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Assessing the Awareness, Willingness, and Barriers to Pasture Cultivation Among Urban and Peri-Urban Cattle Farmers in Selected Communities of the Ashanti Region of Ghana

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ABSTRACT

A total of 105 respondents were surveyed using a semi-structured questionnaire to assess their knowledge of and willingness to cultivate pasture in seven selected communities across two districts in the Ashanti Region of Ghana, chosen on the basis of their increasing number of cattle farmers. Variables considered in the survey included respondents' demographic characteristics, farm operations, management systems, feedstuff availability, and knowledge of feeding improved pasture. The obtained data were analyzed using descriptive statistics in SPSS version 20, and the results were presented as frequency and percentage tables and bar charts. Correlation tests were performed on selected variables. Results of the analysis revealed that 99% of farmers were male, and the majority were in the 21 to 30-year age bracket. The common feedstuffs used by farmers in the study area include grass, kitchen waste, cassava peels, crop residues, and agro-industrial by-products. The major challenge faced by the respondents was shortages of feed and a lack of fodder conservation techniques. The majority of respondents (75.7%) were unaware of improved fodder, and 92.4% had never attended any training on fodder and pasture development, even though 99% confirmed their readiness to go into pasture development when planting materials are made available. Therefore, integrating pasture establishment and improved forage technology into the farming system, along with adequate training in fodder conservation, can support farmers in different ways.

Keywords: Improved forage; Constraint; Feed resource

INTRODUCTION

The livestock sector contributes 6.2% to Ghana's gross domestic product (GDP), with cattle, sheep, goats, pigs, and poultry being the main livestock species reared (MoFA, 2017). Households in urban and peri-urban communities keep ruminant livestock for various reasons. They contribute to food security, income generation, employment creation, savings, insurance, and social status. They are a central and integral part of most farming systems in Ghana. They also act as a 'living bank' for farmers, providing economic support during periods of financial distress and hardships, such as crop failures or business setbacks, and serving as a primary source of cash income (MoFA, 2017). Hoddinott (2006) reported that cattle

production serves as insurance, providing farmers with assets that can be sold in times of crisis. However, feed shortages in both quantity and quality remain the primary constraint to optimal animal performance in Ghana, as livestock depend largely on natural pasture for survival (Timpong-Jones et al., 2014). These grasses and forages are often either insufficient due to seasonal weather variations or so poor in quality that they fail to meet the nutritional requirements for optimal production (Sarkwa et al., 2021). Moe (1994) reported that grasses are the main source of nutrition during the wetter season of the year; however, mineral content in grasses becomes deficient for the normal maintenance of health and growth of ruminants during the dry season.

Traditionally, natural grazing pastures have been the primary forage source for cattle. However, due to urbanisation, the area of grazing land for livestock has been substantially reduced over time, which has affected the quality, robustness, and palatability of grass species for grazing animals. Additionally, Birhan and Adugna (2014) noted that rapid population growth, coupled with rising demand for cropland, has led to a decline in uncultivated pastureland. This, in turn, has reduced forage production due to overgrazing and decreased soil fertility in urban communities.

Urbanization is associated with an increased demand for animal protein, including meat, milk, eggs, and other livestock products. Prain et al. (2010) observed that the availability of a strong market for animal products primarily drives urban and peri-urban dairy production in Ethiopia. These and other factors provide opportunities for smallholder urban and peri-urban cattle farmers to earn extra income from their animals, thereby helping to reduce poverty. The challenges facing urban and peri-urban cattle farmers include inadequate feed, primarily because of irregular rainfall patterns, infrastructure development, road construction and expansion, and rapid population growth (Anane et al., 2023; Timpong-Jones et al., 2023).

Cattle production in some urban centres has, of late, become a common practice, especially in the 'Zongo' communities, which are mostly Muslim (Osman et al., 2018). According to the cited authors, access to adequate feed year-round and the incidence of diseases and pests were the major challenges plaguing smallholder cattle farmers. Masikati (2010) had earlier reported that feed shortages mostly constrain livestock production in communal areas in sub-Saharan Africa during the dry season. Despite the challenges confronting smallholder urban production, it continues to play a vital role in supporting the livelihoods of those engaged in it (Osman et al., 2018). According to Mekonnen et al. (2014), the introduction of improved forage technologies that fit into the existing land-use system, together with improved feeding systems, would be necessary to resolve feed-related problems in livestock production. To address the challenge of providing adequate, high-quality feed throughout the year, it is essential to promote pasture establishment with improved forages and adopt appropriate forage conservation techniques for sustainable year-round feeding. Sadly, forage cultivation and pasture establishment are not common features of cattle production in Ghana due to limited land resources, limited farmer awareness of the benefits of forage crop cultivation, and the unavailability of improved forage seeds and planting materials. Indeed, assessing farmers' willingness to embrace forage production and identifying the challenges that hinder their adoption of this technology is a crucial first step in planning appropriate strategies. This study sought to evaluate the knowledge of urban and peri-urban cattle farmers in some selected communities within the Ashanti Region of Ghana regarding improved pastures and their willingness to adopt pasture cultivation. The study further sought to identify barriers that hinder the adoption of pasture cultivation in the study area.

Materials and Methods

Description of the study area

The study was conducted in seven towns: five within the Asokore Mampong Municipality and two within the Ejisu Municipality, both located in the Ashanti Region of Ghana. These districts and towns were purposively selected due to the increasing prevalence of cattle production among local settlers. The Asokore Mampong Municipal Assembly is one of the thirty (30) Administrative districts in the Ashanti Region. It was carved out of the Kumasi Metropolitan Assembly due to the growing population of the Kumasi Metropolis. The municipality spans a total land area of 23.91 km² and is situated in the northeastern part of the Kumasi Metropolis. The average minimum temperature is about 21.5 °C, and the average maximum temperature is 35.7 °C (Ghana Statistical Service, 2014). Four urban communities, namely Asawasi (Latitude 6° 42′ 9″ N, Longitude 1° 36′ 15″ W) Aboabo (Latitude 5° 56′ 1″ N, Longitude 0° 57′ 30″ W), Sawaba (Latitude 6° 42′ N, Longitude 1° 36′ W), Bouban (Latitude 6° 42′ 54″ N, Longitude 1° 33′ 54″ W), and Parkoso (Latitude 6° 43′ 17″ N, Longitude 1° 32′ 33″ W), as shown in Figure 1, were purposively selected from this municipality.

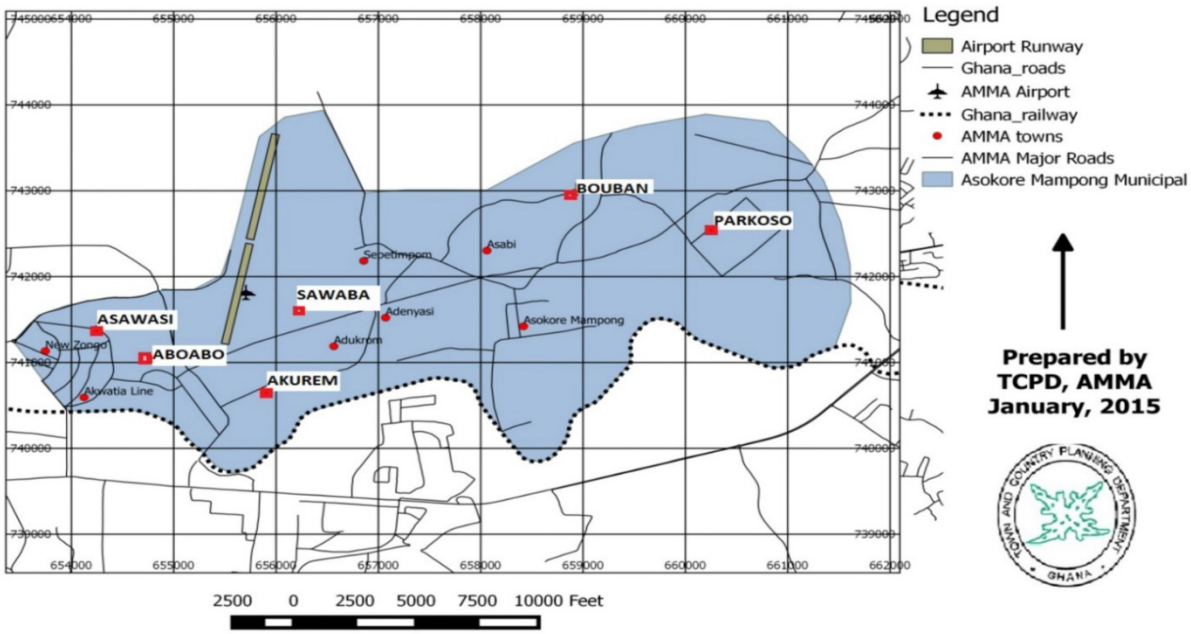


Figure 1: Map of Asokore Mampong
Source: Ministry of Local Government and Rural Development, 2014.

In addition to the Asokore Mampong Municipality, the study also covered the Ejisu Municipality, which lies within Latitudes 1° 15′ N and 1° 45′ N and Longitudes 6° 15′ W and 7° 00′ W. The municipality covers an area of 582.5 km^2 and experiences a bimodal rainfall pattern. The major rainfall period runs from March to July, with an average annual rainfall of 1,200-1,500 mm. However, the minor rainfall period begins in September and tapers off in November, with an average annual minor rainfall of 900-1,120 mm (Ghana Statistical Service, 2021). The two towns purposively selected from this Municipality were Abirem (Latitude 6° 44′ 42″ N, Longitude 1° 32′ 43″ W) and Achiase (Latitude 6° 46′ 15″ N, Longitude 1° 33′ 37″ W), shown in Figure 2.

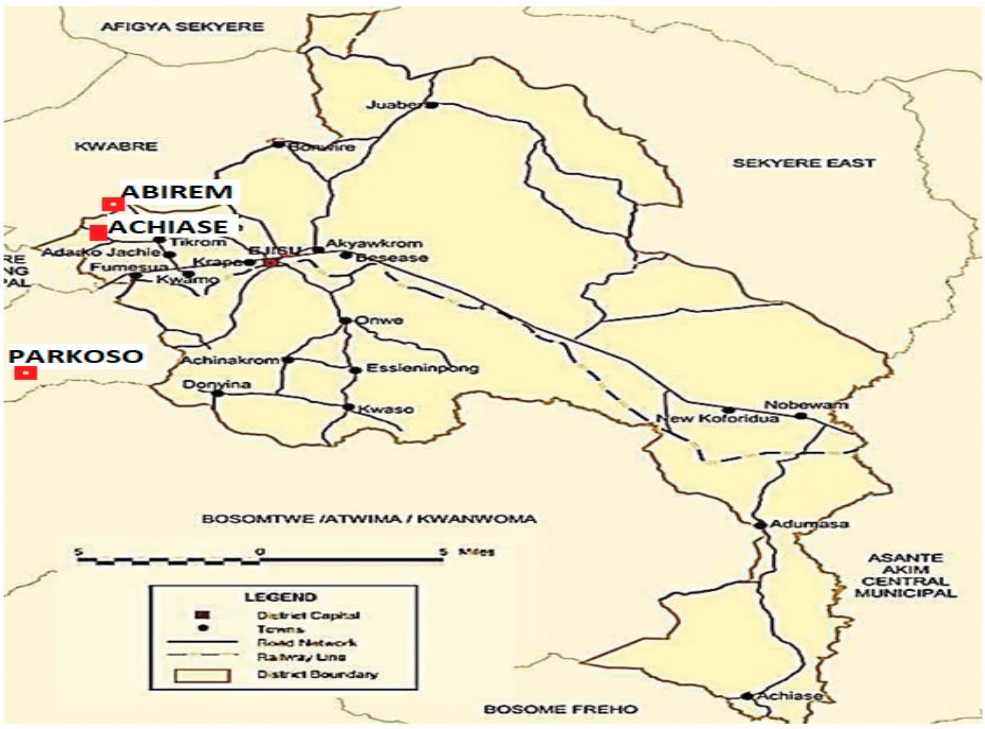


Figure 2: Map of Ejisu-Juabeng
Source: Ghana Statistical Service, 2014

Ethical considerations

Ethical approval for the study was obtained from the Animal Research Ethics Committee of Kwame Nkrumah University of Science and Technology, Kumasi (Approval number: KNUST 0028), ensuring the protection of participants' rights and confidentiality. Informed consent was obtained from all participating cattle farmers before their participation. To safeguard anonymity, their identities were kept confidential throughout data analysis and reporting.

Sources and types of data

Primary data for the study were collected through content-validated questionnaires, comprising both open-ended and closed-ended questions, administered during interviews with cattle farmers engaged in full-time or part-time cattle rearing in the selected municipalities. Secondary sources, including publications, journals, Ministry of Food and Agriculture (MoFA) publications, and online resources, were used to complement and validate the primary data.

Sampling technique and sample size

The sampling technique for this study combined purposive and snowball sampling. Initially, two municipalities in the Ashanti Region (Asokore Mampong Municipality and Ejisu-Juaben Municipality) were purposively selected due to the prevalence of cattle-keeping activities. Within these municipalities, five towns in Asokore Mampong Municipality and two towns in Ejisu-Juaben Municipality were purposively selected for their notable cattle farming activities. In the absence of formal records of cattle farmers at municipal offices, the snowball sampling method was used within each town to identify and access the farmers. Ultimately, 105 cattle farmers were interviewed for the study.

Data collection

Data were collected with content-validated and structured questionnaires for

smallholder urban and peri-urban cattle producers. The structured questionnaires, the main instruments for data collection, included both open-ended and closed-ended questions. The selected farmers were interviewed on-farm and asked questions relating to the set objectives. The survey included questions on farmers' demographic characteristics, management systems adopted, feeds used, knowledge and awareness of improved pasture species, willingness to establish pasture, and barriers hindering pasture establishment. Interviews were conducted in the local languages (Hausa, Zabarma, and Twi) to ensure effective communication and accurate responses from farmers with limited or no literacy.

Statistical analysis

The collected data were thoroughly reviewed for consistency and appropriateness. Afterwards, the data were coded and entered into the Statistical Package for Social Sciences (SPSS, 2011), Version 20. Descriptive statistics, including frequencies and percentages, were used to summarise the participating farmers' demographic characteristics and responses to the questionnaire and presented using frequency and percentage tables and bar charts. This provided a clear understanding of the farmers' backgrounds and their perspectives on knowledge and willingness to cultivate pastures. Correlation tests were performed on selected variables (age, gender, level of education, number of years in operation, and herd size) and on training received in cattle production to examine potential relationships and trends with willingness to establish pasture.

RESULTS AND DISCUSSION

Demographic characteristics of respondents

The demographic characteristics of respondents are presented in Table 1. Based on the results, the majority of respondents (36.2%) were in the 21 to 30-year age group, indicating that most cattle farmers in the selected communities are young, strong, and energetic enough to engage in cattle production and related activities actively. This age trend was in contrast to the report by Slayi et al. (2023), who found that the majority of smallholder cattle farmers in the Eastern Cape of South Africa were between the ages of 30 and 40 years. Twinamatsiko et al. (2020), on the other hand, reported that the majority of agro-pastoralists were aged between 30 and 49 years. Only 3.9% of the respondents were over 50 years of age. These findings align with those of Osman et al. (2018), who reported that only 4% of smallholder urban cattle farmers interviewed in the Kumasi Metropolis and Asokore Mampong Municipality were above 50 years old.

The results also showed that 99% of respondents engaged in cattle production were male, which is consistent with the report by Timpong-Jones et al. (2014). Cattle production, unlike small ruminant production (sheep and goats) in Ghana, is a male-dominated enterprise due to the significant labour demands associated with it. The low involvement of women could also be attributed to limited access to capital and land (Twinamatsiko et al., 2020). In the cattle value chain, women are primarily involved in milking and processing milk into various dairy products such as 'Wagashi' and 'Burkina' for local consumers. These findings are consistent with the results of Osman et al. (2018) and Umunna et al. (2014), who reported that males accounted for 98% and 92.8%, respectively, of cattle farmers.

Table 1: Demographic data of respondents

Parameter	Detail	Frequency	Percentage
Age	10 – 20	20	19.0
	21 – 30	38	36.2
	31 – 40	33	31.4
	41– 50	10	9.5
	51– 60	4	3.9
	Total	*105*	*100*
Gender	Male	104	99
	Female	1.0	1.0
	Total	*105*	*100*
Religious affiliation	Muslim	104	99
	Christian	1.0	1.0
	Traditional	0	0
	Total	*105*	*100*
Marital status	Single	54	51.4
	Married	50	47.6
	Divorced	1.0	1.0
	Total	*105*	*100*
Formal education level	Primary	23	21.9
	JHS	12	11.4
	SHS	15	14.3
	Tertiary	4	3.8
	No formal education	28	26.7
	Arabic education	23	21.9
	Total	*105*	*100*
Household size Herding animals	1 – 5	46.41	44.2
	6 – 10	46.41	44.2
	11– 15	9.14	8.7
	16 – 20	3.04	2.9
	Total	*105*	*100*
Ethnicity	Fulani	35	33.3
	Dagomba	15	14.3
	Zabarma	26	24.8
	Hausa	14	13.3
	Others	15	14.3
	Total	*105*	*100*

Almost all respondents (99%) were Muslims, as the study areas were predominantly Muslim communities. Only 47.6% of the respondents were married. In the current study, 28.6% of those interviewed had no formal education, while

the remaining 73.3% had at least a basic education (Table 1). Twinamatsiko et al. (2020) also found that 20.1% of agro-pastoralists had no formal education. Among those with formal education in the current study, 3.8%, 14.3%, 21.9%, 11.4%, and 21.9% had tertiary, senior high school, Arabic, junior high, and primary school education, respectively. Twinamatsiko et al. (2020) and Slayi et al. (2023) reported 12.2% and 36%, respectively, for cattle farmers with tertiary education, both of which were relatively higher than that of the current study. The differences in tertiary-level education could be due to the Fulanis, who form the majority ethnic group among the respondents and are involved in cattle production, generally not placing a high premium on secular education. Education plays a vital role in transferring knowledge and technology to farmers and fostering their willingness to adopt new agricultural technologies (Ani et al., 2004). It provides an essential interface for information exchange between farmers, extension officers, researchers, and development agents. Umunna et al. (2014) emphasised that education is a crucial factor in the adoption of new technologies, and its absence can hinder advances in small ruminant production. Cattle producers with some level of formal education are more likely to use improved husbandry practices and view cattle production as a profit-driven enterprise rather than merely a tradition. The trend of the majority of respondents being literate agreed with the report of Osman et al. (2018), who also reported the majority of smallholder urban cattle farmers (98%) as being literate.

The survey results further revealed that the household sizes for the majority (44.2%) of respondents ranged from 1 to 5 and from 6 to 10 members, respectively. Household size is an important determinant of family labour availability for farmers engaged in cattle husbandry. Labour plays a crucial role in livestock production, especially for agro-pastoralists, who must allocate their labour among livestock, crop production, and other livelihood activities. Prokopy et al. (2008) observed that the availability of both family and hired labour significantly enhances the adoption of improved farm management practices, such as pasture establishment. Of the total number of cattle farmers interviewed, 47.6% herded animals in search of grazing pastures. The majority of these were from the Fulani ethnic group (33.3%), followed by the Zabarma (24.8%), with the Hausa being the least represented (13.3%). These same ethnic groups (Fulani: 36% and Zabarma: 30%) have been reported by Abdul Aziz et al. (2020) to be involved in dairy product processing in the Kumasi Metropolis and the Asokore Mampong Municipality of the Ashanti Region.

Cattle production characteristics in the study areas

Some characteristics of cattle production in the study areas are presented in Table 2. None of the respondents was engaged in cattle production as their sole business or primary source of income. Instead, all 105 participants (100%) combined cattle production with other economic pursuits. The fact that none of the respondents relied solely on cattle production suggested that it played a supplementary role in their livelihoods. Osman et al. (2018) found that 16% of smallholder urban cattle farmers were full-time cattle farmers, in contrast to what was observed in the current study.

Within the study area, the majority (52.4%) of respondents had been in operation for 1–10 years, followed by 21.0% who had operated for 11–20 years. Respondents who had operated for 21-30 years and more than 30 years accounted for 17.1% and 9.5% respectively. The dominance of the 1–10-year experience group suggested a relatively recent expansion in cattle production. This could be attributable to growing interest in cattle farming driven by economic opportunities.

Only 37.1% of respondents had received formal training in cattle production, with the majority (62.9%) lacking such training. The proportion of respondents without training in cattle production suggests an apparent gap in technical knowledge and skills. This could have a detrimental effect on productivity and animal welfare, which underscores the need for targeted extension services or training programs to equip farmers with relevant experience in cattle management. This observation contrasted with the finding of Osman et al. (2018), who reported the absence of formal training in cattle production among smallholder urban cattle farmers.

Table 2 also showed that herd sizes kept by respondents varied widely. The most common herd size was 21-30 cattle (31.4%), followed by 11–20 cattle (22.9%). Smaller herds of 1–10 cattle accounted for 15.2%, while larger herds of over 60 cattle were maintained by 13.3% of respondents. The prevalence of medium-sized herds (11–30 cattle) could reflect respondents' modest investment capacity. This could also be attributed to the unavailability of space to accommodate very large herd sizes, especially in urban centres. Slayi et al. (2023) reported that smallholder cattle farmers with more than 20 animals constituted only 32%, which was much lower than the herd sizes in the current study. Osman et al. (2019) observed that cattle farmers in the outskirts of Sekyere Kumawu and Sekyere Afram Plains Districts in the Ashanti Region maintained relatively larger herd sizes (up to 300 animals). This was attributed to their adoption of the extensive management system, enabled by the availability of vast grazing lands.

Table 2: Characteristics of cattle production in the study areas

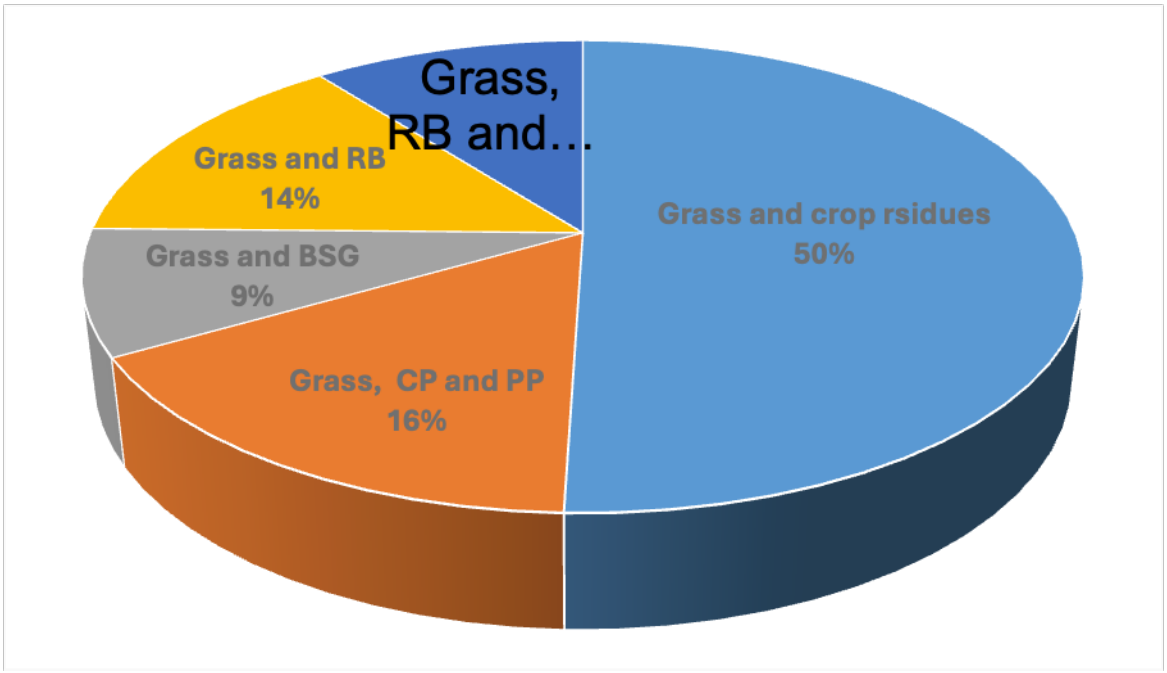
Parameter	Detail	Frequency	Percentage
Cattle production as a sole business	Yes	0	0
	No	105	100
	Total	*105*	*100*
Number of years in operation	1 - 10	55	52.4
	11 – 20	22	21.0
	21 – 30	18	17.1
	>30	10	9.5
	Total	*105*	*100*
Training in cattle production	Yes	39	37.1
	No	66	62.9
	Total	*105*	*100*
Herd size	1 – 10	16	15.2
	11 – 20	24	22.9
	21 – 30	33	31.4
	31 – 40	13	12.4
	41 – 50	0	0
	51 – 60	5	4.8
	>60	14	13.3
	Total	*105*	*100*
Management system	Extensive	53	50.5
	Intensive	22	20.9
	Semi-intensive	30	28.6
	Total	*105*	*100*
	Yes	8	7.6

Record keeping	No	97	92.4
	Total	*105*	*100*

In terms of management systems, the results showed that respondents predominantly practised the extensive management system (50.5%), with 28.6% and 20.9% practising the semi-intensive and intensive systems, respectively. The selection of a particular management system reflected a preference for low-input systems due to inadequate financial resources, infrastructural challenges, and the availability of natural pastures for grazing. The dominance of the extensive system over the others aligns with reports by Timpong-Jones et al. (2014) and Osman et al. (2018) and with traditional cattle-rearing practices in Ghana, where cattle are grazed free-range on natural pastures. The 28.6% practicing the semi-intensive system indicated a gradual shift towards more structured cattle management. This trend contradicted the findings of Osman et al. (2018), who reported the non-utilization of the semi-intensive system among smallholder urban cattle farmers in parts of the same region. However, the low adoption of the intensive system among respondents could be attributable to factors such as high initial capital investment and limited access to feed resources and housing.

A vast majority (92.4%) of respondents did not keep records of their activities, with only 7.6% practicing record-keeping. This observation underscored a significant gap in the proper farm management relative to decision-making in cattle production. This trend could be attributed to poor literacy among respondents, a lack of training on the importance of record-keeping, or a belief that record-keeping is not necessary for small-scale operations. The current study confirms Osman et al.'s (2018) report regarding record-keeping by smallholder cattle farmers, which is generally not encouraging.

Major feed resources utilized by cattle farmers in the study area are shown in Figure 1. The results showed that grass was the major feed resource utilized by the farmers. The choice of feed resources also reflected the farmers' reliance on agro-industrial by-products such as rice bran, groundnut skin meal, and brewers' spent grains and locally available crop residues such as cassava and plantain peels. The utilization of these feed resources shows an innovative approach to resource usage as it can reduce the cost of feed and assist in waste management.



RB: Rice bran, GSM: Groundnut skin meal, BSG: Brewers' spent grains, CP: Cassava peels. PP: Plantain peels

Figure 1: Major feed resources utilized by cattle farmers in the study area

Respondents' knowledge about improved pasture species and willingness to establish pasture

Knowledge of respondents regarding improved pasture species and their willingness to establish pastures for feeding their cattle are presented in Table 4. The results show that a vast majority of respondents (75.2%) were unaware of improved forage species for pasture establishment, with only 24.8% reporting awareness. This low level of awareness is indicative of a knowledge gap in information dissemination about improved pasture species. A very high proportion of respondents (96.2%) were willing to establish pastures for grazing their cattle. This phenomenon reflected a strong interest in improving feeding systems, possibly driven by the need for all-year-round feeding to address the perennial issue of feed shortage, particularly during the dry season. Only 7.6% of the respondents had attended a training or workshop on pasture establishment, while the vast majority (92.4%) had not. This lack of training poses a significant obstacle to adopting pasture establishment practices, as respondents may not have the requisite knowledge and skills to implement and manage them. A significant proportion of respondents (83.8%) were willing to invest in land purchase for pasture establishment, while 16.2% were unwilling. This willingness among the majority of respondents underscored the importance of pasture establishment to them. This trend is akin to the report by Sarkwa et al. (2025), which revealed that the majority of respondents were willing to use their land for organic livestock farming.

Table 4: Respondents' knowledge about improved pastures

Parameter	Detail	Frequency	Percentage
Are you aware of improved forage species for pasture establishment?	Yes	26	24.8
	No	79	75.2
	Total	*105*	*100*
Are you willing to establish a pasture to feed your animals?	Yes	101	96.2
	No	4	3.8
	Total	*105*	*100*
Have you ever attended any training on fodder or pasture establishment?	Yes	8	7.6
	No	97	92.4
	Total	*105*	*100*
Are you willing to buy land for pasture establishment?	Yes	88	83.8
	No	17	16.2
	Total	*105*	*100*

Barriers hindering the adoption of pasture establishment by smallholder cattle farmers

While the benefits of pasture establishment can influence the willingness of smallholder cattle farmers in urban and peri-urban communities in the study areas to adopt it, there are also certain barriers that militate against its adoption. Understanding and addressing these challenges is crucial to encourage greater participation in pasture establishment. Intensities of barriers affecting the adoption of pasture establishment in the study area are presented in Table 5.

Table 5: Intensities of barriers or challenges affecting the adoption of pasture establishment in the study area

Barrier	Less critical (%)	Critical (%)	Very critical (%)	Total
Financial constraints	0	0	100	100
Access to land	0	0	100	100
Access to improved planting materials	30	50	20	100
Inadequate technical know-how	40	60	0	100
Absence of extension services	0	70	30	100
Cultural practices and traditions	80	20	0	100

The results illustrate the predominant barriers hindering pasture establishment in the study area. Six key barriers were assessed based on respondents' perceived criticality. Financial constraints and access to land for pasture establishment were identified as the most severe barriers/challenges, with 100% of respondents rating them as "very critical." This indicated a unanimous consensus among respondents that financial limitations and access to land were significant barriers to adopting pasture establishment. Thus, financial constraints and access to land stood out as the most pressing issues, reflecting the broader challenge of resource limitations in agriculture. Establishment and maintenance of productive pastures require significant investments in infrastructure and equipment, which can be financially challenging for resource-constrained smallholder farmers (Theusme et al., 2021).

Access to improved planting materials was rated as "very critical" by 20%, "critical" by 50%, and "less critical" by 30%. This suggests a moderate barrier, with a significant portion of respondents perceiving it as an important factor, though not as severe as financial or land access issues. In the case of inadequate technical know-how, 60% rated it as "critical" and 40% as "less critical," implying that while some respondents viewed it as a challenge, it was not universally deemed a severe barrier. This notwithstanding, pasture establishment also requires specialised technical know-how in animal nutrition, feed management, and disease control (Costa Junior et al., 2015), which some smallholder cattle farmers may lack, thus making it difficult for them to adopt and implement pasture establishment. The lack of knowledge and skills can be a barrier to participation, as farmers may feel uncertain about proper management techniques and potential risks.

The rating of absence of extension services by 70% of respondents as a critical barrier and 30% as very critical underlines the lack of extension services as a significant factor limiting pasture establishment. Accordingly, the presence of extension services, crucial for disseminating technical information and best practices, is also notably lacking, as indicated by the majority (70%) of respondents. Cultural practices and traditions were considered the least challenging barrier, with 80% of respondents viewing them as "less critical" and only 20% considering them "Critical." Cultural practices and traditions, although identified as a barrier by a minority, appear less significant compared to other challenges. Cultural practices and traditions of smallholder cattle farmers may influence their willingness to establish and manage pastures. Some smallholder farmers, particularly the Fulanis, have strong attachments to their traditional grazing practices and may be resistant to change (Wairimu Ng'ang'a and Crane, 2020).

Correlation between selected variables and willingness to establish pasture

Correlation results between age, gender, level of education, number of years in cattle production, herd size, and training in cattle production and willingness to establish pasture are presented in Table 6. The results show that age and gender had no significant impact on willingness to establish pasture or buy land. Similarly, the number of years in operation, herd size, and training in cattle production showed no significant correlations with either willingness to establish a pasture or to buy land. Education level was positively and significantly correlated with willingness to purchase land for pasture, but not with willingness to establish pasture. However, there was a strong positive correlation ($r = 0.453$, $p = 0.000$) between willingness to establish pasture and willingness to buy land for pasture establishment.

Table 6: Correlations between selected variables and willingness to establish pasture

Variables	r	P value	Decision
Age and willingness to establish pasture	-0.037	0.705	Not significant
Age and willingness to acquire land for pasture establishment	0.083	0.398	Not significant
Gender and willingness to establish pasture	0.007	0.941	Not significant
Gender and willingness to acquire land for pasture establishment	-0.045	0.646	Not significant
Level of education and willingness to establish pasture	-0.001	0.992	Not significant

Level of education and willingness to acquire land for pasture establishment	0.193*	0.049	*
Number of years in operation and willingness to establish pasture	-0.091	0.356	Not significant
Number of years in operation and willingness to acquire land for pasture establishment	0.054	0.585	Not significant
Herd size and willingness to establish pasture	-0.101	0.306	Not significant
Herd size and willingness to acquire land for pasture establishment	-0.160	0.103	Not significant
Training in cattle production and willingness to establish pasture	-.161	.101	Not significant
Training in cattle production and willingness to acquire land for pasture establishment	-0.099	0.313	Not significant
Willingness to establish pasture and Willingness to acquire land for pasture establishment	0.453**	0.000	**

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

This trend of no significant correlation between age and willingness to establish pasture or buy land for pasture in the current study contrasts with that observed in some earlier studies. Younger farmers are generally more receptive to new approaches and technologies, including participation in feedlots. Their openness to change and willingness to adopt alternative strategies make them more likely to participate in pasture establishment than older farmers, who may be more resistant to change (Maluleke et al., 2020; Malusi et al., 2021). However, the current trend of no significant association between age and willingness to establish pasture was consistent with the report by Slayi et al. (2023), who found that willingness to participate in pasture establishment did not vary significantly across age groups.

The absence of a significant impact of gender on willingness to establish pasture or buy land for pasture establishment contrasts with the findings of Michalscheck et al. (2018), who found that gender significantly affected the adoption of new agricultural technologies, including pasture establishment, by smallholder farmers in Africa. The significant correlation between level of education and willingness to buy land for ($r = 0.193$, $p=0.049$) is consistent with findings of Kassie et al. (2015), Oyinbo et al. (2019), Twinamatsiko et al. (2020) and Lottering et al. (2021), where higher levels of education have been associated with a greater propensity to adopt sustainable farming practices or new technologies. Education can enhance the understanding of the long-term benefits of investing in land for pasture establishment.

While herd size and training in cattle production did not show significant correlations with willingness to adopt pasture establishment or to buy land, other studies have highlighted the importance of these factors in the adoption of improved grazing systems. For instance, larger herds may lead to a greater need to adopt new technologies, such as a dedicated pasture. In this regard, the current trend contradicts the report by Fadeyi et al. (2020) that smallholder farmers operating large farms with corresponding large herd sizes have been reported to adopt new technologies faster. Similar observations were made by Mapiye et al. (2006) and Yesuf and Kohlin (2008), who reported a positive correlation between farm/herd size and the adoption of new technologies, such as sustainable pasture establishment. Farmers with larger

herds may be more motivated to seek alternative strategies, such as pastures, to manage their animals. In contrast, smallholder farmers with small herd sizes may find pasture establishment less practical or face challenges related to the necessary infrastructure and management capacity (Novelli et al., 2022). However, in a study by Slayi et al. (2023), herd size did not significantly influence willingness to establish pasture. This implied that the size of the cattle herd did not play a significant role in determining farmers' willingness to adopt pasture establishment or to acquire land for it, which is consistent with the findings of the current study.

Additionally, training in cattle management is often linked to the adoption of new technologies, although this was not significant in the present study. According to Matata et al. (2010), more experienced farmers, arising from training, for instance, increase awareness of what technology is needed and to what extent it should be used. The current trend of attending cattle production training not influencing pasture establishment was consistent with the report by Twinamatsiko et al. (2020). The strong correlation between willingness to establish pasture and willingness to buy land suggests that respondents who are open to pasture establishment also recognise the importance of securing land for this purpose.

Conclusions

The study revealed that urban and peri-urban cattle farming in the study area is male-dominated, with most farmers being young (21–30 years), literate, and combining cattle rearing with other economic activities. This demonstrated a promising workforce, but with limited training in cattle production.

A vast majority (75.2%) of farmers in the study area were unaware of improved pasture species, and 92.4% had not received any training on fodder or pasture establishment. This lack of knowledge hindered the adoption of improved feed systems compared with pasture establishment using improved species.

Despite the knowledge gap on pasture establishment and improved forages, 96.2% of respondents expressed willingness to establish pastures, with 83.8% also showing readiness even to acquire land for that purpose. This reflected a strong interest in improving feeding systems for sustainable cattle production.

Financial constraints, access to land, lack of planting materials, and inadequate extension services emerged as critical barriers impeding the adoption of pasture cultivation. Cultural barriers, however, were deemed less critical.

The study showed no significant correlation between age, gender, herd size, or training in cattle production and willingness to establish pastures. However, education level positively influenced the willingness to acquire land for pasture establishment.

Recommendations

Stakeholders, including the Ministry of Food and Agriculture (MoFA) and universities, should conduct targeted training on improved pasture establishment, fodder conservation techniques, and farm record-keeping. Extension Services should also be extended to the study area and strengthened to bridge knowledge gaps and help farmers adopt sustainable pasture cultivation practices.

Government agencies and research institutions should collaborate to ensure a steady supply of improved forage seeds and planting materials. Local authorities should assist farmers in acquiring land for pasture cultivation through affordable leasing arrangements or communal land allocation.

Microcredit schemes and subsidies should be made available to help smallholder farmers overcome financial constraints associated with pasture establishment.

Awareness campaigns highlighting the economic and nutritional benefits of improved pastures should be conducted. Platforms such as farmer cooperatives, radio broadcasts, and community workshops can be used to disseminate knowledge.

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