOVA showing the mean gross margins of pig production by production systems

Production systems	Mean ±SD
Farrow-to-finish	3,251,934.932 ± 10,626,077.30[a]
Farrow-to-weaner (breeding)	302,311.290 ± 1,430,208.34[b]
Weaner-to-slaughter (fattening)	1,567,921 ± 2,390,429.80[c]

Note: The mean value with different subscripts indicates a significant difference at 1% (*p*-value ≤ 0.01)

Therefore, this study rejected the null hypothesis that there is no significant difference in the gross margins of pig production systems. This implies that the gross margin of the farrow-to-finish pig production system was different from the gross margin of the farrow-to-weaner pig production system, which in turn was different from the gross margin of the weaner-to-slaughter pig production system (between groups) (Table 4). In other words, the average gross margins of the production systems varied from 1 production system to another. This conforms to the findings of Mbaso and Kamwana (2013) who reported a significant difference in the gross margins across the production systems in a study carried out in Malawi.

Drivers of profitability of pig production systems

Table 5 shows the result of the ordinary least square (multiple regression) model used to ascertain the drivers of profitability of pig production systems. The equation of the result of the model regression for each production system is presented in Equation 4, 5, and 6.

The adjusted–R^2 0.855, 0.662, and 0.608 showed that 86%, 66%, and 61% of the variation in the profitability of the farrow-to-finish, farrow-to-weaner and weaner-to-slaughter pig production system respectively were explained

$$Y = 3.63-0.42X1+0.11X2+0.69X3+0.77X4-0.40X5+0.61X6-0.34X7-0.18X8+0.42X9+0.34X10+e \text{ (Farrow-to-finish)} \quad (4)$$

$$Y = 17.72-0.29X1+0.28X2+0.71X3+0.79X4-0.51X5+0.59X6-0.27X7+0.19X8-0.76X9-0.06X10+e \text{ (Farrow-to-weaner)} \quad (5)$$

$$Y = 10.36+0.02X1+0.66X2-0.51X3-0.55X4+0.88X5+0.10X6-0.37X7-0.44X8+0.20X9+0.20X10+e \text{ (Weaner-to-slaughter)} \quad (6)$$

by the independent variables. It was revealed that household size was statistically significant ($p < 0.1$) and positively influenced the profitability of the farrow-to-weaner production system. In other words, profit generated in this production system increased with increasing household size. This could mean that pig farmers practicing this system utilized the service of their household members as family labor in the production process. Adequate care and attention are needed to breed healthy weaners. This result conforms with those of Duniya et al. (2013), who reported that household size positively affected pig production in Kaduna State, Nigeria. This would help minimize the cost of production by eliminating the cost of hired labor, thus increasing revenue. Household size was not significant in the farrow-to-finish and weaner-to-slaughter production systems.

Similarly, access to credit had a positive and significant effect ($p < 0.1$) on the profitability of the farrow-to-weaner production system. Farmers who had access to credit got higher returns than those who did not have credit access. Financial services such as credits, loans, and subsidies would ensure the optimum production of weaners that command a good price in the market, thus leading to high profits for pig farmers. This aligns with the findings of Obayelu et al. (2017) who reported that access to credit had a significantly positive influence on pig production in Ogun State, Nigeria. Access to credit was, however, not significant in the farrow-to-finish and weaner-to-slaughter production systems.

Further, access to extension services was found to be positive and statistically significant in farrow-to-weaner ($p < 0.01$) and weaner-to-slaughter ($p < 0.1$) production systems. This meant that farmers with access to extension services in these 2 production systems generated more profits than those who did not have access to extension services. Pig farmers who were well-trained by extension agents on the intricacies and peculiarities of these production systems could generate more returns. Extension agents could also help provide farmers with information

Table 5. Ordinary least square estimates for drivers of profitability of pig production systems

Variables	Coefficients (*p*-value)		
	Farrow-to-finish (N = 73)	Farrow-to-weaner (Breeding) (N = 93)	Weaner-to-slaughter (Fattening) (N = 74)
Age (X1)	-0.42 (0.38)	-0.29 (0.22)	0.02 (0.49)
Household size (X2)	0.11 (0.65)	0.28 (0.08)*	0.66 (0.45)
Years of farming experience (X3)	0.69 (0.73)	0.71 (0.51)	-0.51 (0.55)
Access to credit (X4)	0.77 (0.56)	0.79 (0.07)*	-0.55 (0.23)
Access to extension service (X5)	-0.40 (0.98)	0.51 (0.000)***	0.88 (0.07)*
Cost of initial stock (X6)	0.61 (0.08)*	0.59 (0.02)**	0.10 (0.05)**
Cost of feed (X7)	-0.34 (0.002)**	-0.27 (0.26)	-0.37 (0.11)*
Cost of vaccines (X8)	-0.18 (0.000)***	0.19 (0.69)	-0.44 (0.02)**
Output (No of pigs produced) (X9)	0.42 (0.04)**	-0.76 (0.59)	0.20 (0.78)
Quantity of feed (X10)	0.34 (0.002)**	-0.06 (0.96)	0.20 (0.58)
Constant	3.63 (0.002)	17.72 (0.03)	10.36 (0.02)
Prob > F	0.000	0.001	0.002
Adjusted R^2	0.86	0.66	0.61
Mean VIF	2.40	1.90	1.85

Note: ***, ** and * denotes *p*-value < 0.01, *p*-value < 0.05 and *p*-value < 0.1, respectively that can help enhance the profitability of these production systems. This agrees with Fakudze et al. (2021), who reported that access to extension services significantly positively influenced pig profitability in Swaziland.

Additionally, the initial stock cost significantly influenced the profitability of the 3 pig production systems. The cost of initial stock increased with increasing profits in the farrow-to-finish ($p < 0.1$) and weaner-to-slaughter ($p < 0.05$) production systems. This could be that healthy and expensive breeding stock was directly proportional to greater productivity in matured pigs' heavy carcass size, thus leading to greater productivity. The cost of initial stock decreased with increasing profitability in the farrow-to-weaner ($p < 0.05$) production system. Reduced production costs can lead to output maximization, thus leading to high profit. Adewale and Belewu (2022) similarly reported a positive significant effect of the cost of breeding stock on revenue.

The feed cost significantly and negatively influenced ($p < 0.05$) profitability in the farrow-to-finish pig production system. This implies that the less money is spent on feeding pigs, the more profit is generated from the pig production enterprise. This is contrary to the discovery of Adetunji and Adeyemo (2012), who asserted that the feed cost significantly and positively influenced pig production. However, this variable was insignificant in the farrow-to-weaner and slaughter production systems. Similarly, the cost of vaccines decreased with increasing profits in the farrow-to-finish ($p < 0.01$) and weaner-to-slaughter ($p < 0.05$) pig production systems. Vaccines and drugs are vital in ensuring the production of healthy pigs. However, increasing costs of treating pigs may lead to reduced profitability.

On the contrary, Ume et al. (2020) asserted that the medication cost increased with increasing pig production. It can be argued pig farmers' access to medications such as vaccines, disinfectants, and drugs could increase their likelihood of generating higher output and profit. The vaccine cost was insignificant in the farrow-to-weaner pig production system. Output (no of pigs) was found to positively influence ($p < 0.05$) profitability in the farrow-to-finish pig production system. This meant that more profits were generated when more finished pigs were sold. This finding aligns with those of Uddin and Osasogie (2016), who reported that flock size significantly positively influenced monetary returns in pig production. Output was not significant in the other 2 pig production systems.

Furthermore, the quantity of feed significantly and positively influenced ($p < 0.05$) profitability in the farrow-to-finish pig production system. Well-fed pigs can command higher prices in the output market due to their significant weight and body size, thus leading to high profits. Similarly, Aminu and Akhigbe-Ahonkhai (2017) posited that the quantity of feed positively influenced output among pig producers in Nigeria. However, the feed quantity was insignificant in the farrow-to-weaner and weaner-to-slaughter pig production systems.

CONCLUSIONS

The study identified that the farrow-to-finish production system was the most profitable, with the highest gross margin, while the farrow-to-weaner system had the lowest profitability. Key factors influencing profitability in the farrow-to-finish system included costs related to initial stock, feed, and vaccines, as well as output and feed quantity. Household size, access to credit, extension services, and initial stock costs were significant for the farrow-to-weaner system. In the weaner-to-slaughter system, profitability was influenced by access to extension services and the costs of feed, vaccines, and initial stock. The study suggests that to help pig producers make more profit, the government and non-governmental organizations (NGOs) should offer training, affordable supplies, better market access, and targeted support services for farmers.

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