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Exploring the Effectiveness of Agricultural Extension Strategies in Combating Livestock Theft in Communal Areas: A Case of Mopani District, Limpopo Province

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ABSTRACT

Livestock theft poses a serious threat to rural livelihoods in South Africa, particularly within communal farming systems. This study evaluates the effectiveness of agricultural extension strategies in addressing livestock theft among communal livestock farmers in the Mopani District of Limpopo Province, South Africa. A qualitative research approach was employed, using semi-structured interviews with 300 communal livestock farmers. Thematic analysis was applied to systematically categorise and interpret farmers' unstructured responses. The findings reveal substantial weaknesses in existing extension practices, including limited farmer engagement, inadequate training of extension officers in livestock security, ineffective communication arising from language barriers, and the low visibility of extension personnel in farming communities. The study identifies several promising strategies, such as context-specific awareness campaigns, the formation of farmer groups to promote collective action, improved accessibility of extension services, and increased government investment in basic security infrastructure. These recommendations provide practical guidance for strengthening policy and extension practice to enhance the effectiveness, inclusivity, and responsiveness of interventions aimed at livestock protection. The study concludes that farmer-centred, inclusive, and adaptive extension strategies are urgently needed to address livestock theft in communal farming contexts.

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Introduction

The theft of livestock presents a significant challenge for smallholder farmers in the communal regions of South Africa. It does not only weaken economic stability and food security but also diminishes trust in rural safety systems (Lombard, 2016). Livestock theft, often referred to as stock theft, poses significant and complex socio-economic challenges in many communal areas of Mopani District, Limpopo Province. It is regarded as an activity which has far-reaching implications, particularly in communal farming areas where livestock contributes significantly to the following; household income, food security, cultural practices, and social foundation (Maluleke *et al.,* 2021). Mopani regions are characterised by a communal land tenure system, and livestock is valued differently, for example, as a source of income and as an embodiment of cultural belonging and sustainable rural livelihoods (Hay, 2015). However, these regions have experienced a reported incidence rising of livestock theft at an uncontrolled rate, often aggravated by limited policing capacity and poor institutional coordination among numerous stakeholders (Clack, 2024). However, the prevalence of livestock theft in Mopani District put significant pressure on the rural economy for both individual farmers and the broader community.

In recent years, the effectiveness of extension service in addressing issues of livestock has gained significant attention in rural development (Ndem, *et al*., 2020). It is argued that well-coordinated and inclusive strategies have the potential to strengthen local knowledge networks, enhance community vigilance, and foster collective action against criminal activities (Danso-Abbeam *et al*., 2018). Agricultural extension services are essential for rural development through provision of extension education, information, technical advice, and access to resources to improve livestock management and reduce risk of livestock theft (Jatuyi *et al*., 2017). In the context of livestock theft, their services on potentially mitigating stock theft have become increasingly critical (Manyeruke *et al*., 2023). However, the effectiveness of such interventions remains a subject of ongoing research and debate (Clack, 2024), and it further remains fragmented, especially in South Africa's communal areas (Sichewo, 2020). In this study, livestock theft is defined as the unauthorised acquisition or loss of one or more livestock, which poses a threat to rural livelihood and food security in communal systems. In this study, the terms “livestock theft” and stock theft will be used interchangeably, and in this article, livestock refers to cattle.

Background

Livestock theft has long been a persistent issue for South African farmers, which is confirmed by many scholars (Aiyzhy *et a*l., 2021; Chelin, 2019; Doorewaard *et al*., 2015 and Clack, 2013).
It is an emotional subject for the farmers; although, most of them appear to be unconcerned about the problem and only react when someone steals from them (Deegan and Dunne, 2022). Livestock theft is a complex issue deeply rooted in the socio-economic livelihood of numerous rural communities, frequently exacerbated by poverty, youth unemployment, institutional enforcement, and limited access to policing and justice (Masuku and Motlalekgosi, 2021). In rural areas where law enforcement capacity is often strained, livestock theft undermines agriculture productivity and disrupts the socioeconomic resilience of households living below the poverty line (Kwenda and Masunda, 2025). Bunei (2018) stated that within all agriculture theft, livestock theft is making agriculture a risky project, additionally, Bunei *et al*., (2016) and Kaprom (2013) further observed that the frequency and intensity of this practice has reached uncontrolled milestones. Hence, the issue necessitates a more cohesive, pro-active, and collaborative approach, where agriculture extension can play a pivotal role.

Motivation, Aim and Objective of the study

Livestock theft persists, compromising rural livelihoods across various regions of Mopani District. This is especially true in communal land systems characterised by inadequate security infrastructure and limited law enforcement resources. In South Africa, livestock farming is a significant economic activity and cultural resource for numerous rural households; however, the ongoing issue of livestock theft has resulted in considerable socio-economic challenges, particularly for smallholder and subsistence farmers. The impact of the livestock theft destroys the confidence of farmers because it compromises food security and income stability by destroying social cohesion and trust in farming communities. The persistence of livestock theft, despite efforts such as policy frameworks and law enforcement initiatives, reveals a significant deficiency in both preventive and adaptive strategies. In the Mopani District, extension officers are a critical player in the development of innovative, community-based approaches to reduce livestock theft, as they are strategically positioned at the interface between government, farmers, and local institutions. The significance of agricultural extension services in tackling livestock theft and promoting localised, contextually relevant solutions is frequently underestimated. Agricultural extension has historically prioritised enhancing productivity and technical efficiency; nonetheless, its potential role in advancing rural safety and security is still inadequately examined. The urgent need to develop innovative and participatory extension methods tailored to the unique dynamics of communal land tenure systems drives this study.

The study aims to uncover practical extension-based approaches by exploring farmers' experiences and perceptions of livestock theft, with the goal of enhancing knowledge, raising awareness, and empowering communities to act together. Hence, the primary objective of the study is to formulate probable agricultural extension methods for minimizing livestock theft under communal land systems. The study seeks to enhance discussions on rural development by highlighting agricultural extension as a vital tool in addressing rural crime and protecting the livelihoods of communal farmers.

Problem Statement

The problem investigated in this article is that there is limited understanding on the function of agricultural extension services in addressing and mitigating livestock theft, which poses a significant threat to the rural livelihoods of Mopani District. Rural safety planning processes often inadequately incorporate extension services, thereby restricting their capacity to impact wider community policing initiatives. However, most studies tend to focus on the general causes and socio-economic effects of stock theft, overlooking practical and strategic extension-based interventions that aim to mitigate it. This represents a significant knowledge gap, given that livestock theft is often influenced by complex local dynamics, including trust, communal cooperation, and informal policing networks. A significant gap exists in integrating agricultural extension services with rural safety initiatives and law enforcement. Current policies often fail to recognise the preventive role that extension services can play; instead, they treat livestock security purely as a criminal justice matter, thereby overlooking their potential contributions to prevention. Furthermore, many studies fail to account for farmer perceptions and experiences with extension services when developing livestock protection strategies. Understanding these perspectives is significant for designing responsive, culturally relevant, and comprehensive livestock protection strategies. Hence, there is a significant gap in the current understanding of how existing extension strategies can be enhanced or adapted more effectively to address livestock security challenges within communal settings.

Literature Review

Livestock theft has historically posed a significant socio-economic problem to rural communities of South Africa, especially in Limpopo Province. It has taken on a new form, where organised and well-planned groups of criminals commit it *(Mabunda et al., 2021and* Maluleke *et al*., 2021). In South Africa, stealing livestock has become a more violent and organised crime in the past few years (Clack, 2013). According to Clack (2024), communal land systems, defined by open grazing and limited institutional oversight, often facilitate this theft. Not only do criminals steal animals, but they also slaughter them on the spot, extract the meat, and leave the carcass nearby, as shown in Figure 2, sometimes within the vicinity of homesteads (South African Police Service, 2023). Concerningly, there is a noted rise in instances of livestock fatalities occurring within secure kraals, as illustrated in Figure 1. This trend indicates a concerning rise in the audacity and operational complexity of these criminal networks (Crime Stats South Africa, 2023). The recurring livestock theft increasingly threatens the viability and profitability of livestock farming in these regions (Jakobsen and Nielsen, 2024). For marginalised groups, like elderly farmers and women-headed households, who frequently lack the resources to recover from the loss of vital livestock assets, the psychological toll is especially high (Bahta and Nyaki, 2024). A cycle of poverty, food insecurity, and underdevelopment in rural areas is sustained by the combined impact of these issues.

Livestock theft represents a persistent and deeply disruptive challenge in many communal farming areas of South Africa, particularly in provinces like Limpopo. It causes direct economic losses through the reduction of household income, loss of productive animals, and increased costs for security measures (Chand, 2023). The reduction in herd size from stock theft discourages farmers from reinvesting in livestock farming (Nori, 2021). Farmers fearing for future loss are forced to abandon livestock farming entirely and transition to risky but profitable livelihood options (Chand *et al.,* 2023). This further discourages youth and women from participating in the livestock sector (Nchanji *et al.*, 2023), consequently undermining intergenerational knowledge transfer and gender inclusivity in agriculture (Stats South Africa, 2022).

Agricultural Extension in South Africa has traditionally focused on enhancing agricultural output and providing technical assistance to farmers (Worth, 2008), while insufficiently addressing concerns linked to rural security and crime prevention, including livestock theft (Myeni *et al.,*2019). Agriculture Extension services were traditionally mandated to disseminate information on improved farming methods (Norton and Alwang, 2020). However, the Revised National Policy on Extension and Advisory Services calls for a more holistic, inclusive, and integrated extension approach that promotes innovation (DAFF, 2016). This policy realignment creates an opportunity to incorporate livestock theft prevention strategies into extension programming (Okwama *et al*., 2022).

According Munyai (2012), in communal regions such as districts like Mopani, Limpopo Province, livestock is valued as a key livelihood measure, as stock theft threatens the social stability of the local community. Extension officers are increasingly required to facilitate multi-stakeholder participation, empowering farmers with technical knowledge and crime prevention awareness (Prajapati, 2025). Research demonstrates that extension interventions can improve community ability to prevent and address livestock theft when coupled with robust community engagement and trust in authorities (Masuku, 2023). Nonetheless, obstacles such as constrained resources, insufficient training of extension personnel, and socio-cultural influences may impede the efficacy of these initiatives (Omweri, 2024). Extension services have, in certain instances, encountered difficulties in addressing intricate social dynamics and the covert nature of livestock theft networks.

Figure 1. Livestock killed in secured kraal

Figure 2. Discarded carcass after the meat was taken

Extension-based solutions in communal areas encounter various institutional, operational, and social challenges. A study by Adisa (2015) highlights the critical importance of specialised training in livestock security and criminal risk assessment for extension officers, emphasising the direct impact it has on their effectiveness in addressing theft incidents. Extension officers typically receive training in general agricultural support; however, they often lack specific skills pertinent to livestock theft (Nkosi, 2017). Insufficient budgets, inadequate transport infrastructure, and a lack of access to technology hinder the ability of extension officers to effectively perform their duties (Ali and Safdar, 2022).

These constraints restrict the movement and presence of extension officers in remote or dispersed communities, limiting their ability to reach and assist community members effectively (Mamun-ur-Rashid *et al.,* 2018). This restriction hinders their ability to reach and provide essential services to beneficiaries in rural or marginalised areas, where the need for these services is particularly pressing (Corpuz *et al*., 2022). Additionally, there is frequently inadequate coordination among extension services, livestock farmers, and security agencies such as the SAPS Stock Theft Unit. This disorganisation can lead to repeated work and slow responses to theft cases, made worse by poor planning and sharing of resources among the groups involve (Bauchi *et al.,* 2009). The lack of coordinated strategies often results in conflicting information and reduced effectiveness, directly impacting rural communities by impeding their ability to combat theft effectively (Saryam and Jena, 2019).

Study material and method

Study area description

The study was conducted in the Mopani District Municipality, located in the north-eastern region of Limpopo Province, South Africa. The district comprises five local municipalities: Greater Giyani, Maruleng, Greater Letaba, Greater Tzaneen and Ba-Phalaborwa (Figure 1: Map of Mopani District Municipality). The district is characterized by a semi-arid climate, marked by hot summers and moderate winters, along with unpredictable rainfall that sustains a diversified agricultural system encompassing both crop and livestock production (South African Weather Service, 2023). The Mopani District is primarily rural, distinguished by its agricultural economy, conventional land tenure systems, and extensive communal land ownership. The Limpopo Department of Agriculture and Rural Development (LDARD) oversees the allocation of agricultural extension officers and consulting services throughout the region. The district is subdivided into traditional authority areas, where communal land tenure prevails, and traditional authorities are pivotal in land governance and rural administration (Shopola, 2022). In the district, communal cattle husbandry occurs on shared grazing pastureland, which is

informally regulated and often lacks adequate fencing, infrastructure, and formal surveillance. Livestock theft continues to be a prevalent problem in the district, aggravated by inadequate rural policing, permeable boundaries, and insufficient collaboration between farmers and law enforcement authorities (SAPS Annual Crime Reports, 2022/2023).

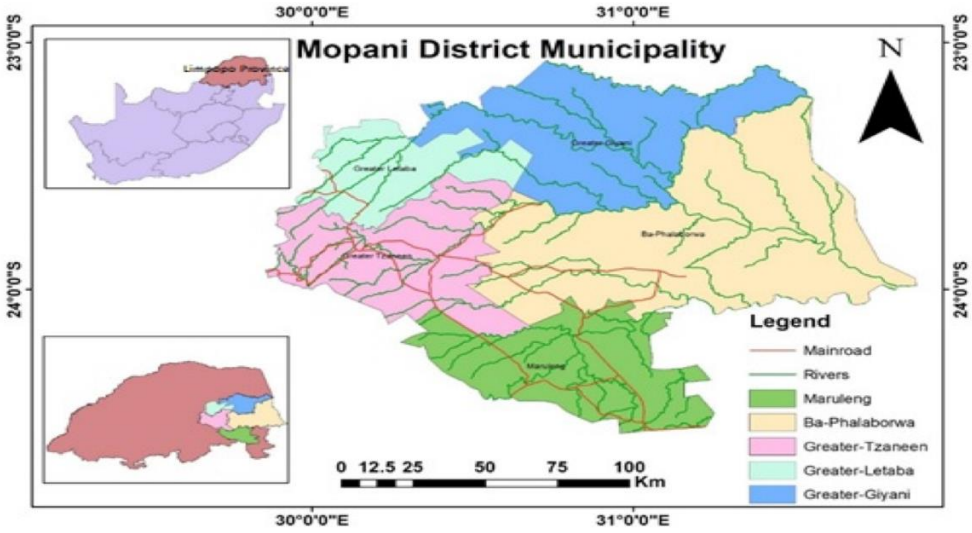

Figure 3. Mopani District Map
Source: Nembilwi et al., 2021

Research design and sampling

This research employed a qualitative study approach to explore the complex dynamics of livestock theft, the experiences of farmers, and the effectiveness of agricultural extension interventions intended to reduce this crime. The qualitative research approach was considered relevant and appropriate to examine complex and socially embedded livestock theft as well as collect in-depth and contextual information on the subject (Creswell, 2014). The purposive sampling technique was adopted to recruit participants who possess relevant knowledge and experience with both livestock farming and incidents of theft. This non-probability sampling technique is appropriate for qualitative research aimed at obtaining in-depth, contextual insights rather than statistical generalizations (Palinkas *et al.,* 2015). The sample comprised 300 (n = 300) communal livestock farmers selected based on specific inclusion criteria: active involvement in livestock rearing, prior experience with livestock theft incidents, and engagement with agricultural extension services.

Data Collection

Data collection was conducted using semi-structured interviews. The data collection process covered a duration of three months (1st November 2024 to 31st January 2025). This was conducted through thirty-three strategically chosen livestock dipping tanks, which served as access points to engage communal livestock farmers during regular agricultural meetings. To facilitate active engagement among farmers, data collection was synchronized with ongoing communal agricultural activities, such as animal dipping sessions, farmer meetings, field days, and commodities study groups. The study employed both open-ended questionnaires to gather qualitative data. During the interview, questions were translated from English to local languages (Sepedi, Tsonga, and Venda). Before complete deployment, the questionnaire was pretested with fifteen livestock farmers who were not part of the main study population. The pilot test evaluated the clarity, relevancy, and order

of the questions. Insights from this activity guided essential modifications, improving the instrument's validity and reliability.

Data Analysis

The data obtained were analysed through thematic analysis, which is a flexible and systematic qualitative analytical approach used for identifying, interpreting, and reporting patterns (themes) within the data (Braun and Clarke, 2006). The process involved the following steps: (1) familiarisation with the data, (2) development of preliminary codes, (3) identification of themes, (4) evaluation of themes, (5) definition and labelling of themes, and (6) preparation of the final report. The study used an inductive (data-driven) coding approach, which allowed themes to arise spontaneously from raw data rather than being bound by pre-existing ideas or frameworks. The choice of theme analysis was influenced by its ability to analyse complicated, subjective experiences, particularly in practical policy contexts such as agricultural extension and rural security. This method enables a thorough, deep, and nuanced analysis of data while retaining transparency and methodological consistency. Thematic saturation was reached after analysing 250 interviews; nevertheless, an additional fifty interviews were done to confirm that no new material was forthcoming, thereby confirming the dataset's completeness (Guest *et al.,* 2006). Emerging themes and coding patterns were addressed with academic supervisors, resulting in a critical external assessment of interpretations and a reduction in subjective bias throughout theme development. While data were collected only from livestock producers, triangulation was achieved methodologically by cross-checking participant responses across all municipalities within the study district and demographic profiles, increasing the depth and credibility of the findings. These procedures were used to establish analytical rigour and satisfy qualitative validity standards, as proposed by Nowell *et al*., (2017).

Ethical considerations

All ethical protocols were strictly followed during the data collection procedure. The study's objective was disclosed to participants, and they were encouraged to participate voluntarily. Personal identifiers were anonymised to ensure confidentiality, and informed consent was obtained from each participant. The Faculty of Natural and Agricultural Sciences Ethics Committee at North-West University granted ethical approval for the study, under reference number NWU-01251-24-A9.

Results

The study's findings, illustrated in Figure 4, reveal that participants recognised multiple key elements contributing to livestock theft in communal regions. Unemployment was reported as the primary factor (35%), succeeded by poor livestock management and inadequate infrastructure (25%), the practice of keeping animals unsecured outside kraals overnight (20%), and poor coordination between farmers, law enforcement, and extension officers (20%). Participants articulated diverse perspectives on agricultural extension services as highlighted on Figure 5. A minority of respondents evaluated the services as good (30%) or fair (10%), while the majority (60%) perceived them as poor, reflecting widespread dissatisfaction with the current extension service provision. Figure 6 presents more insights into the challenges hindering the implementation of extension-based solutions. The most prominent challenges included inadequate training for extension officers on livestock security matters (55%), communication barriers (35%), and limited farmer participation in the planning and implementation of extension programs (10%). Figure 7 illustrates recommendations aimed at improving the efficacy of extension strategies. These include the need for targeted awareness campaigns (36%), the accessibility and visibility of extension services (25%), the establishment of farmer groups to foster collective action (15%), and the provision of adequate resources and infrastructure (24%).

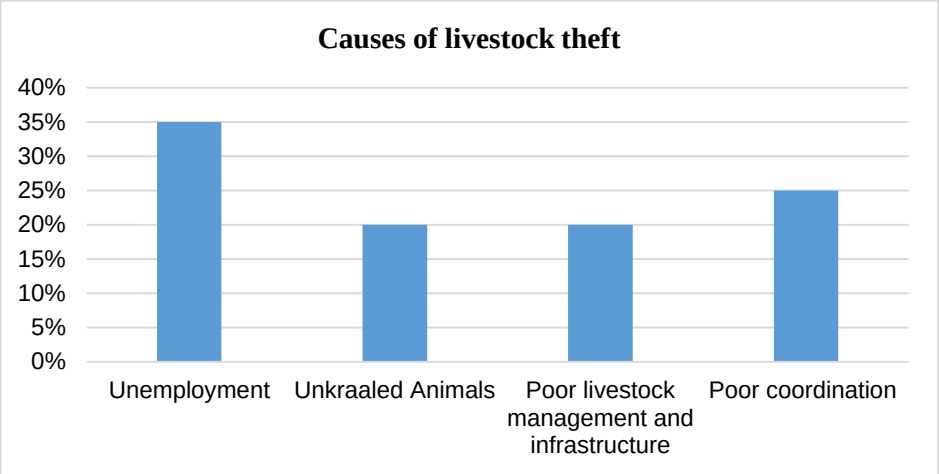

Figure 4. Causes of livestock theft

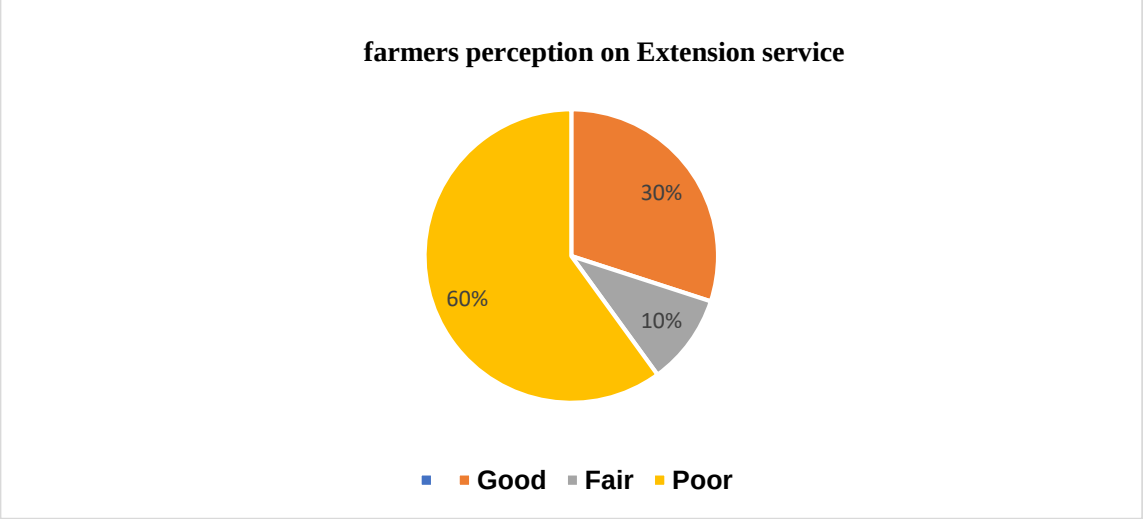

Figure 5. Farmers Perception on agriculture extension effectiveness

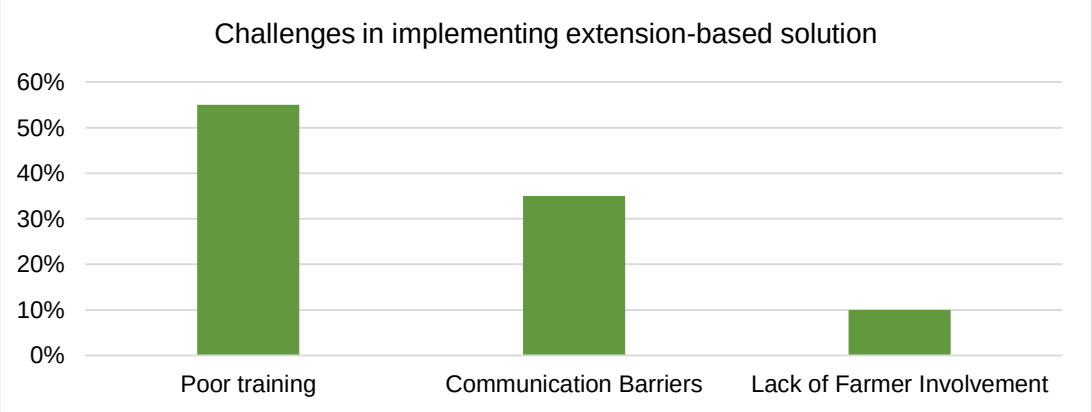

Figure 6. Challenges in implementing extension-based solutions

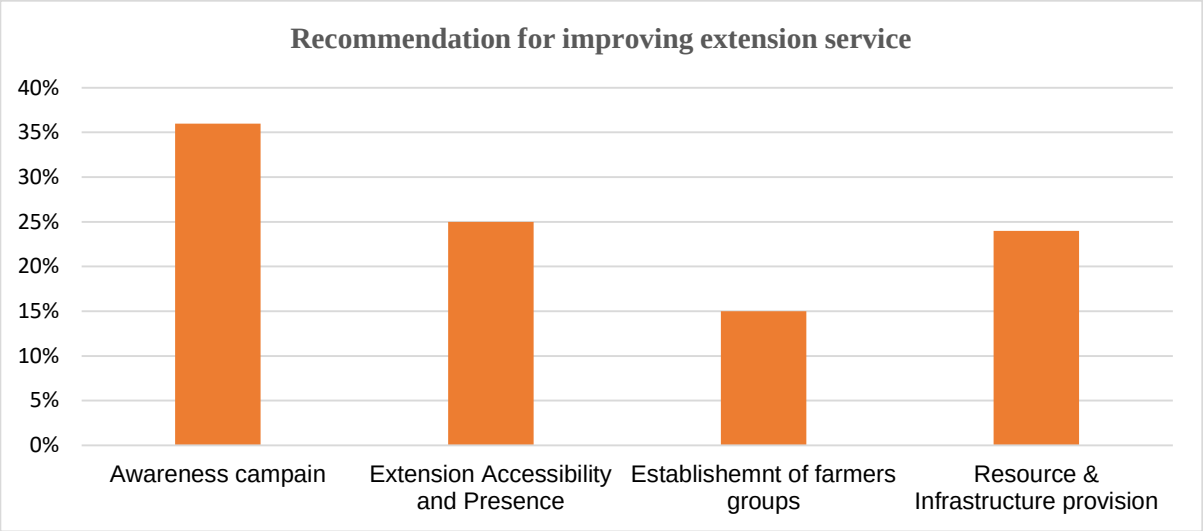

Figure 7. Recommendations for improving extension strategies

Discussions

Perceived Patterns and Causes of livestock theft under communal Land

The results presented in Figure 4 highlight a multifaceted interaction of socio-economic and structural elements that influence the occurrence of livestock theft in communal regions. The correlation between unemployment and livestock theft is marked by social challenges that extend beyond mere agricultural security measures. Shortage of sustainable generating income, especially among youth, may turn to stealing of livestock as a means of surviving when legitimate employment options run out. In a related study Mabunda *et al*., (2021) identified unemployment as a significant socio-economic factor that heightens the vulnerability of rural communities to livestock theft. Hence, when poverty pushes individuals towards actions that provide immediate economic benefits, livestock become a readily tradable commodity target for theft. The significant market value of livestock, combined with the challenges of tracing stolen animals, makes this crime particularly attractive in poor regions. This cycle diminishes social cohesion within communities, undermining trust among members and creating conditions that may hinder the effectiveness of law enforcement. A limited number of members will engage in collective communal vigilance activities, including night- time watch programs and community-based patrols. The decline in communal vigilance highlights the significance of socio-economic stability in addressing criminal behaviour, such as theft.

In communal farming systems, livestock that are not enclosed in kraals increase the vulnerability to theft. Not having physical barriers like kraals weakens the natural deterrents and community-based surveillance systems meant to prevent livestock-related crimes. According to situational crime prevention theory, theft of animals is influenced by the availability of opportunities in the area. When animals are left unattended and unprotected, especially overnight, thieves can easily see and access them, making it less risky and easier for them to steal. Therefore, ensuring that animals are securely enclosed in kraals, especially during high-risk times like nightfall, is not only good management but also a crucial aspect of preventing crime. The findings of Manyeruke *et al*., (2023) are consistent with this observation, indicating that leaving animals unattended or unsecured, especially at night, increases the risk of livestock theft in communal areas. This approach aligns with broader rural security strategies aimed at enhancing community resilience to agricultural crimes and reducing opportunities for criminal activity.

Outdated and ineffective management practices, coupled with limited access to modern technologies and extension services, increase livestock vulnerability. In this context, infrastructure includes physical facilities such as secure kraals and storage areas, along with support systems like transportation, communication networks, and law enforcement responsiveness. Limited network coverage hampers farmers' ability to coordinate security measures or promptly report suspicious activities. The findings suggest that structural flaws in animal husbandry practices weaken livestock security and leave communal farmers ill-equipped to protect their assets. Improving livestock management techniques and investing in infrastructure development significantly reduce the risk of theft. This highlights the essential function of agricultural extension services in disseminating knowledge and promoting best practices among livestock owners.

Livestock are often left unsecured outside kraals overnight due to traditional herding practices, limited kraal capacity, or the need to access better grazing areas that are distant from existing enclosures. Unattended animals grazing in remote areas are vulnerable to theft because perpetrators can act without the presence of witnesses. In regions with hot temperatures or limited water, farmers may choose not to confine livestock in small spaces to prevent distress to the animals. Although this is meant to improve animal welfare, this decision unintentionally heightens the vulnerability of the livestock to theft. Farmers with limited resources face challenges in implementing night-time security measures due to factors like costs and the requirement for constant vigilance. Practical methods like rotational guarding systems and placing kraals strategically near grazing areas offer effective solutions to reduce stock theft. Extension officers are crucial in educating farmers about the risks of leaving animals unsecured, particularly in theft-prone areas.

Inadequate coordination between farmers, law enforcement agencies, and extension officers leads to livestock theft. This highlights the need for effective communication and collaboration among key stakeholders to address this issue. When a theft is reported, the absence of a coordinated communication system leads to delays in responses from law enforcement and support networks. This delay frequently leads to missed chances for apprehending offenders or retrieving stolen livestock. This aligns with the assertion made by O'Brien and Windle (2022) that this vulnerability is frequently exploited by criminals, who take advantage of the limited oversight and delayed response times in rural areas. Furthermore, inadequate coordination can lead to a decline in farmer morale and a sense of neglect. Farmers who feel unsupported by local authorities and extension services are less likely to report stolen livestock or engage in community-based protection efforts. It will leave extension services unaware of farmers' security challenges, thus weakening the implementation of preventive actions.

Table 1. Policy recommendation for livestock theft mitigation

Policy area	Endorsements	Expected outcome
Employment	Initiate rural job creation programs	Reduction in economic desperation resulting in reduced livestock theft
Adoption of Technology	Implement livestock tracking systems and record keeping	Advance Monitoring and enhanced rapid response
Infrastructure development	Transform conventional kraals into modern, secure facilities	Minimised immediate risk associated with unsecured animals.
Extension service improvement	Enhance training initiatives for contemporary livestock management techniques.	Increased best practices and record-keeping.

Community development	Encourage community-based efforts to enhance collective awareness	Enhanced community networks and optimised incident reporting

Source: Own, 2025

As presentenced on Table 1, Local governments ought to prioritise the implementation of specific initiatives, such as job training programs and agricultural cooperatives, that generate employment in rural communities, particularly within the agricultural sector. Enhancing local employment opportunities may reduce the financial insecurity that frequently leads to criminal behaviour, such as livestock theft. Government bodies, in partnership with traditional authorities, should designate land and provide funding for the construction and upkeep of modern livestock pens and secure enclosures for communal livestock to enhance livestock safety and reduce theft risks. The incorporation of advanced technologies, such as livestock tracking systems, can significantly improve the monitoring and protection of animals in rural communities. Comprehensive training programs conducted by extension officers should be implemented to ensure the effective utilisation of such technologies. The integration of indigenous knowledge systems with modern agricultural practices can enhance sustainable rural development. The establishment of centralised communication platforms that facilitate real-time information exchange among farmers, law enforcement, and extension personnel is essential for enhancing collaboration, rapid response to incidents, and effective coordination in addressing livestock theft. These systems would enable prompt reporting of theft incidents and enhance coordinated response strategies.

A comprehensive strategy is essential for effectively mitigating livestock theft. This strategy should include secure livestock management practices, resource allocation towards rural economic development, and robust stakeholder collaboration. Implementing targeted strategies that address the identified factors can significantly reduce theft incidents in communal farming areas while enhancing the resilience of agricultural systems. Protecting livestock assets secures the economic foundation of rural households and preserves traditional farming practices and cultural heritage linked to livestock keeping in communal areas.

Farmers Perception on agriculture extension effectiveness

The results from Figure 5 show that most communal farmers in the Mopani District hold negative perceptions of agricultural extension services. The low approval ratings suggest a disconnect between the current extension interventions and the specific needs for preventing livestock theft in communal contexts. Considering these findings in the socioeconomic, cultural, and historical context of the Mopani District is crucial. These findings cannot be viewed in isolation. Analysing it alongside other key findings in Figure 4**,** reveals a broader pattern associated with livestock theft. The inefficiency of extension services worsens these weaknesses in the system. This indicates that extension officers are perceived as ineffective not just in imparting technical knowledge but also in establishing the institutional connections and collaborative endeavours essential for comprehensive livestock theft prevention. The clear lack of trust in the system could hinder cooperation between farmers and extension personnel, reducing the effectiveness of these strategies. The lack of support or engagement among farmers diminishes the effectiveness of coordinated responses to livestock theft, hindering initiatives such as community-based surveillance, training in kraaling practices, and the implementation of technologies like animal tracking systems.

“We don't see the extension officer very often. We are uncertain as to whom to contact in the event of an emergency, such as theft or ill animals”.

The limited extension initiatives addressing theft are primarily reactive, emphasising post-theft recovery instead of establishing comprehensive security systems. This may indicate an urgent need for revision of the job descriptions and performance metrics of extension officers to incorporate livestock security as a fundamental responsibility is necessary. The favourable feedback from the results underscores the potential impact, pointing to localized achievements in regions where extension officers receive better training, are more accessible and more involved in community structures. This aligns with a study by Moyo andSalawu (2018) which found that ineffective extension efforts, inadequate communication, and a lack of participatory methods lead to distrust and disengagement among rural farmers. Addressing livestock theft requires coordinated efforts, sharing knowledge, and boosting local capabilities. The absence of confidence in extension services constitutes a major obstacle to effective prevention.

This result underscores a significant disparity between policy intentions and practical realities. The findings indicate that, consistent with current research, effective measures against livestock theft require extension services to transition from generic advisory models to more context-specific, security-focused, and participatory approaches involving farmers. A robust feedback mechanism is essential to ensure the responsiveness of extension services to the evolving needs of farmers. Utilizing routine surveys, focus groups, and digital feedback platforms allows extension officers to evaluate the effectiveness of their interventions. This iterative process enables ongoing service modifications informed by farmers' experiences and emerging threats, thereby promoting trust and collaboration among stakeholders.

Challenges in hindering implementing extension-based solutions

The effectiveness of agricultural extension strategies in mitigating livestock theft in communal areas is influenced not only by the availability of extension services but also by various contextual and institutional challenges as highlighted in Figure 6. The lack of adequate training among extension officers significantly impedes their ability to address livestock theft in communal areas. The absence of specialized training hampers extension officers' ability to offer farmers essential guidance on preventive measures, security protocols, and proper responses to theft incidents, reducing their effectiveness in addressing livestock theft. Furthermore, inadequate training hinders extension officers from assisting farmers on critical livestock identification techniques like branding and tagging, essential for tracing and reclaiming stolen livestock. Research consistently indicates that insufficient training for extension officers is the primary obstacle to effectively preventing livestock theft in communal areas. Extension Officers lack the necessary specialised knowledge and skills to effectively advise farmers on contemporary security technologies, risk assessment, and community mobilisation.

“They assist us with livestock production inputs, but when it comes to theft, we don’t see much help”

Moreover, Farmers' language barriers, coupled with extension officers' use of overly technical terms, worsen negative perceptions, and impede effective communication in dealing with livestock theft issues. This led to farmers dissatisfaction with officials who lack proficiency in local languages and do not comprehend traditional herding practices. This shows that extension services often fail to demonstrate cultural sensitivity in dealing with livestock theft, overlooking the broader cultural importance of livestock beyond its economic worth in diverse communities. As a result of this communication breakdown, crucial information on livestock theft trends, prevention strategies, and collaborative efforts is not effectively shared in a timely manner.

“The extension officer communicates with us in English, while I am Tsonga. The government should appoint local extension officers who are fluent in the local language to ensure effective communication and improve service delivery”

Farmers often struggle to understand technical terms related to security systems, legal procedures, or animal identification methods without adequate explanation. The key challenge of communication barriers requires a multifaceted approach that includes strategies to address language differences, bridge cultural gaps, and simplify technical information to enhance comprehension among farmers. To be effective, communication strategies should prioritize local languages, culturally sensitive methods, and participatory approaches that encourage active farmer engagement in discussions to share their experiences and knowledge. Farmers active participation enhances program relevance and promotes shared ownership, crucial for addressing complex issues such as livestock theft that require community collaboration. They are more inclined to engage in programs designed to address their specific needs and priorities, which also allow them to contribute to decision-making processes. The perceptions of farmers regarding extension service activities influence their participation frequency in extension programs. Consistent with the current findings, Mapiye and Dzama (2024) noted that insufficient engagement and disregard for local socioeconomic and cultural contexts can undermine extension outcomes related to livestock security and productivity. Farmers are more inclined to participate in extension programs when extension officers tailor information to align with farmers' perceptions of their needs. Meaningful participation ensures the relevance of extension programs while fostering community ownership and accountability. Community feedback mechanisms facilitate the ongoing enhancement of extension methodologies informed by user experience. Implementing these strategies can enhance farmer participation in extension services, resulting in more relevant, accepted, and effective livestock security measures in communal areas. Establishing livestock security action committees, composed of elected farmer representatives, will support continuous community oversight and the adjustment of security initiatives.

Contextualized recommendations by farmers for strengthening agricultural extension strategies

The findings from Figure 7 highlight the significance of a multi-faceted approach that improves the accessibility and visibility of extension services, leverages the strength of farmer groups for collective action, optimizes resource and infrastructure use, and executes targeted awareness campaigns. The endorsement of the awareness campaign highlights that many communal livestock farmers lack knowledge of the comprehensive extension services available to them, especially those targeting livestock theft mitigation. The existing knowledge gap restricts the potential effectiveness of current programs. The campaigns effectively convey these risks and offer practical mitigation strategies, thereby equipping farmers with essential knowledge for asset protection. Targeted educational initiatives, especially those conducted in local languages and tailored to specific contexts, may significantly contribute to fostering vigilance, improving community knowledge, and promoting the adoption of best practices in livestock management. This is consistent with the findings of Opande and Olago (2024) and Moyo and Salawu (2018), which emphasise the significance of context-specific communication for facilitating behavioural change among rural farmers.

"Regular workshops on livestock safety and theft reporting are necessary, as many farmers lack knowledge regarding appropriate contacts."

Furthermore, the lack of physical presence and consistent engagement by extension officers reduces trust and undermines the potential effectiveness of extension initiatives. Enhancing the presence and visibility of extension officers may strengthen relationships with farmers and promote a collaborative approach to livestock security. This recommendation is supported by the research of Ngegba (2018), who emphasize the importance of proximity and relational trust in enhancing the effectiveness of extension systems in rural communities. Extension officers recognized as community figures and who adhere to regular farm visit schedules demonstrate increased effectiveness in the implementation of security measures and other interventions. Enhancing the visibility of extension services can be achieved by increasing staffing, using local languages, and decentralizing offices, which may enhance the relationships between communal livestock farmers and extension officers.

The establishment of a farmers' group approach acknowledges the effectiveness of collective action in addressing security challenges frequently encountered by individual farmers. This approach may improve collective action through activities such as shared kraals, joint patrolling, and coordinated reporting of theft incidents. According to Ndambuki (2016) and Kufandirori (2019), this system is successful in countries like Zimbabwe and Kenya, where community policing and farmer cooperatives have significantly reduced livestock theft. In areas where police presence is limited, these groups could improve coordinated responses to theft, share resources like herders or secure kraals, and enhance information flow among community members.

"Together, we are more powerful. We could patrol together or report thieves if there was a local livestock security group".

Moreover, when farmers are familiar with their neighbours and engage in regular group activities, they cultivate stronger social bonds that deter theft within the community and encourage collective vigilance against external threats. Therefore, Extension officers can more effectively convey information to organised groups instead of visiting individual farmers. This type of social capital is essential for effectively addressing stock theft in dispersed and resource-limited regions. Numerous communal farmers function without secure kraals, tracking systems, or access to transportation, which heightens their vulnerability. This mobility limitation significantly hampers their ability to address theft incidents within the communities. Farmers remain vulnerable due to the lack of essential physical infrastructure for securing livestock and the absence of tools for tracking movements, despite the efforts of extension services. Resource and infrastructure improvements necessitate coordinated efforts among government agencies, non-governmental organisations, and community stakeholders. Therefore, it is imperative for extension services to prioritise investments in essential infrastructure and to promote public-private partnerships aimed at supporting resource-constrained farmers.

The findings indicate that extension services have significant potential to reduce livestock theft; however, their effectiveness depends on their adaptation to local needs, institutional capacities, and infrastructural conditions, as illustrated in Table 2. The experiences and contextualized recommendations show that farmers acknowledge the necessity of both soft interventions (education, awareness, and coordination) and hard infrastructure (facilities and equipment) to address livestock theft. Technical interventions are inadequate in isolation. They must be integrated with relational trust, local relevance, and community empowerment. Agricultural extension strategies should be participatory, well-resourced, and contextually relevant to enhance community resilience against livestock theft. Consequently, the effectiveness of agricultural extension is presently compromised by operational deficiencies and systemic underfunding. The study's findings indicate a distinct approach for enhancing targeted awareness initiatives using local languages, increased service accessibility, and collaborative strategies, such as farmer security groups. The lack of security infrastructure was perceived not only as a vulnerability but also as a catalyst for public-private partnerships to offer material assistance. Integrating these elements into a unified, locally rooted extension framework is essential for making substantial progress in protecting communal livestock assets.

Table 2. Farmers driven themes

Theme	Key code	Targeted support
Knowledge and Ability	Awareness and education	Community based campaigns in local language and regular trainings
Improved service accessibility	Extension visibility and availability	consistence extension visits
Farmer groups for community mobilization	Collective action	Support for livestock watch group
Investment in security infrastructure	Security support and tools	secured kraals and Fencing subsidies

Source: Own, 2025

Recommendation

To ensure farmers understand livestock security procedures, this study recommends context-specific, inclusive, and community-driven awareness programs using culturally and linguistically relevant materials. Prioritising and training extension officers in rural crime prevention and community participation in livestock security programs is essential. Extension officers should help establish farmer-led security groups to promote joint accountability and information sharing, thus strengthening community mobilisation. Such training should be followed by regular field visits, and localised service locations can improve operational performance by making extension services more accessible and visible, particularly in rural and under-resourced areas. Furthermore, the government should allocate funds for secure fencing and community-based patrol systems to effectively prevent stock theft. Policy integration, including embedding agricultural extensions within broader integration frameworks involving the South African Police Service (SAPS), government structures, and farmer organisations to coordinate rural crime responses, is essential for the effectiveness of these strategies. Moreover, the Animal Identification Act must require livestock registration and confine it to farmers verified by the provincial department of agriculture. Such measures will reduce stock theft from non-animal owners. To enhance livestock security, extension officers' performance metrics/agreements should include crime prevention, community mobilisation, and social dynamics training.

Conclusion

The study illustrates that restructuring agricultural extension to align with community realities can decrease livestock theft. This will allow agricultural extension programs to expand beyond traditional agricultural training to encompass livestock security and community mobilisation. Farmers in Mopani District demonstrate a willingness to collaborate by sharing local knowledge and resources, but they require support, respect, and inclusion in decision-making processes to effectively contribute to livestock security efforts. Enhanced coordination, effective cross-cultural communication, and strategic infrastructure investment can establish extension services as fundamental elements in protecting rural livelihoods against livestock theft. This approach is essential for establishing an environment that promotes constructive dialogue, knowledge sharing, and engagement within community areas, thereby directly contributing to the prevention of livestock theft in the Mopani district. Future research should look at the specific gender-related factors of livestock theft and access to extension services, highlighting the experiences and responses of women and youth farmers to livestock security threats to improve the effectiveness of extension services.

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Conflict of interest

The authors declare that there are no conflicts of interest that could reasonably be construed as influencing the objectivity or impartiality of the research.

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