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# Gender-based approaches for improving milk safety, value addition, and marketing among smallholder livestock farmers

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In the context of Uganda, this study delves into gender-based strategies aimed at enhancing women's engagement in milk safety, value addition, and marketing within smallholder livestock farming. The objectives were two-fold: first, to document the current practices of women in milk safety, value addition, and marketing channels; second, to examine the constraints, opportunities, and strategies related to the production of safe milk and milk products, along with accessing sustainable markets. Conducted in four sub-counties of the Kiruhura district, this research employed both qualitative participatory methods and structured questionnaires, including 12 focused group discussions and 20 key informant interviews with both women and men. Notably, 217 structured questionnaires were administered. The findings illuminate that women played a central role in milk processing, water provisioning, sanitation, and hygiene practices and were the primary contributors to milk value addition, particularly in the production of butter and ghee. Despite their active involvement, women face challenges in accessing adequate milk quantities, employ traditional labor-intensive procedures, and encounter difficulties in marketing their processed products. Men, often the household heads, held decision-making authority over milk consumption and controlled the selling of milk, contributing to gender disparities. Addressing these challenges necessitates comprehensive support, including training and capacity-building initiatives for both men and women in milk value addition, credit access, and market entry. The study underscores the potential for improved women's access to milk quantities, particularly for butter and ghee production, to strengthen rural livelihoods and boost dairy production in Uganda.

## KEYWORDS

decision-making, gender, food safety, milk, value addition

## Background of the study

Many would argue that there is a need to improve women's entry and participation points in livestock ownership in Sub-Saharan Africa. Specifically, access to markets and value chains in relation to the existing laws, policies, regulations, and institutional practices; access to and control over assets and resources; and gender roles, responsibilities, cultures, norms, and

patterns of power and decision-making require more work (Raney, 2011; Grace et al., 2015; Quisumbing et al., 2015, 2021). Rural women perform different roles in livestock farming besides multitasking and performing reproductive, productive, and community roles. Their roles in livestock sub-sectors vary by region, country, and community based on their particular economic status and social and cultural contexts (Naz et al., 2022; Sennuga et al., 2022).

In Uganda, women play a significant role in activities related to animal husbandry, especially in dairy production. Their participation is commonly concentrated at the handling level and less in profitable activities such as marketing (SPRING, 2014; Katothya, 2017). They are often involved in roles that range from washing milking utensils, cleaning milking areas, and making milk products such as butter and ghee, among others. In contrast, men are engaged in grazing, milking, and marketing of milk. Women often lack knowledge on how to produce and maintain safe milk products along the milk value chains. They also lack information and knowledge on how to increase the value of their milk products, including access to sustainable markets. Local milk collection centers do not have adequate cooling and chilling facilities to accommodate all the milk produced. The excess milk is often wasted due to having limited options for prolonged storage of the milk. Excess milk is usually thrown away or sold at very low prices during wet seasons (Monitor, 2020). Value addition can increase the shelf life of excess milk during the wet season since milk is always plenty during these periods. Common value-added products include ghee and butter. Ghee-making has been demonstrated as a major economic activity undertaken by women in western Uganda (Katimbo et al., 2017). Usually, women are rationed milk by their husbands to make butter and ghee, which are mainly processed using traditional methods that may not always guarantee product safety and quality. Women involved in these activities use water from different sources whose quality may not be ascertained. Furthermore, the cleanliness of utensils used in the process, such as calabashes, gourds, buckets, and saucepans, may pose a risk to meeting food safety standards.

Generally, there was a lack of gender-specific data related to the practices of women in the production of safe milk and milk products, value addition, and access to lucrative markets in Uganda. There was a dearth of gender analysis on the role of women in ensuring the production of safe milk and milk products, value addition, and access to lucrative milk market value chains. There remained some work to be undertaken to ensure that women achieve the capacity to address value addition and milk food safety. It was against this background that this study was designed to identify the current practices and constraints faced by especially women in the production of safe milk and milk products, value addition, and accessing marketing channels among smallholder livestock farmers in Western Uganda, Kiruhura district (Njuki and Sanginga, 2013; Katothya, 2017).

## Methodology

In this cross-sectional study, both qualitative and quantitative research tools were used to collect data from four sub-counties that were purposively selected. The four sub-counties were selected during a reconnaissance visit and meetings held with the district and local government extension staff. Mapping of the selected study sites was based on access to the relevant women groups where the

extension staff were aware of the existence of women livestock farmers.

Qualitative data were collected using participatory methods. Quantitative data were collected using a structured questionnaire. The information captured during the discussion and administration of questionnaires was on current practices, constraints faced, and opportunities that exist in the production of safe milk and milk products, milk value addition, and access to milk and milk product markets and credit facilities by women. All these interviews were conducted in the local Runyakole language and guided by extension staff. All tools were translated into the local Runyakole language. This was a requirement of the Research Ethics Committee for approval of the research proposal.

Participatory methods involved carrying out Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) with the aid of a checklist of questions. Twelve FGDs were carried out: three per sub-county. In each sub-county, two FGDs for women and one for men were carried out. Each FGD consisted of a minimum of eight and a maximum of 12 participants. The key informants included opinion leaders, sub-county veterinary extension staff, district production officers, district veterinary officers, community-based development officers, women livestock farmer groups and associations, dairy milk associations, milk processors, milk collectors, milk vendors, and milk value addition actors.

A semi-structured questionnaire was administered to verify the information obtained from participatory methods by conducting a detailed and quantitative inquiry on individual perceptions of the research variables stated above. A sub-county was taken as the administrative sampling unit for the administration of a structured questionnaire.

A minimum sample size of 30 households per sub-county was determined using the equation adopted from Dohoo et al. (2003):

$$n = Z^2 PQ / D^2$$

Where n = minimum sample size.

Z = 1.96 at 95% confidence interval.

P = estimated percentage of households owning cattle to be 98%.

Q = 100 - P.

D = acceptable error of 0.05.

However, to increase the reliability, questionnaires were administered to 54 households per sub-county, totaling 217 households in the district.

Qualitative data collected from KIIs and FGDs were organized and analyzed into themes. The themes were reviewed, defined, and refined through thematic maps to answer the research questions. Following data collection, the research team members would compare field notes daily upon return from the field. Qualitative content analysis was used to have an in-depth understanding of the phenomenon from the perspective of those involved. Inductive content analysis was enlisted in coding categories that were derived directly from the raw data, and this contributed to figuring out possible categories, patterns, and themes. For quantitative data, descriptive statistical analysis was undertaken. The chi-square test was used to test the significant difference in gender participation in carrying out routine household roles involving cattle keeping.

TABLE 1 Mean daily liters of household milk production and use dynamics ( $n = 217$ ).

Season	Production	Home consumption (% of total production used for home consumption)	Milk used by women for value addition (% of total milk production used by women for value addition)	Milk sold (% of total milk production sold)
Wet	56.8 ± 4.3	6.5 ± 0.2 (11.4)	5 (8.8)	45.3 (79.8)
Dry	37.7 ± 3.3	5.1 ± 0.18 (13.5)	5 (13.3)	27.6 (73.2)

TABLE 2 Livestock-keeping households in which specific genders were participating in certain roles on a dairy farm ( $n = 217$ ).

Roles	Gender (%)					$\chi^2$	$p$ value
	Men	Women	Workers	Boys	Girls		
Feeding of cattle	6.9	0.9	91.7	0.9	0	302	0.0000
Fetching water	8.3	0	92.6	0	0	321.3	0.0000
Milking	8.3	0	84.3	2.3	0	263.2	0.0000
Farm cleaning episodes	6.0	20.3	63.6	0	6.9	33	0.0000
Tick control	12.9	0	92.6	3.2	0	321.3	0.0000
Marketing	81.6	3.7	10.1	2.3	0	99	0.0000
Farm maintenance	91.7	3.7	0	2.3	0	30.2	0.0000
Financial transactions	89.4	0.5	10.1	2.3	0	269.2	0.0000

This study obtained ethical approval from Makerere University, School of Veterinary Medicine and Animal Resources, Research Ethics Committee (MAKSVAR REC) under protocol number #SVAR-IACUC/99/2021. Information regarding the role of each participant was explained, and consent forms were signed after a detailed explanation of the study and the rights to participate or not to participate. The researchers ensured that the study participants remained anonymous and confidentiality was observed through coding and restricting access to all the data.

## Results

There were 217 respondents in total, of which 81.6% were women and 12.6% were female household heads. Out of these, 79% were married and 11.7% were widowed. A majority (86.8%) of the farmers had over 11 years of experience in dairy farming. The dynamics of household milk production are shown in Table 1.

The details of how household gender roles were shared in the daily running of the dairy farm are shown in Table 2.

Women were solely responsible for maintaining the hygiene of milking utensils and boiling milk. Details of hygienic practices used for milking utensils are shown in Table 3. A majority (87.2%) of households boiled milk before consumption and 83.2% made sour milk from boiled milk.

In the FGDs, both men and women described and clearly differentiated the specific gender roles in milk processing in the community. Both men and women noted that men and boys were solely responsible for milking cows. Both men and women FGDs confirmed the prevailing norm and cultural belief that women and girls were not supposed to milk cows because it was taboo. Some of

TABLE 3 Households employing hygienic practices for milking utensils, quality including sources of water used for cleaning milking utensils in Kiruhura district ( $n = 217$ ).

Variable	$N$ (%)
Hygiene of milking utensils	
Cleaning milking utensils before milking	195 (91.1)
Drying of milking utensils before milking	176 (82.2)
Sanitizing milking utensils before milking	105 (49.1)
Immediately cleaning milking utensils after milking	138 (64.5)
Water quality used for cleaning	
Very clean	116 (54.2)
Clean	181 (84.6)
Unclean	6 (2.8)
Water sources	
Dam	40 (18.7)
Well	120 (56.1)
Protected spring	2 (0.9)
Tap water	5 (2.3)

the taboos attached to milking by women included the belief that it would lead to the death of cattle and that girls would not get married. In most households, male workers were hired under the supervision of the head of the household to milk the cattle. Men also supervised the quality and quantity of milk produced at the farm on a daily basis. Workers were also employed to feed cattle, fetch water, and clean farm implements.

*We believe that once women and girls milk the cows, our cattle will die and our girls will not get married. Why should a woman or girl squat (okurotama) under the udder of cattle? (Interview from Male FGD).*

Some men acknowledged that it was their responsibility to wash the udders and tits of cows before milking. However, their female counterparts were in charge of cleaning both the conventional and indigenous utensils used for milk storage. Women cleaned and smoked milk pots and gourds, tidied up the milk shade, and swept the home yards.

Boys and girls in this community performed the same duties as their fathers and/or mothers, respectively in the production of milk. Children aged 3–10 years took care of the calves and chased away flies while milking was done.

In total, 36.4% ( $n=78$ ) of the households were engaged in milk value addition. Details of milk value-addition activities are shown in Table 4. Women were involved in value addition as traditional roles for household consumption, and this provided them a business opportunity to earn income. Details of reasons for involvement in value addition are shown in Table 5.

All these milk value-added processes were conducted in all four sub-counties of the study area except jelly processing. Indigenous jelly processing was only practiced in the Kikatsi Sub-county in 0.9% of the households ( $n=2$ ).

Interestingly, milk value addition was solely undertaken by women. Culturally, butter/ghee-making was a women's activity and was clearly defined within the community. In a cultural context of male dominance, a woman's task, such as butter-making, was perceived to be an inferior task only for women and girls. Women used traditional knowledge and experience to produce dairy products such as yogurt, ghee/butter, and jelly. However, the women lacked preservation techniques that could further improve the shelf-life of their products. They also had inadequate information and knowledge on proper packaging and labeling.

TABLE 4 Households producing milk and types of value-added products in Kiruhura district ( $n = 217$ ).

Value-added milk product	$N$ (%)
Yogurt	18 (8.4)
Sour milk ( <i>amacuunda</i> )	35 (16.4)
Ice cream	3 (1.4)
Butter	28 (13.1)
Indigenous jelly processing	2 (0.9)

TABLE 5 Livestock keeping households and their reasons for participating in the milk value addition in Kiruhura district.

Reason	$n$ (%)
Improve marketability of milk and its products	78 (36.4)
Create a business opportunity	66 (30.8)
Improve financial sustainability	70 (32.7)
Career change	26 (12.2)
Passion for producing dairy products	78 (36.4)

Critically, the women lacked certification of their products by the Uganda Bureau of Standards.

*As women, we are also interested in the value addition, but some of us still have many challenges in accessing milk because it is controlled by our husbands. Some of us can buy milk from our spouses once in a while but we often do not have the money to buy it (Interview with a female-dominated FGD).*

Overall, decision-making about the money from milk marketing was deemed a man's responsibility. Women also explained that they faced problems accessing milk for value-added products. Some women explained that their obtaining of milk depended on their husbands' mood. *If he is not happy, there will be no milk.* According to women, a husband's happiness depended on various factors such as good sex, good food, respect, maintaining a clean homestead, and providing a warm reception to his relatives. According to men, they did not give women all the milk they needed because the proceeds from the sale of valued-added milk products were spent solely by women without involving them. However, after dialoguing with men and women on this issue, women agreed to share the proceeds. Women also faced the challenge of their spouses consuming their value-added products freely without payment, while still expecting the women to buy milk from them. A common challenge that women reported was the traditional processing (churning) of butter, which was very tiresome and time-consuming.

*Culturally, women have more opportunities to engage in value addition, especially in butter/ghee processing, sour milk, creams, lotion, jelly, and oils. This is because men in this community have been nurtured and trained that it is solely a female-dominated responsibility. In fact, you will never ever find a man/boy in this community churning milk for ghee. This is solely due to the clear demarcation of the gender-specific roles (interview with the sub-county officials, a key informant).*

The women complained of chest pains and fatigue due to the handling of big volumes of milk when churning the milk into butter or ghee. Processes from value-added products were completely under the control of women. Men complained that women did not give them any share of the money earned from value-added milk products. That was the reason why they were reluctant to give women the milk for value addition. In a week, from 35 L of milk given to them costing approximately Ug Shs 35,000, women can produce 5 kg of ghee that could sell at Ug Shs 100,000, making a gross margin of Ug Shs. 65,000.

In total, 42.5% ( $n=92$ ) of the households complained that they had a poor market for milk, especially during the rainy season. Prices of milk per liter fell 87% from Ug Shs 1,500 during the dry season to Ug Shs 200 during the wet season. This was the time when women had the opportunity to buy more milk for value addition, especially for ghee-making. In addition, any access to loans or credit required the husbands' approval. However, the women lacked marketing strategies and networks for their products. They only marketed their value-added milk products through social networks. Women also had difficulties penetrating the market space and promoting the sale of their products. They also lacked linkages to private partners for marketing milk products.

## Discussion

This study showed that different genders play distinct roles in household dairy farming, milk processing, and value-adding activities. We demonstrated that men were solely responsible for milking and the women for cleaning up milking utensils and churning milk. However, this differs from the Masai communities in Kenya and Tanzania, where women were allowed to milk the cattle (Parsons and Lombard, 2017; Yurco, 2022). In Uganda, the Karamoja women were solely responsible for milking (Stites and Mitchard, 2011). In these identified communities, women were the milk managers and were responsible for providing it to their households. They were the right to sell any surplus milk. Unlike in this study community, men were solely responsible for the use of milk within their households, and they apportioned milk use. Most of the household milk produced was for sale. Approximately 79.7 and 73.2% of the milk produced was sold during wet and dry seasons, respectively. In most Eastern African pastoral communities, men were the lone decision-makers in terms of milk use allocation (Parsons and Lombard, 2017; Yurco, 2022). In addition, among the Bihar community in India, women actively got involved in tasks related to milking, collecting cow manure, caring for ill animals, preparing feed, feeding the animals, and cleaning the animal shades (Kumar et al., 2021; Manisha and Satpathy, 2022).

In this study area, it was entirely women's responsibility to clean and sanitize milking utensils. Both conventional and traditional utensils were used for milk handling and storage. Milking utensils were sanitized by smoking using local herbs. Similar findings were also reported in Ethiopia (Mossie, 2019; Abera and Mideksa, 2020; Amenu et al., 2020), where traditional methods were used for handling and processing dairy products by women. The washing of traditional milking utensils comprised using traditional herbs/plants and smoking.

Our study showed that women played a limited role in financial transactions in the sale of milk despite having more options for value addition (Table 2). The men were in charge of marketing and managing financial receipts from milk sales. This is similar to studies in Bihar, India, where men were in charge of managing funds and selling milk and milk products (Kumar et al., 2021; Manisha and Satpathy, 2022). This would imply that women could not actively participate in the marketing and financial management of milk proceeds. Therefore, women played a limited role in decision-making in households. In the study communities, where there were widowed-headed households, the sons took over this responsibility, thus marginalizing their decision-making powers.

Our findings strongly suggest and support women taking the lead in milk value addition in the study area. They were involved in making butter, ghee, yogurt, and jelly. This finding was similar to what was found in Ethiopia, where traditional butter-making, known as *kibe*, was mainly processed by women (Mossie, 2019). In addition, women in the Boran pastoral community in Ethiopia sold traditionally made fermented yogurt to enhance their household incomes. In our study, women were allocated 5 L daily for milk value addition. Ghee/butter production was a profitable enterprise with a return on investment of 1.9. However, the amount of milk given was not enough for women to meet the value-addition efforts. To increase access to milk, women need to continue dialoguing with their spouses to allocate more milk to them and to share proceeds accrued from value addition used as a household income. Alternatively, women could identify ways such as

working together in groups or seeking financial support, such as accessing credit, to enable them to buy more milk. However, this also requires men to provide them with security so they can access loans from financial lending institutions readily available in the area. The ghee/butter value addition has a high potential for becoming a sustainable and profitable household enterprise among communities in the study area.

In the study area, there was no clear, well-established milk marketing system for women to sell their products. Their access to markets was limited. Women only sold their products through social networks. A similar finding was observed in Ethiopian pastoral communities in the Hamaraya District (Eshetu et al., 2019), where the marketing systems were not well-developed. Marketing of the milk products was mainly done by women who organized themselves into traditional milk association groups called *Faraqqa Annanni*. To overcome these challenges, there is a need to identify, lobby, and link women to private partners to market their value-added milk products. Similarly, in our study area, one way to overcome these challenges would be to organize the women into groups. Studies show that where patriarchal norms interfere with or limit women's entrepreneurship, especially in rural areas, groups could provide an option (Semkunde et al., 2022). However, the men in the study area were found to be against forming these associations. Exploring these issues through participatory dialogues could be a way of addressing some of these negative cultural norms hindering a gender-aware milk value chain. Considering the amount of money or rewards women earn from the production of ghee, butter, and jelly, explaining these opportunity costs and sharing benefits may make men more willing to work together with women.

In summary, there were a number of limitations constraining women's participation in milk value chains in the study area. Women did not have access to enough milk for value addition. On the other hand, men concluded that women did not share the benefits of the sale of ghee and butter despite purchasing milk from them. The effort toward value addition, such as churning, was limited due to the tedious, laborious traditional technology available. Churning was done to separate butter fat using simple gourds. Women handling big milk volumes complained of chest pains and fatigue due to the energy required during the churning process. Seldom occupational hazards are included in the discussions on gender and milk value addition. There is a need to design and introduce appropriate household labor-saving technology for churning in this area.

## Conclusion

The presented findings underscore the central role of women and girls in crucial aspects of the milk production process, encompassing milk processing, water provision, sanitation, hygiene practices, and value addition. Conversely, men primarily focused on milking cows and held decision-making authority regarding milk consumption within households, with the selling of milk under their control. Despite women's pivotal involvement, challenges arise from limited support, insufficient information, and knowledge, particularly in appreciating the significance of value addition. The absence of energy-efficient technology poses occupational hazards, particularly for women.

The implications call for targeted support initiatives, emphasizing training, capacity building in milk value addition, credit access, and financial assistance. Such interventions could enhance negotiating skills among women and foster constructive dialogues with men. The acknowledgment and positive engagement of men in supporting and marketing women-produced milk could potentially lead to increased ghee and butter production, contributing to elevated household incomes. Future ethnographic studies are recommended to delve deeper into socio-cultural contextual factors, paving the way for informed interventions and a more comprehensive understanding of the dynamics at play.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

This study obtained ethical approval from Makerere University, School of Veterinary Medicine and Animal Resources, Research Ethics Committee (MAKSVAR REC) under the protocol number #SVAR-IACUC/99/2021.

## Author contributions

JN: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. MO: Supervision, Writing – review & editing. ER: Conceptualization, Formal analysis, Funding acquisition,

Methodology, Project administration, Writing – review & editing. AA: Conceptualization, Formal analysis, Methodology, Writing – review & editing. LC-K: Conceptualization, Formal analysis, Methodology, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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