

Research Article



Women's Contributions to Livestock in West Africa

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Abstract | Livestock plays a vital role in global food security by providing essential products such as milk, meat, and eggs. Additionally, it generates income through livestock sales and enhances cereal yields by improving productivity through the use of manure and animal traction. In sub-Saharan Africa, women are key contributors to socio-economic development, particularly in livestock ownership. They often focus on smaller animals, like sheep and goats, which are easier to manage. These animals, rich in energy, protein, vitamins, and minerals, provide a significant source of income for women. The primary objective of this study is to explore the diverse roles women play in sheep and goat production in sub-Saharan Africa and beyond. By conducting a comprehensive review of secondary data and case studies, and employing content analysis procedures such as literature identification, data evaluation, and information synthesis, the study highlights that women are instrumental in various aspects of sheep and goat rearing, including feeding, health management, and the processing and marketing of milk and meat. The cultivation of small ruminants offers women financial autonomy, positively impacting household budgets and reinforcing food security. In conclusion, this study emphasizes the critical role of women in sheep and goat production in sub-Saharan Africa and globally. It highlights their significant contributions to food security and socio-economic development. The findings can inform policies and programs aimed at empowering women and promoting gender equality in the agricultural sector.

Keywords | Women breeder, Livestock farming, Small ruminants, Food security, Gender equality

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INTRODUCTION

Livestock production stands as a linchpin in global efforts to address food security and alleviate poverty, serving as a vital source of nutrition for millions worldwide, especially in developing countries (Mottet and Tempio,

2017). The sector not only offers direct access to essential products such as milk, meat, and eggs but also generates substantial cash income through livestock sales.

Initially, livestock provide high-density macro- and micro-nutrients for infants, children and women of childbearing

age (Alonso *et al.*, 2019; McKune *et al.*, 2021). Secondly, livestock enhance agricultural production by providing manure, traction for tillage and transport, and cash through the sale of surplus livestock products (Mottet *et al.*, 2017). Livestock also perform cultural and religious functions that are important for livelihoods in low- and middle-income countries (LMICs) (Alders *et al.*, 2021; Schneider and Tarawali, 2021). Furthermore, it contributes significantly to increased cereal yields by enhancing productivity through the application of manure and animal traction (Sanogo *et al.*, 2017).

In the context of sub-Saharan Africa, where livestock plays a pivotal role in socio-economic development, women have emerged as indispensable contributors to the sector. Women ownership is particularly pronounced for smaller livestock, such as sheep and goats, due to their manageable nature compared to larger species like cattle and camels (Hulela, 2010).

Livestock, particularly small ruminants and poultry, also make an important contribution to inclusion in agri-food systems, providing entry points for progressing towards gender equality through women's empowerment (Njiru *et al.*, 2024). These animals are easily accessible and controlled by women compared to other assets, providing income that women can control and constituting a mobile bank that women can use to accumulate wealth or liquefy to cope with financial shocks (Galié *et al.*, 2019; Omondi *et al.*, 2022). According to Joseph *et al.* (2019); women are primarily responsible for performing all livestock-related roles. The rich nutritional content of animal foods positions them as a substantial source of income for women, thereby empowering them and fostering financial autonomy.

This paper aims to delve into the intricate roles that women play in sheep and goat production, both within sub-Saharan African countries and on a global scale. Our approach involves a comprehensive review of available secondary data and case studies, employing content analysis procedures to identify pertinent literature, evaluate data, and synthesize information. Through this analysis, we aim to shed light on the multifaceted contributions of women to sheep and goat production, encompassing aspects such as feeding, health management, and the processing and marketing of milk and meat.

The significance of this paper lies in its potential to inform policies and programs that strive for gender equality and the empowerment of women in the agricultural sector. By recognizing and understanding the pivotal role women play in livestock production, we take strides towards fostering sustainable development and improving outcomes related to food security, poverty reduction, and overall socio-economic development. In summary,

this paper underscores the imperative of comprehending the gendered dynamics within livestock production and advocates for the support and acknowledgment of women's indispensable contributions in this critical sector.

LITERATURE REVIEW

The acknowledgment of women's contributions to agricultural activities, particularly in small ruminant farming, has grown significantly as researchers and policymakers delve into the multifaceted aspects of women's involvement in livestock management, health, processing, and marketing. This literature review aims to provide a thorough overview of existing knowledge, drawing from the findings and discussions presented in the article.

Research consistently underscores the pivotal role of women in small ruminant farming, making substantial contributions to socio-economic development and rural livelihoods (Oluwatayo et Oluwatayo, 2012; Cafer *et al.*, 2015; Olawoye *et al.*, 2021). The specific focus on sheep and goat production within the broader livestock sector draws attention to the flexibility and significance of these activities in supporting household needs (Negassa *et al.*, 2012; Hassen et Tesfaye, 2014; Silva *et al.*, 2022).

Women are central figures in the day-to-day management of small ruminants, actively engaged in feeding, watering, and health management (Sanogo *et al.*, 2017; Kinati *et al.*, 2018). The division of responsibilities is influenced by cultural and socio-economic factors, contributing to the diversity of women's roles in different regions and communities (Egbue, 2010; Bikketi *et al.*, 2016). These findings underscore the need to recognize and adapt interventions to the local context.

The breeding system and the number of small ruminants practiced by women are critical aspects of small ruminant farming. Studies reveal variations in breeding practices, with goat breeding being more prevalent among women in Benin due to the species' adaptability to diverse vegetation (Dossa *et al.*, 2008; Ahozonlin and Dossa, 2020). However, challenges such as low health coverage and animal performance call for targeted interventions to enhance sustainable livestock production by women breeders in sub-Saharan Africa (Galié *et al.*, 2017; Ibeagha-Awemu *et al.*, 2019).

Oluwatayo and Oluwatayo (2012), sheds light on the substantial contributions of women in feeding small ruminants, playing a significant role in forage collection and storage. The use of woody fodder is highlighted as a cost-effective option for small ruminants, promoting increased family income and food security in various regions (Vandermeulen *et al.* 2018). Nevertheless, challenges, particularly in urban settings, indicate the

need for strategies to address feeding issues and promote women's participation in the livestock industry (Price *et al.*, 2018; Dan and Kim, 2020).

Women's empowerment in small ruminant breeding emerges as a critical theme in the literature. The ownership of small ruminants provides women with a source of income, allowing them to cover essential expenses such as food and schooling (Oluwatayo and Oluwatayo, 2012). However, limited access to finance remains a significant constraint, hindering women's capacity to improve productivity and achieve financial independence (Witbooi and Ukpere, 2011; Magesa *et al.*, 2013; Gaititi, 2013). The literature strongly advocates for promoting women's empowerment through increased access to finance, education and training.

Animal husbandry, particularly the ownership of small ruminants, is highlighted as a common scenario for women in rural areas, serving as the main source of income (Kaumbata *et al.*, 2020; Ferreira *et al.*, 2020; Dimon *et al.*, 2021). The economic return from livestock rearing, particularly sheep and goats, significantly impacts the lives of landless women and men in rural areas (Kaumbata *et al.*, 2020). This reinforces the importance of interventions that promote animal husbandry and provide women with access to resources and markets.

Livestock, particularly small ruminants, is recognized as a crucial factor in addressing food insecurity at the household level (Wodajo *et al.*, 2020). Women's active involvement in small ruminant care and management significantly influences household food security and livelihoods (Sargison, 2020). The literature highlights the need to consider the needs and priorities of women and other vulnerable groups in livestock production and management, emphasizing the potential impacts of climate change on these challenges.

Women's role in animal health is crucial for the overall well-being of small ruminants. The literature emphasizes that women significantly contribute to animal husbandry, production, and milk capital management (Valdivia, 2001). The smaller the farm size, the more intensely women engage in economically viable livestock farming, underscoring the importance of prioritizing animal health in livestock production for environmental sustainability and human well-being.

Women's significant role in milk processing and marketing activities is highlighted in various contexts (Hebo, 2014). Despite the growing and formalizing value chains, women face challenges in accessing resources to improve their productivity, limiting their participation in the formal milk

value chain. Efforts are needed to promote the inclusion of women in milk processing and provide them with the necessary resources for productivity enhancement.

Women's participation in small ruminant breeding faces challenges related to social, economic, and technical factors (Haile *et al.*, 2019). High costs of veterinary services, limited access to training, and financial support are identified as significant constraints (Campbell *et al.*, 2021). Additionally, the cost of animal feed, workload from domestic activities, and decision-making in animal marketing are recognized challenges. These constraints are further compounded by climate change, necessitating policies and interventions that support women's participation in animal production while addressing associated challenges.

In conclusion, this literature review provides a comprehensive understanding of women's roles in small ruminant farming, emphasizing their contributions to livestock management, health, processing, and marketing. The varied responsibilities underscore the need for targeted interventions and policies that recognize and enhance the contributions of women in the livestock sector. The subsequent sections of this article present original research findings and recommendations, building upon this foundation to further advance the inclusion and recognition of women in small ruminant farming.

MATERIALS AND METHODS

As shown in Figure 1, publication search and article selection were conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher *et al.*, 2015). This study employed a documentary review methodology to synthesize existing literature on the roles of women in small ruminant breeding, both in Africa and globally. A literature review of published research articles and technical reports concerning the role of women in animal husbandry was carried out. To carry out an effective search for systematic reviews, it is essential to combine several databases, as this eliminates or significantly reduces the possibility of finding qualified reviews (Bramer *et al.*, 2017). During the identification phase, several keywords and their synonyms, related terms and variations were combined using the Boolean operators OR and/or AND: Role of livestock keepers, The role of women in the livestock industry and women's role in the dairy industry AND Africa, livestock breeding and women's empowerment, livestock breeding AND food security, women breeders AND animal health (Figure 1). The initial search of the scientific literature was carried out on various databases: ScienceDirect, Scopus, Google Scholar and PubMed.

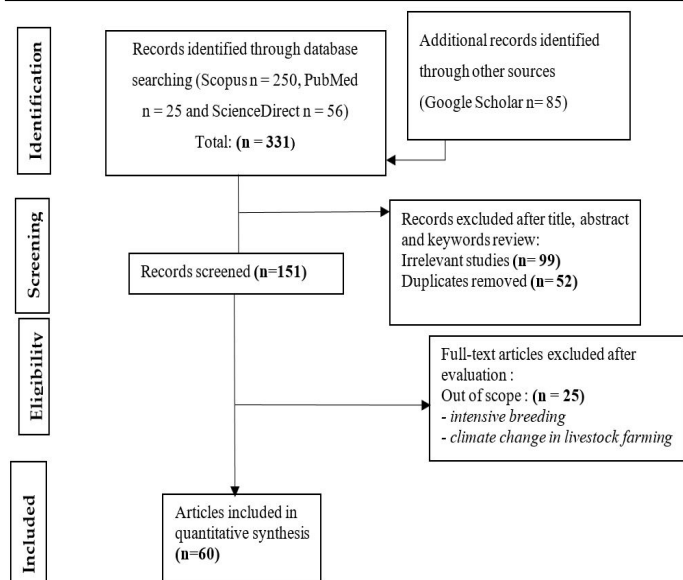


Figure 1: PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram showing the detailed selection process of studies in the systematic review.

RESULTS AND DISCUSSION

BREEDING METHOD AND NUMBER OF SMALL RUMINANTS PRACTICED BY WOMEN

The breeding system, defined as the combination of resources, animal species, and techniques implemented by a community or breeder to satisfy needs and develop natural resources, plays a pivotal role in small ruminant husbandry (Hoste *et al.*, 2001). In our investigation, we found that during the dry season, herds freely roam throughout the village during the day and are housed in household courtyards at night. In contrast, during the rainy season, some women opt to tether the animals or keep them in semi-confinement (Challaton *et al.*, 2022). Notably, goat breeding emerged as more prevalent among women in Benin, attributed to the species adaptability to diverse vegetation types. However, it's crucial to highlight that this particular breeding system is associated with

challenges, including low health coverage and suboptimal animal performance. These challenges may have implications for both animal welfare and productivity (Mensah *et al.*, 2022).

Our findings underscore the necessity for targeted interventions aimed at enhancing the breeding system and promoting sustainable small ruminant production by women breeders in sub-Saharan Africa. Figure 2 provides a visual representation of the numbers of goat and sheep herds in Benin, indicating a significant focus on goat herding (Houessou *et al.*, 2021). Women are actively engaged in various livestock activities, including feeding small ruminants, managing animal health, and processing milk and meat (Table 1). Table 2 highlights the significance of livestock farming in women's daily lives. The data indicates that women achieve self-sufficiency, generate income, and enhance food security through their involvement with small ruminants.

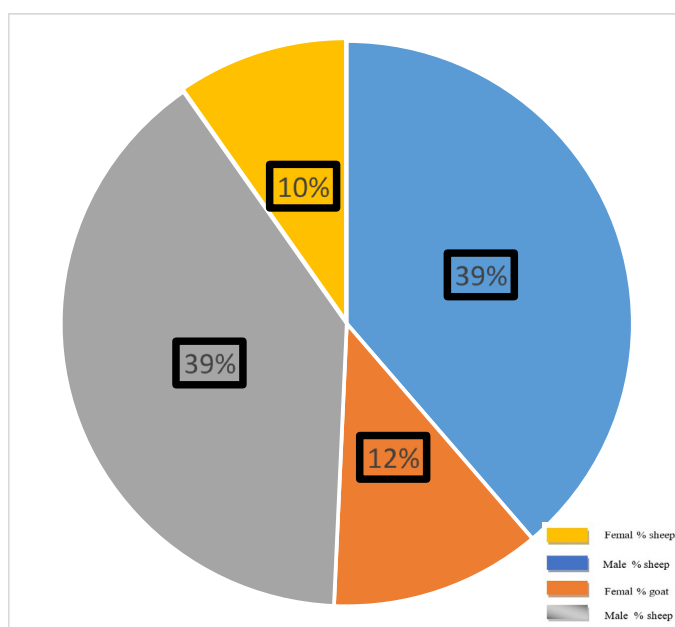


Figure 2: Number of goat and sheep herds in Benin (Houessou *et al.*, 2021).

Table 1: The role of women in small ruminants production system.

Variable	Description of roles	Reason for carrying out the role	Reference
Feeding small ruminants	Forage and feed production	Improved fodder and food production through a cereal-pea cropping and rotation system, coupled with optimal use of available local natural resources collection and storage of woody fruits for livestock feed.	Ayantunde <i>et al.</i> , 2017; Meguellati <i>et al.</i> , 2016; Zoundi <i>et al.</i> , 2011
Animal health	women are primarily concerned with the health and well-being of the animals	On small farms, women, along with children and the elderly, take primary responsibility for animal care and pastoral management due to domestic chores and limited access to paid activities.	(Oelz et Rani, 2015) ; (Mabe, Antwi, et Oladele, 2010)
Milk and meat processing	Milk is marketed by women, often over short distances	Women play an essential role in the processing and marketing of milk and meat, constituting a crucial economic force within households	(Magnani, Ancy et Hubert, 2019)

Table 2: Importance of small ruminants in the socio-economics of women.

Variable	Description of roles	Reason for carrying out the role	Reference
Empowerment	Marketing and processing of livestock products	Actively involved in milk production, collection, processing and marketing. Investing in livestock helps to improve productivity, increase income and achieve greater financial independence	Galie <i>et al.</i> , 2017; Schneider <i>et al.</i> , 2007
Source of income for Females	Investment in investment capital and livestock inputs guarantees favorable economic returns for women	Livestock farming is an active economic activity for women in rural areas	Dumas <i>et al.</i> , 2018
Food security	The women in charge of caring for and managing the small livestock generate substantial income and food for their households through these activities.	Facilitates travel, improves short-term food security, promoting productivity through animal traction and manure, enabling market exchanges and fostering social networks that provide crucial support in times of need.	Bain <i>et al.</i> , 2020; Georges and Reilly, 2009

ROLE OF WOMEN IN FEEDING SMALL RUMINANTS

In the African livestock industry, where women contribute to over 80% of agricultural activities, their specific roles, particularly in feeding small ruminants, are integral to economic development (Hulela, 2010). Despite the significance of their contributions, limited research has been conducted on the unique responsibilities shouldered by women in this context.

Women and youth are actively engaged in fodder and animal feed production, encompassing tasks such as feeding young animals and monitoring livestock in proximity to their residences (Ayantunde *et al.*, 2017). A key activity among women is the collection and storage of woody fodder fruits for livestock feed, emphasizing their direct involvement in ensuring the nutritional well-being of small ruminants (Zoundi et Hitimana, 2011). The enhancement of fodder and food production is achieved through a system of cropping and rotation of cereals-cowpeas, coupled with the optimal utilization of local natural resources available off-farm (Meguellati-Kanoun *et al.*, 2019).

Studies underscore the effectiveness of woody fodder as a cost-efficient feed option for small ruminants. In Mali, for instance, women farmers observed that sheep fed with tree leaves exhibited comparable weight gains to those fed with peanut haulm but at significantly lower costs. This contributed to increased family income and food security (Sanginga *et al.*, 2014). Similarly, in Burkina Faso, the diet of house sheep is diversified, incorporating natural pasture, kitchen residues, and stored fodder such as Pennisetum, Andropogon, Dactyloctenium, and Zornia, depending on the season (Boly *et al.*, 2001).

However, the management of herds presents challenges, notably in feeding practices. Urban herders have identified feeding as a primary challenge, often requiring animals to be taken to pasture on a long line led by women or children. Girls, in particular, are more likely to engage in a range

of activities alongside women, sometimes at the expense of formal education, as they assist their mothers with agricultural tasks such as forage harvesting and livestock watering (Njuguna *et al.*, 2022).

The findings underscore the vital role of women’s participation in the livestock industry for economic development and food security. Improving women’s access to resources and education emerges as a crucial avenue to unlock even greater benefits for both women and the broader community.

WOMEN EMPOWERMENT

The empowerment of women in small ruminant breeding is a cornerstone with profound implications for individual well-being, household economy, and overall socio-economic development. Within many traditional family economies, small ruminant herds serve as shared resources among various individuals, including women and dependents. Frequently, marginalized groups embark on small animal husbandry enterprises either for personal income generation or as a collective safeguard against the vulnerabilities faced by heads of households.

In numerous African communities, it is not uncommon for women to own a limited number of small ruminants, enabling them to cover essential expenses such as food and schooling for their children. Additionally, some societies endow women with a dowry animal, providing temporary use and ownership rights that extend to its descendants. Senegal serves as a compelling example where women are progressively engaging in the marketing and processing of livestock products, illustrating their evolving role in the economic activities of the livestock sector (Galie *et al.*, 2017).

The economic empowerment of women in small ruminant breeding extends to the critical realm of the milk sector. Women often play a significant role in informal markets,

actively participating in the production, collection, processing, and marketing of milk. However, a substantial constraint persists in the form of women's limited access to finance, hampering their ability to invest in livestock, improve productivity, increase income, and attain greater financial independence (Schneider *et al.*, 2007).

Thus, there is an imperative need to promote women's empowerment in small ruminant breeding by addressing barriers such as limited access to finance, education, and training. Enabling women's active participation in these breeding activities holds the potential to drive increased productivity, enhance household nutrition, and foster a more equitable distribution of resources within households and communities. Importantly, the empowerment of women in small ruminant breeding aligns with broader sustainable development goals, including poverty reduction, food security, and gender equality.

ANIMAL HUSBANDRY AS A SOLE SOURCE OF INCOME FOR FEMALES: A COMMON SCENARIO

This review underscores the pivotal role of animal husbandry as the primary source of income for women in rural areas, illuminating its profound impact on household economies. The findings reveal that income generated from the sale of women's livestock products is instrumental in meeting the daily expenses of their families. The manageable capital investment and input requirements for livestock rearing ensure a favorable economic return for women (Dumas *et al.*, 2018). Particularly, sheep and goats emerge as crucial contributors to the well-being of landless women and men in rural areas. Additional studies highlight the common practice of cattle and sheep fattening among agricultural producers, a strategy employed to secure and augment income in rural settings (Cafer *et al.*, 2015; Oyebola *et al.*, 2019). The ownership of small ruminants by women plays a vital role in meeting household needs, encompassing essential expenses such as food and schooling for their children (Kariuki *et al.*, 2021; Aboe *et al.*, 2022; Bikaako *et al.*, 2022; Tella and Chineke, 2022). These results underscore that livestock farming is not merely critical for the survival of households, particularly small farms and landless families, but also for women, who constitute the majority of the world's poor (Solesbury, 2003). The study accentuates the role of livestock farming as an active economic lifeline for women in rural areas (DeGeorges and Reilly, 2009). Consequently, interventions aimed at promoting animal husbandry and facilitating women's access to resources and markets are crucial steps toward enhancing the economic status of rural women and mitigating poverty.

LIVESTOCK AND WOMEN'S FOOD SECURITY

Livestock emerges as a critical factor in addressing food

insecurity beyond the household level, playing multifaceted roles such as facilitating travel, enhancing short-term food security, promoting productivity through animal traction and manure, enabling market exchanges, and fostering social networks that provide crucial support in times of need (DeGeorges and Reilly, 2009). Small ruminants, notably sheep and goats, stand out as particularly effective in tackling food insecurity due to their short reproductive cycles, prolific nature, and high demand (Nantoumé *et al.*, 2011).

The impact of livestock production and management on women's food security and livelihoods is significant. Women, typically tasked with the care and management of small livestock, derive substantial income and food for their households from these activities. Specific livestock ownership arrangements by women or children, sanctioned by social or matrimonial structures, play a regulatory role in specific food security functions at the household level (DeGeorges and Reilly, 2009). Beyond economic contributions, involvement in small ruminant production has been reported to empower women, enhancing their decision-making power and garnering respect within families and communities (Ilse, 2012).

Furthermore, small ruminants and other livestock that do not deplete household assets prove to be well-suited for fulfilling the immediate food needs of households, contributing to better health and livelihoods and promoting global food security (Ilse, 2012). However, challenges exist, particularly for women who predominantly own small livestock. In cases where men transhume most of the herd to better pastures, leaving insufficient income to cover household needs, women are particularly susceptible to poverty and malnutrition (Kaka, 2013). Therefore, recognizing and addressing the needs and priorities of women and other vulnerable groups in livestock production and management are crucial aspects of sustainable and equitable food security initiatives.

In conclusion, livestock, particularly small ruminants, plays a significant role in mitigating food insecurity, especially in the short term. However, ensuring the inclusivity and welfare of women and other vulnerable groups in livestock production and management is imperative. Further research is essential to comprehensively understand the intricate relationships between livestock and food security and to identify effective strategies for promoting sustainable and equitable livestock production.

ROLE OF WOMEN IN ANIMAL HEALTH

This review illuminates the substantial contributions of women to animal husbandry, small ruminant production, and the management of milk capital. In small-scale farms,

women, along with children and the elderly, shoulder the primary responsibility for animal care and pastoral activities, driven by domestic obligations and limited access to remunerated activities (Oelz and Rani, 2016). Active participation by women in milk production, processing, and marketing not only generates income for themselves but also contributes significantly to the overall household economy (Bebe *et al.*, 2003).

The review underscores that women's engagement in economically viable livestock farming intensifies with smaller farm sizes (Mulema and Assefa, 2016). Additionally, the pivotal role of women in milk processing and marketing activities carries significant implications for household economies (Dedieu *et al.*, 2011). However, women often face challenges in accessing resources to enhance their productivity, limiting their participation in formal milk value chains and constraining their ability to upgrade equipment.

Furthermore, the review highlights the critical role of women in animal care within small farms. Studies by Mabe *et al.* (2010) indicate that women primarily manage animal health and welfare. This finding implies that women significantly contribute to enhancing animal health and mitigating the environmental impacts associated with livestock farming.

The importance of prioritizing animal health in livestock production is underscored by the review, addressing both environmental sustainability and human well-being. The findings emphasize that involving women in animal care can have substantial positive impacts on livestock production and environmental sustainability.

ROLE OF WOMEN IN MILK AND MEAT PROCESSING

Women play a pivotal role in milk processing and marketing activities, constituting a crucial economic force within households. The significance of women in dairy processing micro-enterprises and individual processing systems is underscored by the findings of Bain *et al.* (2020), emphasizing the central role they play in these essential economic activities (Dedieu *et al.*, 2011). Research by (Broutin and Diokhané, 2000) further reinforces this point, highlighting that the marketing of curdled milk is predominantly undertaken by women, often over short distances (Magnani, 2019).

In traditional Fulani communities, women are typically entrusted with the responsibilities of milk processing and marketing. However, the landscape is evolving, with the gradual increase in men's involvement in milk production, driven by the adoption of zootechnical and veterinary inputs (Hamadou *et al.*, 2008). Despite the growing and

formalizing value chains, women encounter challenges in accessing resources to enhance their productivity, constraining their participation in the formal milk value chain. The lack of access to resources not only marginalizes women but also hampers their capacity to upgrade their equipment.

Addressing these challenges necessitates focused efforts to promote the inclusion of women in milk processing and provide them with the necessary resources to enhance their productivity. By facilitating access to resources, interventions can empower women in milk and meat processing, enabling them to contribute more effectively to household economies and fostering sustainable development in the broader livestock sector.

CONSTRAINTS EXPERIENCED BY WOMEN IN THE FARMING OF SMALL RUMINANTS IN CONNECTION WITH CLIMATE CHANGE

The engagement of women in small ruminant breeding faces multifaceted challenges influenced by social, economic, and technical factors (Luqman *et al.*, 2014). According to Arshad (2021), the prohibitive cost of veterinary services emerges as a significant constraint for female farmers, coupled with the need for adequate training and financial support. Similarly, Shaista *et al.* (2018) highlight that the expense associated with veterinary services and the absence of technical training hinder women's participation in livestock management, particularly in rural areas where limited access to credit is prevalent. Additionally, the high cost of animal feed, the burden of domestic activities, and decision-making in animal marketing compound the challenges faced by women (Awan *et al.*, 2021).

Alary *et al.* (2011), emphasize the pivotal role of the cost of animal feed as a primary constraint for female sheep and goat farmers, particularly in regions grappling with water scarcity (Ngqulana, 2017). This challenge significantly impacts milk productivity and marketing. In remote areas like Matrouh, where food costs are intricately linked to climatic conditions and geographical isolation, herders are compelled to sell animals to procure food for their herds. As climate change exacerbates these constraints, there is a pressing need for policies and interventions that not only support women's active participation in animal production but also address the specific challenges they confront, ensuring their resilience in the face of evolving climatic conditions and geographical constraints.

CHALLENGES TO OVERCOME

The active participation of women in small ruminant breeding encounters a spectrum of challenges rooted in social, economic, and technical dimensions (Aboe *et al.*, 2022). The same author underscore that the elevated

costs associated with veterinary services pose a substantial hurdle for female farmers, accentuated by the need for comprehensive training and financial support. In rural settings, where access to credit is restricted, the expenses related to veterinary services and the absence of adequate technical training hinder women's meaningful involvement in livestock management.

Furthermore, women contend with the financial burden of costly animal feed, the weight of domestic responsibilities, and complexities in decision-making regarding animal marketing, all contributing to the array of challenges faced by women in small ruminant breeding (Aboe *et al.*, 2022). Haile *et al.* (2019) draw attention to the critical role of the expense of animal feed, particularly impacting female sheep and goat farmers in regions characterized by water scarcity, with subsequent repercussions on milk production and marketing.

In regions like Matrouh, where climatic conditions and geographical isolation intensify the costs of animal feed, herders are compelled to sell their livestock to secure sustenance. The evolving challenges exacerbated by climate change accentuate the urgency of implementing targeted policies and initiatives. These measures should not only foster the active participation of women in animal production but also strategically address the specific impediments they face, ensuring resilience and sustainable engagement in small ruminant breeding amidst evolving environmental and economic dynamics.

CONCLUSION AND RECOMMENDATIONS

Women play an indispensable role in small ruminant production, significantly contributing to the socio-economic progress of many nations. However, they face substantial challenges, including limited access to resources and systemic barriers rooted in agricultural and economic policies. Addressing these challenges requires a concerted effort from policymakers, development practitioners, and researchers.

This study highlights the importance of prioritizing women's roles in small ruminant production through gender-sensitive policies and targeted extension programs that cater to their specific needs, providing technical training and equitable access to resources. Additionally, the interplay between animal health, environmental sustainability, and women's participation in livestock production should be central to public policy, warranting further research. Formulating policies that recognize women's contributions, encouraging research on the interconnectedness of these issues, and establishing

supportive networks will advance rural sustainability and economic empowerment. Furthermore, enhancing women's participation in decision-making processes will ensure their voices shape policies in the small ruminant sector. Addressing these recommendations is vital for empowering women economically, fostering the growth of the small ruminant sector, and improving the overall well-being of rural communities.

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NOVELTY STATEMENT

This study's novelty lies in its focus on the unique challenges faced by women in small ruminant breeding, particularly in terms of limited access to veterinary services, credit, and training. It highlights women's roles in animal health, milk processing, and marketing, and addresses how climate change and high animal feed costs further impact their participation. The study proposes gender-sensitive policies and targeted interventions to enhance women's involvement in livestock production, aiming to improve resilience, sustainability, and rural economic development.

AUTHOR'S CONTRIBUTION

ED and LK: Wrote the manuscript, supervised the study and edited the final version of the manuscript.
YT, R V.D, BA: Supervised the study and edited the final version of the manuscript.
AAS, VMB, IAT: Supervised the study and edited the final version of the manuscript.

CONFLICT OF INTEREST

The authors have declared no conflict of interest.

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