Drivers and Challenges in Pig Production Systems in Northern Uganda: Analyzing Farmers' Choices and Confronting Issues

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Selected Paper prepared for presentation at the 2024 Agricultural & Applied Economics Association Annual Meeting, New Orleans, LA; July 28-30, 2024

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ABSTRACT

Meat consumption, particularly pork consumption, has increased substantially in most developing countries. Pig farmers are employing various production systems to produce pork for consumption. This study examined the drivers of the choices of pig production systems and the challenges confronting pig farmers in Northern Uganda. Primary data were collected through a cross-sectional survey of 240 pig farmers with the aid of a pretested structured questionnaire. Data were analyzed using descriptive statistics (mean, frequency, and percentage), multinomial logit regression, and a Likert-type scale. Results revealed that most (54.6%) of the farmers were male and more than two-thirds of the farmers were married. A majority (38.8%) of the pig farmers practiced the farrow to weaner (breeding) production system and most (40.8%) of the farmers reared the large white breed of pigs. Further, marital status (married), distance to the nearest market (in km), number of weaners purchased as initial stock, access to extension service, breed of pig (large white), and gender (male) were found to significantly influence the choice of the farrow to finish production system over the reference category. Similarly, significant predictors of the choice of the weaner to slaughter (fattening) production system include distance to the nearest market (in km), years of farming experience, and number of weaners purchased as initial stock. The main challenges confronting pig farmers include the lack of or inadequate extension visits, the high cost of pig feeds, the lack of financial capacity for pig business expansion, and inadequate access to information relating to production systems. Based on our findings, we recommend that adequate extension services be made available to pig farmers. Such services should provide tailored advice pig production systems, focusing on breed selection, feeding, and marketing strategies. Adequate and up-to-date information should be made available to pig farmers regarding these production systems, Further, the government in collaboration with agricultural institutes should support research into pig breeds that are well suited for production systems in different environmental conditions. Policies that would ensure the availability of subsidized pig feeds and sufficient access to credit for pig business expansion should be enacted.

KEYWORDS

Challenges facing pig farmers, Multinomial logistic regression, Pig production systems, Farrow to finish, Weaner to slaughter, Northern Uganda

1. INTRODUCTION

The consumption of meat is on the increase in the world today leading to an upsurge in the production of livestock (Stoll-Kleemann & O'Riordan, 2015). There has been an increase in the world's meat production in the last decade with most of the surge being documented in developing countries (Whitton et al., 2021). Livestock production is a core part of the agricultural sector of developing countries of which a common example is pig production. Pork production has impacted the total productivity of meat in many countries in the world immensely (Lebret & Čandek-Potokar, 2022). Pork is obtained from domesticated pigs scientifically known as *Sus scrofa*. They belong to the family *Suidae* and the order *Artiodactyla* (Frantz et al., 2016). Pig production is one of the world's fastest-growing livestock sectors, and this trend will linger in the near-term years. Pig production has gained ground in countries transitioning from ruminant to monogastric livestock production (Cheng et al., 2022). The shorter life span of pigs, increasing demand for pork, higher rates of return, and high feed conversion ratio of pigs are key rationales behind the popularity of pig production (Knox, 2014).

Pig production is an attractive substitute for ruminant production due to its lesser costs of investment and it also does not strive for grassland with other forms of livestock production. Furthermore, selling pigs and their by-products presents a decent opportunity for the principally rural populace to realize any amount of money in a short time (Cupido, 2020). However, pig production in developing countries is influenced negatively by inadequate animal husbandry skills, inadequate capital for business enlargement, epidemic, and endemic diseases infestation, poor quality feeds, inadequate access to credit for purchasing farm inputs, high cost of building materials, lack of access to veterinary services, and illiteracy of the farmers (Dione et al., 2014).

These pig production constraints result in low productivity and hinder producers from becoming more competitive in foreign and domestic markets (Oosting et al., 2014).

Pig production systems refer to the various operations farmers explore to produce pigs. They are classified based on the stages of pigs' growth. Pig production systems include the farrow-to-weaner (breeding) system, the weaner-to-slaughter (fattening) system, and the farrow-to-finish system (Kithinji, 2018). The farrow-to-finish production system is the most common production system practiced in Northern Uganda (Kithinji, 2018). In this system, pigs are raised from the farrowing stage to full maturity. It has the longest duration of about 6 to 7 months from the farrowing stage and pigs weigh between 90 to 100kg after maturity. Economically, it is ideal to start with five sows and aim at producing a mature pig ready for the market with a weight of about 90 kg in about 6 months. Beyond 7 months, the pig enterprise starts to become uneconomical (Lurette et al., 2008). The farrow-to-finish production system has the greatest flexibility and potential in the long run. This system is also more demanding in terms of labor and capital and requires a long-term commitment to the swine business (Jerlström et al., 2022).

In the weaner-to-slaughter pig production system also known as fattening, a pig farmer purchases weaners from other pig farmers as his/her initial stock and rears them until full maturity. Most weaner-to-slaughter pig enterprises purchase weaners weighing 13 to 25kg and feed them to market weight for between 4 to 5 months (Klooster & Wingelaar, 2011). The matured pigs are then sold at the farm gate or in the market. This operation allows for low labor requirements and minimum overhead costs. The weaner-to-slaughter production system can afford a crop farmer the opportunity to use local feeds to finish pigs (Chibanda et al., 2020). Dung from pigs in this system can serve as an important source of manure and fertilizer for farmlands. The source, health, and quality of weaners to be purchased are important factors to be considered before

venturing into this enterprise (Collins & Wall, 2004). Ideally, all weaners should be sourced from a single farm to mitigate the risk of potential herd health hazards. According to Kithinji, (2018), a weaner-to-slaughter (fattening) system could prove to be economical if good weaners are reared under intensive and semi-intensive management systems.

A farrow-to-weaner (breeding) system is such that pigs are raised from the farrowing stage till the piglets are weaned from the sow. This system is characterized by a few sows that are used to produce piglets and are weaned after one to two months with an average weight of 20kg. The weaners are sold to other pig farmers who might want to stock their pig farms for fattening or breeding. This system could be an ideal business but there must be adequate management practices (Baxter et al., 2013). However, for the weaners to attract a good price, there must have been an adequate selection of genetically sound boars and sows which will result in weaners that weigh about 8 kg at 40 days of age (Kithinji, 2018). This production system is usually practiced under intensive rearing or semi-intensive management systems due to the adequate care and attention needed for piglets to survive (Puppe et al., 2008). Few facilities, low operating capital, and reduced amount of feed are major characteristics of this system as compared to other production systems (PennState, 2016). The biggest challenge of this system is that smallholder pig farmers may not be able to keep up with the high demands of weaners when the pig market is volatile. They may have to farrow sows in groups or batches to augment the number of weaners available during periods of increased demand (Gale et al., 2012). Based on these three production system options, farmers who want to venture into pig production are faced with a choice among the pig production systems and need to consider the production cost structure, their associated risks, and capital requirements of each system to attain maximum profit from pig farming.

Some empirical studies exist on the characteristics and challenges facing pig production. For example, Nantima et al. (2015) examined the characteristics and constraints facing pig production systems along the Kenya-Uganda border and observed that people kept pigs mainly for income generation. It was also observed that feeding was the major challenge facing pig production in the region. In the study of Arvidsson et al. (2023) in northern Uganda, it was reported that some farming household abandoned pig production due to pig health issues. Improvement of the quality of veterinary services was recommended as a solution to sustainable pig production in rural areas. Emebet et al. (2017) conducted a study on the management practices, challenges, and opportunities in pig production in Ethiopia and found that most of the farmers practiced the semi-intensive management system. According to the authors, lack of market, poor attitude of society, and feed availability and cost were the top three constraints facing pig production in the region. Furthermore, Rosanowski et al. (2023) researched the challenges of pig production among farrow to finish farms in Hong Kong. It was reported that lack of veterinary support was the major challenge faced by those farms. Mbuthia et al. (2015) evaluated pig production practices and identified the challenges faced by pig farmers in Kenya. The authors surveyed pig farmers practicing the semi-intensive and extensive management system and identified housing, feeding, and finances as the major challenges to pig production in the area. Similarly, Dorh et al. (2019) reported that the main challenges faced by pig farmers in Kebbi State, Nigeria include the high cost of commercial feed and feed ingredients and inadequate start-up capital.

While existing literature provides valuable insights into the characteristics and challenges of pig production, there remains a notable gap in comprehensive studies that integrate the socio-economic dimensions influencing farmers' decision-making processes regarding production

systems. The choice of pig production system, a critical factor influencing efficiency, sustainability, and profitability may vary widely among farmers and could be influenced by a range of socio-economic, environmental, and technical factors. However, little is known about how these factors influence Uganda's farmers' choices. It is against this backdrop that this study sought to ascertain the drivers of the choices of pig production systems and identify the challenges confronting pig farmers in the region. Understanding these choices, alongside the challenges faced, is essential for supporting the development of the pig sector in this region. This insight will shed light on the current state of pig farming and identify pathways for support, innovation, and development.

2. MATERIALS AND METHODS

2.1 Study area

The study was carried out in the Northern Ugandan districts of Lira (2.2581° N, 32.8874° E) and Kole (2.3701° N, 32.7633° E) in the Lango Sub-Region (Figure 1). The population of the Lango sub-region is thought to be two million. The nine districts that make up the sub-region at the moment are Alebtong, Amolatar, Apac, Dokolo, Kole, Lira, Oyam, Otuke, and Kwania District.. Despite the region's single, long rainy season (a unimodal form of precipitation), farmers manage to raise two crops annually.

Figure 1: Map of Lango Sub Region showing Lira and Kole districts

2.2 Sampling design

The study employed a cross-sectional survey approach, conducted between November 2021 and August 2022. Lira and Kole districts were purposefully chosen because they have a high concentration of pig farmers and are geographically close to each other. Furthermore, a total of 240 pig farmers were chosen at random from both districts. This was facilitated by a list obtained from the pig farmers organization, serving as the sample frame.

2.3 Data collection

A pre-tested structured questionnaire was used to collect data on the characteristics of production systems practiced by pig farmers and the challenges facing pig farmers in the region. It constituted open and close-ended questions to obtain thorough information from pig farmers.

2.4 Data analysis

2.4.1 Multinomial logit regression

The logit multinomial model approach was adopted to ascertain the drivers of the choices of pig production systems among farmers. The Multinomial Logit Regression model is ideal for assessing the drivers behind farmers' choices of pig production systems because it accommodates multiple mutually exclusive categories (farrow to finish, farrow to weaner, and weaner to slaughter), flexibly incorporates both continuous and categorical explanatory variables, offers insights into the comparative likelihood of choosing one system over another via relative risk ratios, handles the unordered nature of these non-ranked categories, and provides interpretable coefficients that clarify the impact of different factors, ultimately making it an invaluable tool for understanding and informing decision-making and policy formulation. The model is given by;

$$Y = \beta 0 + \beta 1 InX1 + \beta 2 InX2 + \beta 3 InX3 + \beta 4 InX4 + \beta 5 InX5 \ldots + Ei \quad \textbf{(1)}$$

Where: Y = Production systems (farrow to finish, farrow to weaner, and weaner to slaughter)

β0 is the constant term

β1 to β10 are the parameters to be estimated

X1 – X10 are as defined in Table 1.

Ei = Error term

TABLE 1 Variables used in the multinomial logit model

Variables	Description	Expected sign
X1 = Age	Number in years	+/-
X2 = Gender	1 = male, 0 = female	+/-
X3 = Education level	Number in years	+/-
X4 = Marital status	1 = married, 0 = otherwise	+/-
X5 = Distance to the nearest market	In km	+/-
X6 = Household size	Number in years	+/-
X7 = Years of farming experience	Number in years	+/-
X8 = Number of initial stock	Number	+/-
X9 = Breeds of pig	1 = large white, 0 = others	+/-
X10 = Access to extension service	1 = yes, 0 = no	+/-

2.4.2 Likert type Scale

A Likert-type scale was used to describe the main challenges confronting pig farmers in the region. Using a 4-point rating scale technique, data were presented using mean, frequency, and percentage. The 4-point rating scale represented Very Serious = 4, Serious = 3, Less Serious = 2, and Not Serious = 1. Based on the rating scale, the average score of farmers was used to establish a cutoff point and is computed thus;

$4 + 3 + 2 + 1 = 10$

$10/4 = 2.50$ Cut-off Point

Items with mean values of 2.50 and above were identified as challenges faced by pig farmers in the region, using a cut-off point of 2.50 for decision-making. Conversely, items with mean values below the cut-off point of 2.50 were deemed unchallenging for pig producers in the region.

3. RESULTS AND DISCUSSION

3.1 Socioeconomic and demographic characteristics of pig farmers

The results (Table 2) showed that the majority (54.6%) of the pig farmers were male. Many of the pig farmers are married with an average age of 37 years. This could imply that pig farmers possessed the agility, youthfulness, and physical strength necessary to engage in pig-producing enterprises. They embarked on the pig farming industry intending to provide for the welfare of their families. These results align with the findings of Adetunji & Adeyemo (2012) who observed that the majority of pig farmers are married. The majority of pig farmers (75.8%) indicated that they had ready access to markets. This may be due to the proximity of their pig farms to the marketplace. The average level of education among farmers was approximately 8 years, indicating that they possess a certain degree of literacy that allows them to effectively digest information linked to inputs and markets, resulting in improved productivity. Umeh et al. (2015) corroborated this claim in their study where they reported an average of 7.71 years of education of pig farmers in Makurdi, Nigeria. Furthermore, the average number of household members for pig farmers was roughly 6. Household members might potentially serve as a source of labor for a pig production enterprise, thereby significantly reducing the expenses associated with hiring farm workers. This is in agreement with the findings of Onyekuru et al. (2020) which indicated a mean household size of 5 members among pig producers in Enugu, Nigeria.

The average number of years of experience among farmers was roughly 4 years. A lack of experience may lead to inefficiency among pig farmers. This observation contradicts the results presented by Okojie et al. (2019), who found that the average number of years of pig farming experience among farmers in Edo State, Nigeria, was 8 years. Pig farmers with extensive experience will possess a certain amount of managerial acumen, enabling them to make informed

decisions that can improve output. The majority (60.4%) of the respondents indicated a lack of access to credit. This is contrary to the findings of Fakudze et al. (2021) which indicated that 72% of pig farmers in Swaziland had access to credit. However, in a study conducted by Obayelu et al. (2017) in Nigeria, it was reported that the majority of pig farmers do not have access to credit. Access to agricultural loans is essential for increasing agricultural output and developing farming business.

In terms of access to extension services, most of the pig farmers (73.8%) did not have access to extension services. This is contrary to the findings of Nabikyu & Kugonza (2016) which stated that about 63% of pig farmers in Kampala, Uganda had access to extension services in the form of veterinary support. Extension service is crucial in the pig sector as it provides pig farmers with current information and innovative strategies to achieve optimal productivity, albeit at a potential expense. Experienced extension agents with sufficient expertise in pig production can certainly assist farmers in comprehending the unique characteristics of pig production systems. Furthermore, most (70.8%) of the farmers do not belong to any farming association or cooperative society. Conversely, a study conducted by Umeh et al. (2015) revealed that the majority (60%) of pig farmers are members of farmers' groups. Farmer group alliances and cooperatives offer pig producers the chance to engage in bulk sales and obtain increased bargaining power.

TABLE 2 Socioeconomic and demographic characteristics of pig farmers

Variables	Frequency (N = 240)	Percent
Gender		
Male	131	54.6
Female	109	45.4
Marital Status		
Married	203	84.6
Unmarried	37	15.4
Ready Access to Market		
Yes	182	75.8
No	58	24.2
Access to Credit		
Yes	95	39.6
No	145	60.4
Access to Extension Services		
Yes	63	26.3
No	177	73.8
Membership in Farming Association/Cooperative Society		
Yes	70	29.2
No	170	70.8
	Mean	**Standard Deviation**
Age	39.6	11.672
Years of education	8.2	4.065
Household size	5.8	2.502
Years of experience	4.4	3.132

Source: Field survey

3.2 Characteristics of Pig Production Systems

The result (Table 3) revealed that 38.8% of the pig farmers practiced the farrow-to-weaner (breeding), 30.8% practiced the weaner to slaughter (fattening) and 30.4% practiced the farrow to finish production system. Family land is the most common method of land acquisition among pig farmers. This would probably lead to a reduction in the cost of production incurred by the pig farmers especially in terms of rent as they have access to free lands. This is in contrast with the

findings of Saka et al. (2010) who found out that the most common method of land acquisition by pig farmers in Lagos, Nigeria was through outright purchase.

The timber ground is the type of housing predominant in pig production accounting for 41.3% of the housing systems used. This could be because it is cheap to use and also easily accessible. Other closely used types of housing include the bricks and mud (25.4%) and the tethered method (24.6%). The piglets and weaners were most likely kept in the timber ground or brick and mud housing while sows were tethered. Ndyomugyenyi & Kyasimire (2015) also reported that most pig farmers used timber ground housing for their pigs. Regarding the types of feed used for pigs, household wastes and local feed ingredients were the most commonly used feed for pig production. This could be a result of the affordability and accessibility of these feed types compared to processed and concentrate feeds which are very expensive. This would lead to a higher return on investment and help to reduce the costs incurred in feeding pigs. In a similar study conducted by Okojie et al. (2019), it was reported that majority (95.3%) of pig farmers use both local and formulated feeds in feeding pigs. This seems to be more economical in terms of feed cost due to more local feeds being used than the more costly concentrates. Water was given to pigs mainly with the use of feeding troughs accounting for 82.5% indicating the lack of technological advancement in pig production in the region.

The large white and the local breeds were the most commonly reared breeds of pigs accounting for 40.8% and 37.9% respectively. The predominance of the large white breed can be justified technically because of their high prolific rate and disease resistance ability. They are also used to produce pigs with better characteristics through cross-breeding with local breeds. This is in line with the findings of Fakudze et al. (2021) who reported that the majority (60.7%) of pig farmers in Swaziland reared large white pig breeds.

TABLE 3 Characteristics of pig production systems

Variables	Frequency	Percent
Pig Production Systems		
Farrow to Finish	73	30.4
Farrow to Weaner (Breeding)	93	38.8
Weaner to Slaughter (Fattening)	74	30.8
Method of Land Acquisition		
Freehold	2	0.8
Family land	206	85.8
Rented land	2	0.8
Purchased land	30	12.5
Pig Breeds Farmed		
Large white	98	40.8
Camborough	1	0.4
Large black	7	2.9
Landrace	18	7.5
Local breeds	91	37.9
Large white & Landrace	3	1.3
Camborough & local breeds	1	0.4
Large white & Local Breeds	15	6.3
Large white & Camborough	6	2.5
Types of Feed		
Household Wastes	1	0.4
Processed Feeds & Household Wastes	54	22.5
Local Feed Ingredients	40	16.7
Household Wastes & Local Feed Ingredients	139	57.9
All Feed Types	6	2.5
Housing System		
Bricks & mud	61	25.4
Timber ground	99	41.3
Tethered	59	24.6
Iron roof & cemented floor	15	6.3
Mud & wattle	6	2.5
Water Drinking System		
Feeding Troughs	198	82.5
Automated Nipple System	2	0.8
Improvised Bucket	40	16.7

Source: Field survey

3.3 Drivers of the choices of pig production systems among pig farmers

The Prob > chi2: 0.0000 indicates that the model is statistically significant and the Pseudo R^2 value of 0.2011 suggests that about 20.11% of the variance in the dependent variable is explained by the model, which is moderately good. The mean VIF (variance inflation factor) of 1.19 indicates low multicollinearity among predictors. This study revealed that marital status (married), distance to the nearest market, number of initial stocks, access to extension service, pig breed (large white), and gender (male) were the drivers of the choice of the farrow to finish production system over the farrow to weaner production system. Drivers of the choice of the weaner to slaughter production system over the over the farrow to weaner production system include distance to the nearest market, years of farming experience, and the number of initial stocks (Table 4).

Married pig farmers were more likely to choose the farrow to finish production system over the reference category. Being married might imply a more stable personal situation, which could support managing more complex or labor-intensive pig farming systems like the farrow to finish system. Moreso, married individuals might have more household support, both financially and in terms of labor, which could influence their ability to engage in this production system. The probability of farmers choosing either the farrow to finish or the weaner to slaughter production system increased with less distance to the nearest market. This may reflect the increased transportation costs, increased travel time, and potential loss of livestock quality associated with longer distances. This corroborates the findings of Jabbar & Akter (2008) who reported that less distance to major markets influenced the technical efficiency of pig production in Vietnam. Furthermore, an increase in the number of initial stocks significantly increases the likelihood of

farmers choosing either the farrow to finish or the weaner to slaughter production system over the reference category. Larger stock sizes may provide economies of scale, reducing per-unit costs and potentially increasing profitability for these systems. Jabbar & Akter (2008) also reported that increasing herd size influenced the technical efficiency of pig production in North and South Vietnam. Pig farmers who had access to extension services were less likely to choose the farrow to finish production system possibly indicating that extension services promote more specialized or alternative systems. These services may be recommending alternative or newer systems possibly due to perceived advantages. According to Fakudze & Sibandze (2021), access to extension services influenced the profitability of pig production in Eswatini. Okello et al. (2022) also found that access to extension services had a significant influence on the choice of pig health management strategies in Uganda.

Pig farmers raising the large white breed of pigs were more likely to choose the farrow to finish production system. The preference for the large white breed in farrow to finish systems may suggest that certain breeds are seen as more suitable or profitable for specific production systems. The characteristics of the large white breed, such as growth rate and meat quality, might align better with the requirements or outputs desired from farrow-to-finish systems. The probability of pig farmers choosing the farrow to finish production system decreased with the male gender. Cultural or social factors might influence the types of activities men engage in, or men may have different risk preferences influencing their system choice. Furthermore, pig farmers with fewer years of farming experience were more likely to choose the weaner to slaughter production system. This suggests that more experienced farmers are less likely to choose this system, possibly due to greater knowledge of or preference for more specialized systems. More experienced farmers might also have preferences for systems that provide greater

control over the production process or potentially higher profitability. Li et al. (2017) asserted that pig production efficiency was increased as a result of high years of pig breeding experience in China.

TABLE 4 Drivers of the choices of pig production systems among pig farmers

	Farrow to Finish	**Weaner to Slaughter**	**Farrow to Finish**	**Weaner to Slaughter**
	Coef. (Std. Err)	Coef. (Std. Err)	dy/dx (Std. Err)	dy/dx (Std. Err)
Marital status (Married)	*0.942 (0.515)	0.706 (0.627)	0.122 (0.900)	0.037 (0.090)
Distance to the nearest market	**-0.356 (0.165)	**-0.422(0.173)	-0.034 (0.026)	-0.038 (0.022)
Years of farming experience	0.236 (0.308)	*-0.569 (0.349)	0.087 (0.051)	-0.105 (0.047)
Household size	-0.076(0.095)	0.823(0.090)	-0.021 (0.016)	0.018 (0.013)
Number of initial stocks	***0.348 (0.128)	***0.738 (0.130)	0.009 (0.016)	0.087 (0.011)
Access to extension service	**-1.043 (0.464)	0.466 (0.436)	-0.230 (0.074)	0.151 (0.058)
Pig breed (Large white)	*0.648 (0.355)	0.564 (0.398)	0.078 (0.057)	0.037 (0.053)
Gender (Male)	*-0.634 (0.344)	-0.288 (0.383)	-0.096 (0.056)	0.004 (0.052)
Age	-0.517 (0.734)	0.492 (0.806)	-0.134 (0.124)	0.115 (0.112)
Constant	-.0.786 (2.405)	-4.386 (2.766)		
Number of obs	240			
Prob > chi2	0.0000			
Log-likelihood	-212.36705			
Pseudo R^2	0.2011			
Mean VIF	1.19			

Note: Reference category: Farrow to weaner; ***, ** & * denotes p-value at 1%, 5% and 10% respectively

Source: Field survey

3.4 Challenges confronting pig farmers in the region

Results (Table 5) revealed the challenges confronting pig production in the region. Based on the established cut-off point of 2.5, the following were regarded as challenges confronting pig production in the region. Lack or inadequate extension visits or contacts is ranked 1st with a mean of 3.50. Suvedi et al. (2017) also reported that farmers had limited extension contacts in rural Nepal. Extension agents could help keep pig farmers updated with the latest information and advanced technology to increase pig productivity. The high cost of pig feeds is ranked 2nd with a mean of 3.39. This agrees with Adesehinwa et al. (2024) who posited that the high cost of feeds is a major challenge facing pig production in Africa. Feed cost, approximately 70% of the total cost of pig production, is critical in ensuring increased productivity and improved meat production. High cost of feed and inadequate feeding can lead to reduced income and stunted pig growth in pig production. Lack of financial capacity for pig business expansion is ranked 3rd with a mean of 3.26. Poor access to information relating to production systems is ranked 4th with a mean of 3.16. The low level of education of farmers is ranked 5th with a mean of 3.08. The problem of pest and disease infestation and low technical know-how in pig management are jointly ranked 6th with a mean of 3.05. The incidence of pathogens and disease outbreaks can negatively affect pig welfare and have serious biosecurity implications if not well managed (Pietrosemoli & Tang, 2020). Lack of collateral security to secure loans is ranked 7th with a mean of 3.04. This conforms with the findings of Uddin & Osasogie (2016) who reported that 61% of pig farmers in Edo, Nigeria had difficulties in securing loans for pig business expansion. Financial institutions demand collateral before credit disbursement however, most smallholder farmers do not have personal properties that could serve as collateral making it impossible for them to access credit. Insufficient knowledge of credit sources by farmers is ranked 8th with a

mean of 2.91. The lack of a stable market for pigs or weaners is ranked 9th with a mean of 2.80 and the tedious nature of the pig farming business is ranked 10th with a mean of 2.55. A study conducted by Nantima et al. (2015) along the Uganda-Kenya border concluded that feed and disease were the major constraints facing pig production in the area.

Based on the established cut-off point of 2.5, shortage of labor, lack of proper farmland ownership, religious or cultural beliefs against pig consumption, and low patronage or acceptance of pigs were not regarded as challenges confronting pig farmers in the region.

TABLE 5 Challenges confronting pig farmers in the region

	Very Serious	**Serious**	**Less Serious**	**Not Serious**		
	Freq (%)	Freq (%)	Freq (%)	Freq (%)	Mean (S.D)	Rank
Lack or Inadequate Extension Visits or Contacts	150 (62.5)	60 (25.0)	29 (12.1)	1 (0.4)	3.50 (0.720)	1st
High Cost of Pig Feeds	123 (51.2)	95 (39.6)	14 (5.8)	8 (3.3)	3.39 (0.746)	2nd
Lack of Financial Capacity for Pig Business Expansion	91 (37.9)	122 (50.8)	25 (10.4)	2 (0.8)	3.26 (0.672)	3rd
Poor Access to Information Relating to Production Systems	80 (33.3)	123 (51.2)	32 (13.3)	5 (2.1)	3.16 (0.726)	4th
Level of Education	85 (35.4)	100 (41.7)	44 (18.3)	11 (4.6)	3.08 (0.847)	5th
Problem of Pest and Disease Infestation	97 (40.4)	73 (30.4)	55 (22.9)	15 (6.3)	3.05 (0.940)	6th
Low Technical Knowhow in Pig Management	72 (30.0)	115 (47.9)	47 (19.6)	6 (2.5)	3.05 (0.772)	6th
Lack of Collateral Security to Secure Loan	48 (20.0)	155 (64.6)	35 (14.6)	2 (0.8)	3.04 (0.616)	7th
Insufficient Knowledge of Credit Sources by Farmers	43 (17.9)	141 (58.8)	48 (20.0)	8 (3.3)	2.91 (0.712)	8th
Lack of Stable Market for Pigs or Weaners	70 (29.2)	92 (38.3)	39 (16.3)	39 (16.3)	2.80 (1.035)	9th
Tedious Nature of Pig Farming Business	24 (10.0)	124 (51.7)	53 (22.1)	39 (16.3)	2.55 (0.881)	10th
Shortage of Labour	10 (4.2)	67 (27.9)	74 (30.8)	89 (37.1)	1.99 (0.906)	11th
Lack of Proper Farmland Ownership	13 (5.4)	36 (15.0)	112 (46.7)	79 (32.9)	1.93 (0.833)	12th
Religious or Cultural Beliefs Against Pig Consumption	0 (0.0)	11(4.6)	60 (25.0)	169 (70.4)	1.34 (0.564)	13th
Low Patronage or Acceptance of Pigs in Your Area	1 (0.4)	2 (0.8)	64 (26.7)	173 (72.1)	1.30 (0.501)	14th

Source: Field survey

4. CONCLUSION AND POLICY RECOMMENDATIONS

Our study revealed that various socio-economic factors, stock size, and accessibility to extension services influenced the choice of pig production system among farmers. These factors influence the preference for either the farrow to finish or weaner to slaughter production systems compared to the reference farrow to weaner system albeit positively or negatively. The significant predictors highlight areas where interventions or support could be targeted to influence system choices effectively. The major challenges confronting pig farmers in the region include a lack or inadequate extension visits or contacts, high cost of pig feeds, lack of financial capacity for pig business expansion, and poor access to information relating to pig production systems. Based on our findings, we recommend the following;

i. Extension services should be enhanced to promote awareness and education about the benefits and operational requirements of different production systems. Extension programs should be tailored to highlight the economic and logistical benefits of the farrow-to-finish and weaner-to-slaughter systems, especially for those distant from the market.

ii. Since the number of initial stocks significantly increases the likelihood of choosing either farrow-to-finish or weaner-to-slaughter systems, support in areas such as financing, health management, and best practices could be offered to farmers planning to operate on a larger scale including subsidies for initial investments or periodic veterinary support.

iii. Relevant stakeholders should support and possibly subsidize breeding programs for preferred high-quality pig breeds like the large white, especially in areas adopting the farrow to finish system. In collaboration with agricultural institutes, the government should support research into pig breeds that are well-suited for production systems in different environmental conditions.

iv. To mitigate the high cost of pig feeds, it is recommended that policymakers and agricultural stakeholders provide subsidized pig feeds and promote the use of alternative, cost-effective feed ingredients. This should be supported by robust research and development efforts to ensure these alternative feeds meet nutritional standards without negative health implications for pigs.

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APPENDIX: DATA COLLECTION TOOL (QUESTIONNAIRE)

SECTION A: SOCIO-ECONOMIC AND SOCIO-DEMOGRAPHIC DATA. PLEASE INDICATE AND TICK WHERE APPLICABLE.

Qn.	Question	Responses
1	Gender of the respondent	1 = Male 2 = Female
2	Age **(*in completed years)***	
3	Educational Status **(in *completed years*)**	
4	Marital Status	1 = Married 2 = Single 3 = Widowed/Widower 4 = Divorced
5	Household Size	
6	Years of Pig Farming Enterprise	
7	Are you a full-time farmer?	1 = Yes 2 = No
8	If not, what is your other occupation?	
9	What is the estimate of the amount of money realized from the other occupation monthly? (in UGX)	
10	What is the level of your production?	1 = Subsistence 2 = Commercial
11	Do you have access to credit?	1 = Yes 2 = No
12	Do you have access to extension services?	1 = Yes 2 = No
13	Are you a member of a farming association/cooperative society?	1 = Yes 2 = No
14	Did you undergo any training in pig farming?	1 = Yes 2 = No
15	What is the source of your funds?	1 = Personal Savings 2 = Borrowed Loan 3 = Others (Specify)

		……

SECTION B: PIG PRODUCTION AND MANAGEMENT SYSTEMS

16	How do you acquire land for your pig farm?	1 = Freehold 2 = Family land 3 = Community land 4 = Rented land 5 = Purchased land
17	Which pig management system do you practice?	1 = Intensive 2 = Tethered 3 = Semi-intensive 4 = Extensive/Free range
18	Which pig production systems do you practice?	1 = Farrow to finish 2 = Farrow to weaner (Breeding) 3 = Weaner to slaughter (Fattening)
19	What type of feed do you give your pig?	1 = Concentrates 2 = Household wastes 3 = Both 4 = Others (Specify) **……**
20	How many times do you feed your pigs in a day	1 = Once 2 = Twice 3 = Thrice
21	What are your sources of labour?	1 = Family labour 2 = Hired labour 3 = Community labour 4 = Others (specify) **……..**
22	How do you decide on labour charges?	1 = Fixed amount/day 2 = Fixed amount/month 2 = By bargaining 3 = Others (specify) **……**
23	What is the source of your water?	1 = River 2 = Tap 3 = Well 4 = Borehole
24	Do you rent land for your pig production?	1 = Yes 2 = No
25	What kind of pig breed do you have on your farm?	1 = Large white 2 = Camborough 3 = Large black 4 = Landrace

		5 = Others (specify)……
26	Have you experienced any pest or disease infestation?	1 = Yes 2 = No
27	If yes, Which	……
28	Do you use medication and vaccines for your pigs?	1 = Yes 2 = No
29	What is the production span, from the first day of stock to the last day?	1 = 1 to 2 months 2 = 2 to 3 months 3 = 3 to 4 months 4 = 4 to 5 months 5 = 5 to 6 months 6 = Others (specify) ……..

SECTION C: COST AND RETURNS

30	Land size under pig production	Owned…… (Acres) Rented……. (Acres) Total…… (Acres)
31	Cost of land rent (per acre)	……Ugx
32	How many pigs were purchased as initial stock in the last production cycle?	
33	How many pigs are contained on your Farm?	
34	Cost of purchasing initial stock(pigs). In UGX	
35	Cost of feeding the pigs from the first day to the selling period. In UGX	
36	Quantity of feeds used per production cycle. In KG	
37	Cost of vaccines and medication. In UGX	
38	No of hired labour	
39	Cost per hired labour. UGX	
40	Transportation cost. UGX	
41	Any other cost (specify) …….	
42	At what rate/price do you sell one pig (weaners)? UGX	
43	At what rate/price do you sell one pig (matured pigs)? UGX	
44	Kindly estimate the total income you make in pig farming from initial stocking to maturity. UGX	
45	How often do you sell the pigs in the market?	1 = Daily 2 = Weekly 3 = Monthly 4 = Seasonally
46	Whom do you sell to?	1 = Wholesaler 2 = Retailers

		3 = Consumers 4 = Restaurants and hotels

SECTION D: CHALLENGES FACED BY PIG FARMERS (Tick as appropriate)
The response options are as follows:

Very Serious (VS) = 4

Serious (S) = 3

Less Serious (LS) = 2

Not Serious (NS) = 1

S/N	CONSTRAINTS	VS	S	LS	NS
1.	Insufficient Knowledge of Credit Sources by Farmers				
2.	High Cost of Pig Feeds				
3.	Poor Access to Information Relating to Production Systems				
4.	Lack of Financial Capacity for Pig Business Expansion				
5.	Low Patronage or Acceptance of Pig in your Area				
6.	Lack of Proper Farmland Ownership				
7.	Level of Education				
8.	Problem of Pest and Disease Infestation				
9.	Lack or Inadequate Extension Visits or Contacts				
10.	Low Technical Knowhow in Pig Management				
11.	Religious or Cultural Beliefs Against Pig Consumption				
12.	Lack of Collateral Security to Secure Loan				
13.	Lack of a Stable Market for Pigs or Weaners				
14.	Tedious Nature of Pig Farming Business				
15.	Shortage of Labour				

Thank you for your participation.