



Opportunities and constraints to smallholder dairy market development in Burundi

A dairy value chain assessment report



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International Livestock Research Institute

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Abbreviations and acronyms

ACCORD	African Centre for the Constructive Resolution of Conflicts
BIF	Burundian Franc
BPEAE	Bureau Provincial de l'Environnement, de l'Agriculture et de l'Elevage)
BTC	Belgian Technical Cooperation
CAHW	Community animal health worker
CAPAD	Confédération des Associations des Producteurs Agricoles pour le Développement
CDC	Comité de Développement Communautaire
EADD	East Africa Dairy Development Project
FAO	Food Agricultural Organization of the United Nations
FGD	Focus group discussion
FLM	Front Luterienne Mondial
GDP	Gross domestic product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
IDA	International Development Agency
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IPPTE	Initiative Pays Pauvre Très Endetté
ISABU	Institut des Sciences Agronomiques du Burundi
MCC	Milk collection centre
MDB	Modern Dairy Burundi
MPC	Milk processing centre
NGO	Non-governmental organization
OIE	World Organisation for Animal Health

PARSE	Livestock Sector Rehabilitation Support Project
PRASAB	Agricultural Rehabilitation and Support Project in Burundi
PRODEFI	Inclusive Value Chain Development Project
PRODEMA	Projet de Productivité et de Développement des Marchés Agricoles
PTRPC	Transitional Programme of Post-Conflict Reconstruction

Executive summary

Phase 2 of the Agricultural Productivity and Market Development Project (PRODEMA), is a partnership project between the Government of Burundi and the International Development Agency (IDA) of the World Bank. It was launched in July 2017. This phase of the project is concerned with developing markets for dairy, cassava, banana, fruits and vegetables and improving human nutrition along these value chains. The International Livestock Research Institute (ILRI) is responsible for implementing the dairy subcomponent of the project. Results obtained from a review of Phase I reports and recent visits to the preselected dairy sites suggest that absence of rewarding markets for milk and dairy products is discouraging production and diminishing farmers' incomes. ILRI therefore, launched a detailed dairy value chain study in November 2017 to investigate existing markets for milk and milk products, and identify opportunities and constraints for improving access to lucrative markets and value chain upgrading interventions that enhance dairy incomes for smallholder farmers, without neglecting farmers' home consumption of milk for nutritional security.

The study was conducted in five communes of three representative provinces in target PRODEMA sites in Burundi. The study used a participatory appraisal methodology utilizing value chain assessment tools developed under the CGIAR Research Program on Livestock¹. For each representative province, three days were planned for data collection and stakeholder discussions. The discussions involved focus group discussions with farmers, key informant interviews with different dairy value chain actors and stakeholder groups, and a wrap up workshop comprising representatives of the dairy value chain actors and stakeholder groups.

Key highlights

Results from the assessments reveal the following key dairy value chain constraints:

- High cost of commercial concentrate feed prices and veterinary drugs.
- Unavailability and inaccessibility by farmers of essential services including extension services, financial services, input supply, and business development services.
- Low adoption of improved management practices and technologies.
- Milk spoilage due to limited preservation and storage infrastructure.
- Low milk prices and delayed payments.
- Poor road infrastructure limiting transportation of milk to high demand areas, especially during high peak production periods.

To address these constraints, while tapping into the demand opportunities in urban centres, phase 2 of PRODEMA could consider investing in the following value chain development initiatives:

- Improving access of smallholder producers to urban markets – this could be through farmer-managed milk transport infrastructure with a cold chain to ensure milk preservation and supply to urban areas. This should be done hand in hand

¹ CGIAR. 2020. CGIAR Research Program on Livestock. <https://www.cgiar.org/research/program-platform/livestock/>

with setting up cold chain facilities at urban milk retail outlets, while strengthening the entrepreneurial skills of farmers to manage such outlets through collectives such as cooperatives.

- Enhancing farmer access to inputs and other business development services through business models that minimize transaction costs. This is imperative in order to sustain production. Such models have been tested within East Africa with positive outcomes. The models necessitate horizontal integration of producers into collectives and linkages to different business development service providers through various contractual arrangements.
- Enhancing capacities of existing cooperative-managed milk collection centres (MCCs) to attract milk supply from farmers. The current MCCs are operating below capacity and offer low producer prices of milk to suppliers. There is need to bring on board nongovernmental organizations (NGOs) with experience in mentoring and strengthening capacities of such collectives to improve the value proposition of the cooperatives to farmers in order to attract supply.

I Background

The current PRODEMA phase 2 project, which is funded by the World Bank, is the continuation of its phase 1, which ended in December 2016. Phase 2 aims to consolidate and scale up the achievements of phase 1 in the areas of socio-economic resilience and development in 10 provinces of Burundi. For better management, the selected provinces had been clustered into 3 zones of intervention (interprovincial units) namely; (1) the Central Zone covering Bubanza, Muramvya, Mwaro; (2) the Northern Zone covering Ngozi, Kirundo, Muyinga, Cankuzo; and (3) the Southern Zone covering Makamba, Bururi and Rutana. Among these provinces, those with the highest prevalence of poverty are Kirundo, Muyinga and Cankuzo. It is estimated that the additional financing from World Bank for PRODEMA phase 2 will benefit more than 8,000 dairy producing households in the 10 provinces.

I.1 Policy environment

Agriculture is central to Burundi's economy and is considered a key sector with high potential for poverty reduction and mitigation of food insecurity. More than 71% of the population are poor according to World Bank criteria (live on less than USD 1.90 per day). The country's national development policies including the climate change adaptation policies have identified potential growth sectors, including dairy, that have the highest potential impact for promoting sustainable and equitable economic growth. The agricultural sector is a mainstay of the Burundian economy accounting for about 36% of the GDP and about 85% of the current labour force. Burundi is endowed with valuable natural assets e.g. abundant rainfalls and fertile arable land providing many opportunities for improving smallholder farmers' livelihoods including by improving income, nutrition, employment and food security, if there is a shift towards intensification and a more efficient market-oriented production. Dairy is one of the important value chains that is important for food and nutritional security and has potential to respond to market opportunities. Strengthening the dairy value chain will necessitate increasing productivity (milk yield and quality and reducing post-harvest losses) and improving access to markets. Access to markets will include aspects of storage, processing and packaging of products.

Since September 2017, a legal framework (Ordonnance Ministerielle No 710/1364 of September 20, 2017) is in force to regulate the dairy sector. This framework directs smallholder dairy farmers to apply zero-grazing systems for their dairy cattle and to adhere to strict milk hygiene standardization norms than align with international standards. This was enacted into law by parliament on 4 October 2018.

I.2 Significance of the dairy sector

The 10 target provinces of PRODEMA represent 50% of the population and over 60% of the cattle population in Burundi. Some of the poorest provinces are targeted by the project. There are few alternatives for the population to earn their living besides crop and livestock farming. Considering that about 25% of the produced milk is home consumed (for the moment, due to the fact that the evening milk cannot be sold as no means of milk conservation exist), this milk represents an important part in the nutrition of children and plays a key role in reducing the effects of malnutrition. According to Word Food Programme, 58% of the Burundi population is chronically malnourished and only 28% is food secure.

Besides the direct effect of dairying on improving the nutritional status of smallholder dairy households and that of neighbours without cows who benefit from the free distribution of evening milk, which cannot be kept for marketing until the next day, it is expected that with dairy value chain development, there will be an increase in productivity and quantity of marketed milk. Reports from semi-structured surveys¹ suggest that 25% of the milk produced by Burundi's smallholder farmers is consumed by the households or given to neighbours. Dairy value chain improvements can be achieved through household-level interventions to reduce overnight milk spoilage through various initiatives such as the use of charcoal coolers and lactoperoxidase. It is anticipated that such interventions will (1) improve the economic situation of the milk producers, (2) ensure that urban and peri-urban communities have access to milk, and (3) reduce the outward flow of foreign exchange to purchase milk in neighbouring countries.

I.3 Existing infrastructure for the dairy subsector in Burundi

The main player in the Burundi dairy processing sector is the Modern Dairy Burundi (MDB) Factory, which produces 'Natura' branded milk. MDB is working with milk collection centres supported through the International Fund for Agricultural Development (IFAD)-funded Inclusive Value Chain Development Project (PRODEFI) in Ngozi, Kanyanza and Gitega provinces. They have also set up their own milk collection centres in the Imbo plain. There is also a small MCC in Marembo, Kirundo province, which is funded by the Belgian Technical Cooperation (BTC) using solar cooling but the capacity of the two coolers is limited (not more than 300 litres per day).

The MDB plant has a production capacity of 40,000 litres of milk per day, but for the moment, it produces only 2,500 litres per day. Natura milk is available at all kiosks in Bujumbura and inside the country at a price of BIF500/250 ml and BIF1,200/500 ml (USD 1.00 = BIF1,890) and has a shelf life of six months for the UHT products. Natura is competing with imports of UHT milk from Uganda, Kenya and Rwanda. There are some smaller processing units (e.g. Italbu) which sell milk mostly in their shop.

During Phase I of PRODEMA, the project provided a pasteurization and packaging unit to Icacunze pre-cooperative, a smallholder dairy cooperative in Matana (Bururi province). The equipment was intended to complete the setting up of a first batch of equipment granted by IFAD.

I.4 Objective of the dairy value chain study

The main goal of the November 2017 dairy value chain study was to assess existing markets for milk and milk products and identify opportunities and constraints for improving access to lucrative markets and value chain upgrading intervention options that enhance dairy incomes for smallholder farmers, without neglecting farmers' home consumption of milk for nutritional security.

The study aimed to address the following questions:

- What type of production, marketing channels and processing options are available/most appropriate to meet the demands of poor consumers?
- What present constraints hinder milk and milk products to be available, accessible and affordable to poor consumers?
- How can the dairy value chain be upgraded to better meet the demand of the consumers and improve farmers' incomes?

2 Methodology

2.1 Site selection

Three representative provinces that were preselected by PRODEMA were targeted in this study, namely Mwaro, Matana and Cankuzo (Figure 1). Within each province, only preselected communes were included in study, as shown in Table 1.

Table 1: Provinces and communes selected for the dairy market study

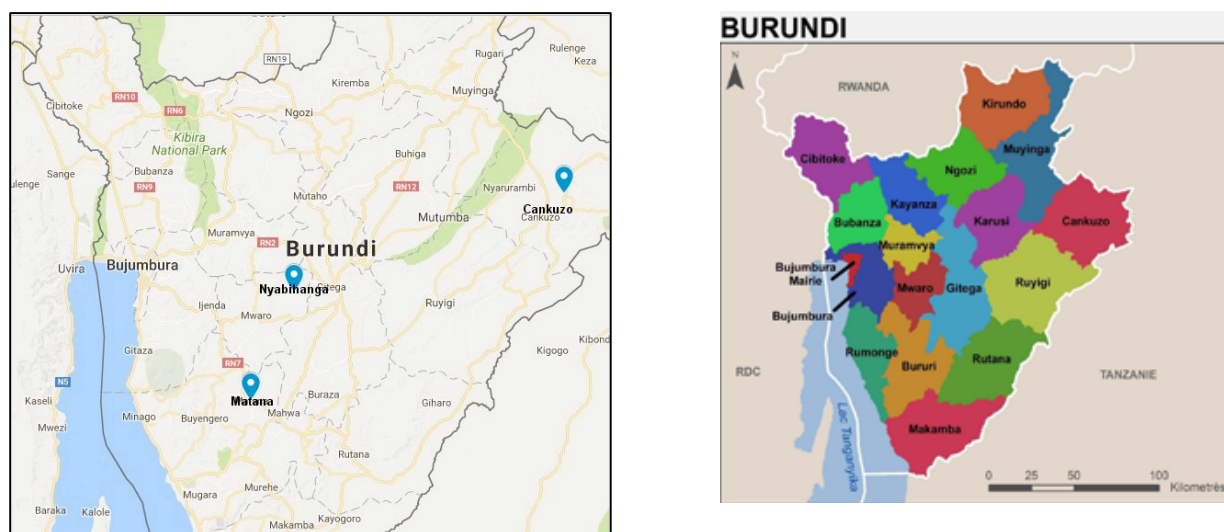
Interprovincial unit	Province	Commune
Central Zone	Mwaro	Nyabihanga
		Kayokwe
Northern Zone	Cankuzo	Cankuzo
		Mishiha
Southern Zone	Bururi	Matana

PRODEMA indicated that Nyabihanga and Kayokwe communes of Mwaro Province and Matana commune of Bururi Province were high priority project intervention areas. Matana already has a partially completed milk processing centre (MPC) that was equipped by IFAD and PRODEMA. This initiative needs to be completed, because only a few components of the necessary equipment is required to make it operational. The dairy cooperative at Nyabihanga has high potential for setting up a milk collection centre as it owns a plot of 10 acres that has; (i) access to water, (ii) access to electricity, and (iii) all weather road access – three key prerequisites for the establishment of a milk collection centre.

Cankuzo and Mishiha communes of Cankuzo province were selected for the following reasons:

- The province ranks second in terms of cattle population in Burundi, with 700,000 heads.
- The Cankuzo commune has two well-organized cooperative groups with more than 170 members of whom 69 are women and has more than 200 improved cows and about 750 local cows.
- A recent study estimates the annual production of milk in the province is more than 2,000,000 litres.
- The high milk volumes need to be transported to other provinces/markets as the population of Cankuzo province is the lowest compared to other provinces. Owing to its proximity to the Tanzania border, export opportunities to Tanzania need to be evaluated.

Figure 1: Location of the PRODEMA dairy market study sites



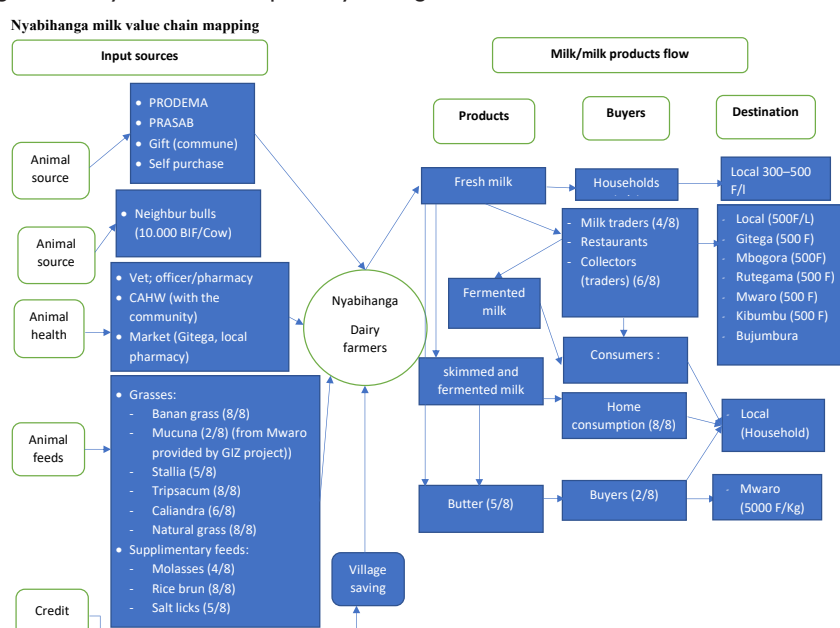
2.2 Assessment design

The assessment approach was based on the participatory appraisal methodology utilizing value chain assessment tools developed under the CGIAR Research Program on Livestock (Baltenweck et al. 2019)². For each of the three study locations, three days were planned for data collection and stakeholder discussions as follows.

Day 1: Focus group discussions with value chain actors

Focus group discussions (FGDs) were held with dairy value chain actors on the first day. Prior to starting the focus group discussions, the study team paid a courtesy call to the local administration to inform them of the objectives of the assessments. In each site, the local administrator shared his vision for the dairy sector, the constraints faced by the commune and the possible solutions which the planned project might contribute to. Each focus group discussion comprised 12–15 dairy farmers. During the FGDs, participants mapped the milk value chain and the actors (see example in Figure 2).

Figure 2: Dairy value chain map for Nyabihanga



² Baltenweck, I., Poole, E.J., Galiè, A., Ouma, E., Marshall, K. and Kruijsen, F. 2019. Livestock and Fish value chain assessment toolkit, version 2. Nairobi, Kenya: ILRI. <https://hdl.handle.net/10568/105608>

The price of milk and milk products along the marketing chain was also captured including any seasonal price fluctuation (Table 2).

Table 2: Milk price seasonality in each marketing channel

Item	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Quantity	High milk production					Low milk production					High milk production	
Price	BIF500/l					BIF 550/l					BIF 500/l	

Information about the following areas was also collected during the FGDs:

- Access to financial credit
- Gender issues related to the milk value chain (who is in charge of milking /selling, who receives the money and who decides what to do with the milk revenue. Is there a price differential for milk depending on who is selling?)
- Awareness of milk hygiene and milk quality
- Cost of supplementary feed to boost milk yield (e.g. rice bran, etc.).
- Availability/access to inputs like commercial feed
- Cost of transport from farm to milk collection centre/ intermediary buyer/final consumer
- Home consumption of milk
- Other advantages of dairy cow keeping (e.g. revenues from manure)
- Animal health, artificial insemination, access to medicines.

Day 2: Key informant interviews

Individual key informant interviews with at least two representatives of each value chain actor category were held. Where possible, both women and men were invited to participate in order to get data on possible differences in perception between men and women. The following value chain actor categories in each commune were targeted:

- Dairy farmers (suppliers)
- Dairy consumers
- MCC cooperative members (manager, accountant, quality assurance)
- Milk traders including cafeterias, restaurants
- Milk collectors
- Public and private veterinary and extension services including community animal health workers (CAHWs), veterinary pharmacy operators, and agricultural extension workers that focus on fodder and pasture management.
- Suppliers of input (commercial feed, farmers producing /selling fresh fodder).
- Credit institutions (i.e. saving and loan cooperatives [COOPECs]).

The findings of the first day were used as a basis for discussions with the key informants (e.g. if the problem of weakness in veterinary/insemination services had been raised during the FGDs, the representative service providers were asked to give their opinion on how the bottlenecks could be overcome). The key informants were identified, using a combination of snowball sampling and expert opinion. When inviting the key informants, the need to have male and female representatives was emphasized.

Day 3: Mini-workshop with representatives of dairy value chain actors to discuss results from value chain assessments

The findings of day 1 and 2 were presented in a plenum, adjusted where necessary and validated. The stakeholders were divided into groups of 6–7 participants each and asked to prioritize the constraints in the dairy value chain and discuss potential interventions to address the constraints. These were then presented in plenary for further discussion.

For all discussions, discussions were recorded in flip charts and opinion cards. Photographs of these documents were taken and stored as backup. The entire process was also recorded (through handwritten minutes) and photos taken to allow a reconstitution of the meetings in case of loss/damage of original documents. At the end of each day the handwritten information was transcribed into electronic formats.

3 Assessment results

3.1 Structure of the smallholder dairy value chain

The smallholder dairy value chain in the study sites is dominated by an informal, unregulated sector. The dairy value chain is relatively short with minimal processing activities, as depicted in Figures 3–5.

Dairy production

Dairy production is based largely on smallholder farmers with one or two cows producing milk for home consumption and selling surplus to the markets. Most farmers are beneficiaries of livestock asset transfer programs from NGOs and other government efforts that provide heifers as initial breeding stock. Other farmers have also sourced the dairy animals through purchases or inheritance. The NGOs and government programs involved in providing dairy cattle to the farmers include PRODEMA, Send a Cow, FAO, the rehabilitation project to support the agricultural sector in Burundi (PRASAB), the Initiative of the Heavily Indebted Poor Countries Project (IPPTE), the Livestock Sector Rehabilitation Support Project (PARSE) and the Transitional Programme of Post-Conflict Reconstruction (PTRPC). In Cankuzo, World Vision and Front Luterienne Mondial (FLM) were also a key source of dairy cattle. Some of the NGOs also provided the beneficiary farmers with commercial feeds and drugs for an initial period of six months, equivalent to BIF2 million per farmer, to jump-start production. In Matana, PRODEMA granted BIF11 million to a group of 11 farmers as a start-up fund for dairy production. Each farmer purchased 1 improved cow provided by PRODEMA at a price of BIF800,000–850,000 and the balance was used to purchase feeds and supplements. After six months, an additional fund was granted to the same farmers to purchase feeds.

In an effort to increase dairy production and productivity, NGOs such as the German Corporation for International Cooperation (GIZ) have provided forage seeds of bana grass, *Tripsacum laxum*, *desmodiums*, *Mucuna pruriens*, and *Caliandra calothyrsus* to farmers that belong to groups/associations and provided trainings on management and feeding. Send a Cow has initiated cross-breeding efforts with a few dairy farmers to upgrade the breeds through use of artificial insemination (AI). These efforts are yet to be upscaled since most farmers still do not have access to improved germplasm either through AI or bull service.

Some of the smallholder farmers belong to farmer associations involved in agriculture and livestock. However, they do not have specific collective activities involving dairying.

Milk and milk product marketing

Milk traders (collectors) in milk production areas are the primary interface with dairy farmers for milk marketing in the three study locations (Figures 3–5). They play the important role of collecting milk produced by the several smallholder farmers who are often located across diverse geographical regions, and who are often too far from the market centres. These traders purchase the milk (mostly morning milk) and transport it to milk bars, restaurants and institutions such as schools and hospitals within the communes and sometimes over long distances (up to 48 km) to neighbouring towns to

be sold to individual household consumers through other itinerant traders. For instance, the bulk of the milk produced in Nyabihanga commune is transported by the milk traders for sale in Gitega and to some extent in Bujumbura, while milk from Matana is sold in Rumonge, Bujumbura, Matana and Rutana, besides local consumers.

Itinerant milk traders are also key actors in the chain. They perform the retailing function by purchasing milk from farmers and selling it to individual households within the same or neighbouring locality. These milk traders are well known to the farmers and this relationship facilitates some form of informal agreements regarding payment due to repeat transactions and mutual trust. The farmers are able and willing to provide the milk on credit and get paid later by the traders (usually within two weeks) after they have sold the milk. Individual family consumers within the farmer neighbourhoods also have informal agreements with farmers for milk supply on credit, with farmers commonly paid after 1 month of supply. Due to inadequate transport facilities and high potential for spoilage, evening milk is mainly sold by farmers to neighbours or friends or is dedicated to home consumption and processing into butter or fermented milk.

In Matana, farmers sell milk to a milk collection centre (MCC) that has a cooling/chilling plant in Icakunze. This MCC is managed by the Groupement Pre-cooperative Icakunze de Matana, which has 130 members of whom 36 are women. The plant is part of an investment by PRODEMA and has a capacity of 1,000 litres of milk per day but is operating below capacity. It handles only 60–80 litres per day. The MCC also has a milk retail outlet where chilled milk is sold to consumers and other retailers.

Processing

A few actors are involved in milk processing, mainly as small-scale backyard processors. The small-scale cottage industry includes raw milk traders and some of the dairy farmers. The majority operate from their homes and process butter and cheese that they sell locally (Box 1).

The Association de Developpement Laitiere (in Kayokwe, Mwaro) comprising dairy farmers, attempted to produce cheese in 2005 but were not successful due to lack of raw materials and pressing equipment for processing cheese. They also got disappointed by a buyer from Bujumbura who defaulted in payment. Fermented milk is a common product among consumers in milk bars and is produced by both farmers and traders. Capabilities, appropriate processing technologies including equipment, business skills, and financial resources are key constraints to the cottage industry actors. Significant growth remains to be unlocked for many cottage industry actors through partnerships, financing and trade opportunities. Most cottage industry owners have engaged in dairy processing without necessarily having technical skills in processing. Furthermore, there is a shortage of technical expertise in the country generally to assist the interested cottage industry entrepreneurs despite existing market potential for such products in Burundi and in neighbouring countries such as the Democratic Republic of Congo.

Inputs and services

The business actors along the dairy value chain require support services. Suppliers of inputs and services for dairy production that were mentioned by the farmers include:

- **Feeds shops:** the farmers purchase concentrates such as maize bran, rice bran, salt licks, premixes, cotton seedcake, etc. Farmers from Mwaro purchase such feeds in the neighbouring Gitega town, located about 41 km from Mwaro, while farmers from Matana access feeds from Bujumbura and Rumonge, which are located 93 and 72 km away, respectively. Cankuzo farmers source their feeds from outlets in Ngozi, and Bujumbura, which are located 125 km and 215 km away, respectively; and access forages from neighbouring Tanzania farmers in Nyarumashi, 125 km away. Most of the farmers across the sites purchase molasses from the Moso Sugar Company factories. The farmers also feed cattle on their own planted forages such as bana grass, *Tripsacum*, *Desmodium*, *Setaria*, *Mucuna* and *Calliandra*. Some of the farmers purchase planted forages from their neighbours.

- Veterinary services: most of the farmers obtain veterinary services from private veterinarians and public commune veterinarians. In Mwaro and Matana, CAHWs also play a key role in providing animal health services.
- Veterinary drug shops: most of the farmers access veterinary products, especially dewormers, analgesics, and antibiotics such as oxytetracycline from agro-veterinary stockists located in Gitega, Bujumbura, Rumonge, and Ngozi towns. Most of the agro-veterinary drug stockists interviewed indicated that they obtain supplies from Bujumbura in outlets such as Alchem and Coopers.
- Breeding services: most of the farmers rely on bull service from neighbours, charged at BIF10,000 – 15,000 per successful service. The purity/breed of the bulls was not specified. AI services are accessible to a few farmer associations involved in the Send a Cow project. The semen is sourced by the project and farmers pay BIF10,000 for the inseminator's services. The inseminator's transport fee is paid separately and the rate is relative to distance they travel to farms.

Mr. Nshimirimana (not real name) is a businessman operating in Mwaro province. He buys milk from farmers in his neighbourhood and sells the following products:

- Part of the milk is sold pasteurized
- Part of it is sold as soured milk
- The cream from the milk is processed into butter
- The butter is sold between BIF5,000–7000 per kg

Figure 3: Mwaro dairy value chain

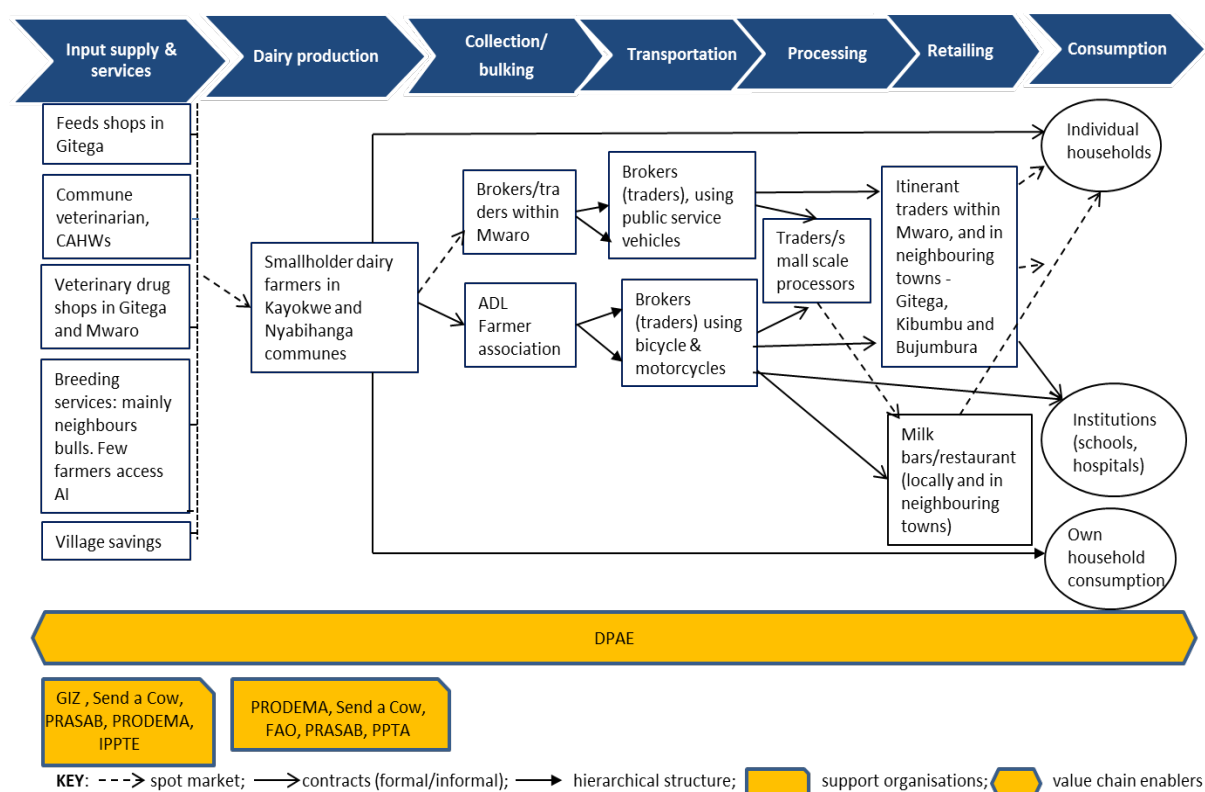


Figure 4: Matana dairy value chain

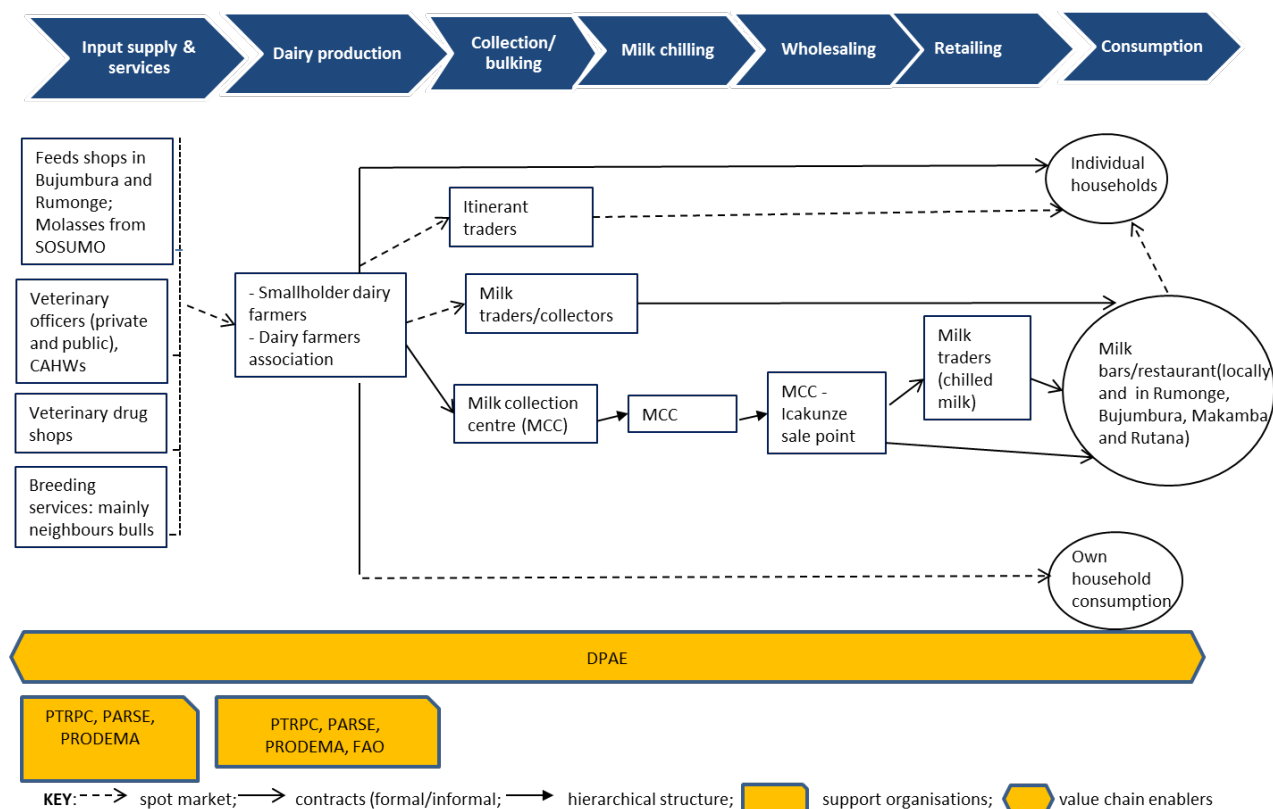
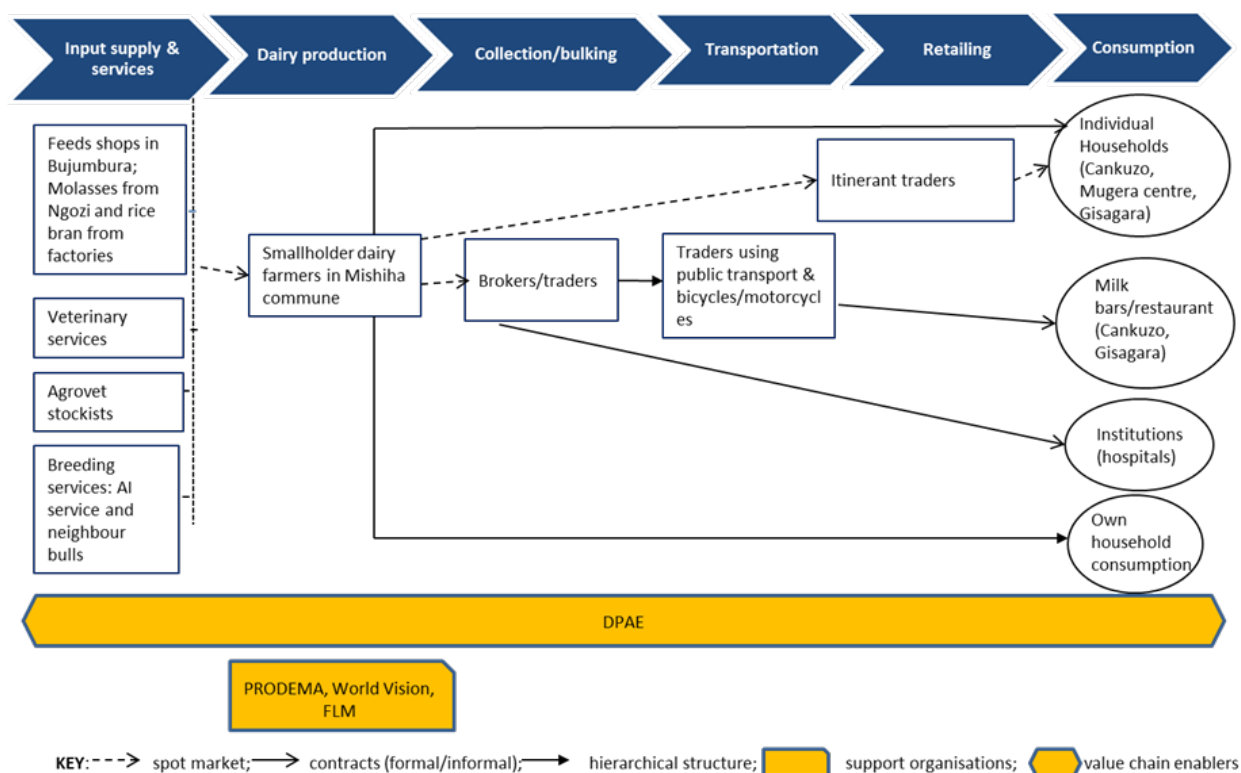


Figure 5: Cankuzo dairy value chain



3.2 Pricing and seasonality

Milk and milk product pricing

The key milk products traded in the markets and supplied in the value chain to final consumers include fresh and fermented milk. Butter and cheese processing is limited. The producer price of milk varies across sites as shown in Table 3.

Table 3. Producer price of milk by site and outlet type (BIF/litre)

Site	Itinerant traders	Milk traders (collectors)	Milk collection centre	Individual households
Mwaro – Nyabihanga	500	500	-	500
Mwaro – Kayokwe	700	700	-	700
Matana	650	650	600	700
Cankuzo	500*	500	-	500

*Depends on the distance from the city

Although Nyabihanga and Kayokwe communes are both in Mwaro province, the producer price is higher in Kayokwe due to higher demand for milk – there are several institutions (schools, health centre, and university) and individual household consumers there. In Matana, the milk price varies across outlets. The milk collection centre gives the lowest price of BIF600/litre while individual households give the highest at BIF700. However, farmers prefer to sell their milk to the MCC due to its reliability in payment because several other outlets usually default in payments. In Mwaro, a farmer cooperative has already acquired land for setting up an MCC with a capacity of 1,000–1,500 litres per day through investments by PRODEMA. However, no business plan for such a facility has been prepared, therefore no estimates of the potential profit margins are available. The milk producer price in Cankuzo varies depending on the location of the dairy farmer. For instance, at Kigamba, far from the city, where most bike collectors get their supplies, the producer price of milk is BIF500/litre while farmers in the peri-urban area get between BIF800–1,000 BIF/litre. The poor road infrastructure in the remote locations of Cankuzo limits the delivery of milk to urban consumers.

Across all the sites, there is no difference in retail price of fresh and fermented milk (Table 4). The MCC in Matana has a retail outlet where fresh and fermented milk is sold at BIF750–800/litre and BIF800/litre, respectively. Due to its low milk retail price, the MCC attracts several consumers in Matana compared to milk bars and other outlets such as restaurants. The retail price of butter compared to fresh and fermented milk is relatively high, though the local demand is low due to the high price. In addition, since high volume of milk (20 litres) is required per kg of butter produced, and milk obtained after removal of fat is less preferred by consumers, farmers prefer to sell whole fresh or fermented milk.

Table 4. Retail price of milk and milk products by site (BIF/litre)

Site	Fresh milk	Fermented milk	Butter
Mwaro – Nyabihanga commune	1,200	1,200	5,000
Mwaro – Kayokwe commune	1,400	1,400	5,000
Matana	1,200	1,200	7,000
Cankuzo	1,600	1,600	-

The milk retail prices outside the three study sites were indicated by the milk traders as being higher than 1,400 in most cases.

Seasonality in production and producer price trends

High milk production periods are between October and May in the study sites and this coincides with low producer prices (Tables 5–7). These periods are associated with rainfall, and high fodder production. Nyabihanga commune in Mwaro recorded the lowest producer price of BIF500 during the high production period.

Table 5: Mwaro sites

Variables	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Milk production	High (high fodder production)					Low (dry season, scarcity of forage)				High (high fodder production)		
Producer milk price – Nyabihanga	BIF400–500/l in Nyabihanga					BIF550–600/l (high feed costs) in Nyabihanga				BIF400–500/l in Nyabihanga		
Producer milk price – Kayokwe	BIF700/l – price is constant across seasons											
Seasonality in milk retail	Low demand/low milk sales					High demand – milk consumption is high due to the high temperatures during the dry season				Low demand/low milk sales		
Milk retail price	Low price – 1200BIF/l					High sales price – BIF1,400/l				Low price – BIF1,200B/l		

Table 6: Cankuzo sites

Variables	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Milk production	High				Low					High		
Producer milk price	In rural areas: BIF 500–800/l				In rural areas: BIF 900–1,000/l					In rural areas: BIF500–800/l		
	In urban areas: BIF 800–1,100/l				In urban areas: BIF1,200/l					In urban areas: BIF800–1,000/l		
Seasonality in milk retail	Low				High					Low		
Milk retail price	Low sales price BIF1,200–1,600/l				High sales price BIF1,800–2,000/l					Low sales price BIF1,200 – 1,600/l		

Table 7: Matana sites

Variables	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Milk production	High					Low					High	
Producer milk price	BIF650–700/l					800 BIF/l					BIF650–700/l	
Milk retail price	BIF1,200/l					BIF1,300–1400/l					BIF1,200/l	

The dry season, between May–September (Cankuzo and Mwaro) and June–Nov (Matana) is associated with low milk production due to forage scarcity. This is the period with the highest producer prices.

According to the participants from Mwaro, and Cankuzo, the high milk production period is also associated with high quantity of milk rejection due to spoilage since demand is low. Appropriate milk preservation methods to increase shelf life have not been implemented. Consumer prices are directly impacted by the price fluctuations of milk at the producer level. Prices rise during the dry season, when milk production drops, and fall in the wet season when milk supply increases.

Indicative margins

The margin analysis results shown in Table 8, reveal positive margins being made by traders and retailers in the value chain. Relative to other sites, the traders' margin of 31% in Mwaro is rather high, while Matana has the highest margin of 37% at the retail node. This information was obtained from FGDs.

Table 8: Indicative margin analysis for fresh milk

Dimension	Site					
	Mwaro		Cankuzo		Matana	
	Amount (BIF/l)	% margin	Amount (BIF/l)	% margin	Amount (BIF/l)	% margin
Retail price	1,200		1 600		1 200	
retailer margin	400	33.3%	200–400	12.5–25%	450	37.5%
Trader	800		1,200–1,400		750	
trader margin	250	31.3%	200	14.2–16.7%	100	13.3%
Farm gate	550		1,000 ^a –1,200 ^a		650	

Notes: Margins calculated as follows: Retail price minus trader price=retailer margin; Trader price minus farm gate price = trader margin

Percentage (%) margin calculated as follows: trader margin % = trader margin/trader price*100; retailer margin %=retailer margin/retail price*100

The margin indicated does not account for production and overhead costs, as this information was not readily available. One of the milk traders interviewed indicated that they earn a monthly gross margin of about BIF100,000/month.

3.3 Quality attributes demand and price premium

Several quality attributes are considered by milk buyers. In all the study sites, the following were indicated as key attributes of milk quality:

- Colour (white and frothy)
- Observation of dirt or flakes
- Cleanliness of containers
- Non-adulteration with water
- Odour (linked to non-mixing of evening and morning milk)

Most of these attributes are assessed through organoleptic measures because farmers and buyers lack appropriate equipment for gauging milk quality. Some milk collectors (traders) have lactodensimeters for testing milk adulteration with water or cream removal. The buyers also confirm from farmers if the appropriate withholding period is observed for cows under treatment. In the milk collection centres, lactodensimeters and alcohol tests are used to assess milk quality.

No premium prices are paid for good quality milk, but if the quality requirements are not met, milk is rejected. Most farmers complained of frequent rejection of milk by traders especially during the high milk production period. They said this is a strategy that traders use to avoid being left with unsold milk.

4 Constraints and opportunities

4.1 Opportunities for smallholder dairy development

Several opportunities for the development of the smallholder dairy value chain were identified across the sites. In Cankuzo, these included availability of land for fodder production, good climatic and edaphic conditions for cultivation of pasture and fodder crops, good road infrastructure, existence of farmer associations, availability of market for milk, and support by NGOs such as Confédération des Associations des Producteurs Agricoles pour le Développement (CAPAD) and African Centre for the Constructive Resolution of Conflicts (ACCORD). In Matana, the existing opportunities included water and electricity availability, milk demand from institutions such as hospitals and schools, and proximity of dairy farmers to urban areas. Burundi is a small country, and distances to markets are usually short. In addition, there is ease of entry and exit into dairy business due to the relaxed regulatory laws.

4.2 Constraints

Productivity related constraints

The constraints associated with supply of milk from farm to market in Burundi are presented in Table 9. Infrastructural constraints to move milk to demand areas is a common constraint in Mwaro and Matana. Milk spoilage associated with poor preservation methods were indicated as constraints in all the study sites. In Mwaro, delayed payments and payment defaults by buyers was common.

Table 9: Milk supply constraints by site

Mwaro	Matana	Cankuzo
High milk production but infrastructural constraints to transport milk to high-demand areas and to preserve milk especially during periods of high milk production	No market for evening milk	Low milk price
General lack of market for evening milk	Lack of improved storage and processing system	Milk spoilage due to poor milk conservation
Low milk price and unreliable market outlets	Low hygiene (worker, containers, cows, seller/traders)	Lack of proper milk transportation means
Low farmer profit margins from milk	Lack of market	Lack of milk conservation equipment
Milk spoilage at the sales point since traders bulk milk from many suppliers without checking for quality Delayed payments for milk and payment defaults to farmers. This is worsened by the fact that no formal agreements are drawn and most traders do not have a fixed abode and are unable to be traced by farmers. Lack of appropriate transport equipment to transport milk to lucrative markets in urban centres such as Bujumbura and Gitega	Long distance to travel while selling milk	Lack of milk testing instruments Lack of market outside Cankuzo province
Lack of milk storage infrastructure coupled with lack of initiative to create effective milk transport associations or firms		

Several general value chain constraints were highlighted by the actors interviewed. These included lack of funds to initiate or improve businesses around the dairy value chain, poor access to credit, and lack of business skills.

Milk processing constraints

Processing constraints are largely around knowledge and availability of processing equipment, even though the market for processed products exists. In Matana, insufficiency of key critical resources – water and electricity – is limiting processing constraints.

Table 10: Milk processing constraints, by site

Mwaro	Matana	Cankuzo
Lack knowledge on milk processing	Lack of sufficient water and electricity	Lack of processing equipment
	Lack of equipment for pasteurization and packaging	Lack of technical knowledge on processing and packaging
	Lack of knowledge on milk processing	

4.3 Potential interventions and target outcomes

During the mini-workshops with selected value chain actor representatives on day three of the value chain assessment exercise, the dairy value chain actors were given an opportunity to identify potential interventions required to resolve the constraints and the target outcome. These are summarized in Tables 11–13.

Table 11: Potential interventions to resolve value chain constraints (Mwaro)

Constraints	Interventions or solutions	Key players (who should be involved)	Contribution of intervention to gender equity (men, women and youth)	Contribution to economic sustainability
High transaction costs in accessing inputs – long distance travelled	Set up cooperatives and a central veterinary pharmacy	Project: PRODEMA BPEAE	Employment, product access, income increased	Price reduced, transport cost reduced
Milk spoilage	Establish milk processing factory	Private sector	Livelihoods improved	Transaction cost reduced
Lack of awareness on importance of milk consumption for human health	Capacity building on milk importance for human health	PRODEMA, GIZ	Nutrition status improved and life standard improved.	Income generation
Lack of milk storage infrastructure	Setup storage infrastructures	BPEAE, Comité de Développement Communautaire (CDC) PRODEMA	Livelihoods improved	Employment generation
Lack of awareness on importance of milk consumption for human health	Promote milk products by using publicity/mass media, religious organizations	PRODEMA, farmer group	Reduce nutritional related diseases especially women and children	Improved health status
Lack of knowledge of processing techniques	Capacity building for farmers on processing techniques	Farmer groups and PRODEMA	Women and youth prioritized	Reduction in labour burden for women

Table 12: Potential interventions to resolve value chain constraints (Cankuzo)

Constraints	Interventions or solutions	Key players (who should be involved)	Contributions of interventions to gender equity (men, women and youth)	Contribution to economic sustainability
Feeds and drugs are expensive	(i) Establishment of local feed processing industries	Government Projects	Sensitization of different categories of people	Decrease in milk prices
Long distance from the source	(ii) Input subsidies by (government/ donors)	NGOs PRODEMA	Access to market by all categories	Decrease of inputs costs
	(iii) Encourage many traders to join the feeds business	Community cooperatives	Access to healthcare by all categories Improvement of life standard of household members	Increase in government taxes (revenue office, commune) Increased milk productivity (quality, quantity)
Animal diseases	Availability of drugs (vaccines)	Government Projects NGOs BPEAE services PRODEMA	Improved animal health for improved human health	Less mortalities, availability of animals and animal products
Lack of improved bull breeds	AI services	Government Projects NGOs BPEAE services PRODEMA	Improved animal health for improved human health	Availability of good animal breeds
Low technical know-how on processing and lack of dairy processing industries	Capacity building and establishment of dairy processing plants	Same as above	Same as above	Same as above
Lack of forages due to seasonality and climate change	Capacity building on forage conservation	Same as above	Same as above	Same as above
Forage diseases	Use of improved forage varieties resistant to drought	Same as above	Same as above	Same as above

Table 13: Potential interventions to resolve value chain constraints (Matana)

Constraints	Interventions	Key players (who should be involved)	Contribution of intervention to gender equity (men, women and youth)	Contribution to economic sustainability
Long distance travelled while selling milk	Test business model options for milk transportation and equipment	Project, PRODEMA, BPEAE, subsidized by government	Time selling milk reduced and they win time for other activities especially for women and children	Reduction of price and transport cost (transaction cost reduced)
Lack of support from Donors and Government	Set up policies for livestock support	Government, PRODEMA, GIZ,	Livelihood improved of the household	Income generation; increase employment opportunities Improvement of livestock management
	Hiring and support other veterinary agents	Donors and government	Awareness in the field increased	
Lack of knowledge on milk processing	Set up milk processing program	Government, PRODEMA, GIZ, BPEAE;	Nutrition status improved	Income generated
	Capacity building	Private sector	Improved health status for the whole family members	Farmers motivated
	Training on organizational and financial management		Livelihood improved	Experience-sharing may improve milk processing
Low milk prices	Promoting milk processing techniques	Farmer groups,	Knowledge increased	Income improved
	Association management, market and conflict resolution	PRODEMA, GIZ, BPEAE;	Motivation for farmers especially for women and youth who faced rejection of spoiled milk	
		Private sector GIZ	Women more healthy/tiredness reduced due to the reduction of working time	

Capacity to pay for livestock labour

5 Conclusion

The findings from the smallholder dairy value chain study show that the value chain is generally underdeveloped with minimal value addition. There is high potential for growth and market development given the relative proximity of supply areas to large urban demand centres such as Gitega, Bujumbura and neighbouring countries such as Tanzania and eastern Democratic Republic of Congo. Interventions that improve milk preservation and facilitate transportation of milk from supply areas to large demand areas can be useful in upgrading the value chain and enhancing benefits to farmers and other value chain actors. These measures also need to focus on improving and sustaining production through access to input and business development services, including lucrative milk/milk product markets and capacity development in various aspects of production and entrepreneurship.

The main constraints to improved dairy value chain performance in Burundi are:

- High cost of commercial concentrate feeds and veterinary drugs.
- Unavailability and inaccessibility of essential services such as extension services, financial services, input supply and business development services.
- Low adoption of improved dairy management practices and technologies.
- Milk spoilage due to limited preservation and storage infrastructure.
- Low milk prices and delayed payments.
- Infrastructural constraints to transport milk to high demand areas, especially during high peak production periods.

Potential interventions/efforts to address the constraints include:

- Farmers becoming better organized. Farmer organization under associations and cooperatives is a significant feature in the highly-successful milk sheds in the eastern Africa region. The impact and benefits of this are clear. Organized farmers are able to access good markets through better bargaining power. They are also able to grow and develop plans for setting up their own retail outlets in large urban centres. It is also easier for such farmers to receive appropriate support and capacity building from national and international development actors. For such farmer collectives to be effective, they need capacity development in governance, business and entrepreneurship.
- To improve the position of farmers in the value chain, their value capture and to reduce transaction costs associated with individual spot market transactions for inputs and sale of milk, business models such as the dairy business hub models used by the East Africa Dairy Development (EADD) project could be effective. Such models necessitate horizontal integration of producers into collectives and linkages to different business development service providers including processors through various contractual arrangements to improve farmer access to inputs and services. They also reduce transaction costs through economies of scale.
- Strengthening the dairy cottage industry through capacity development and appropriate processing techniques.

The few milk collection and cooling centres in the country are operating below capacity as farmers prefer to market milk through other outlets due to low value proposition (including lower milk prices relative to other outlets) by MCCs. Some of the MCCs have challenges accessing water and electricity. Although several stakeholders who were interviewed expressed interest in having such facilities to address some of the value chain challenges, most did not take into consideration the costs associated with running such facilities and how to incentivize farmers to supply milk to the facilities. In all the MCCs (existing or planned) no business plans had been drawn, making it difficult to ascertain whether such models are profitable and whether they would improve value chain efficiency. It will be useful to develop plans for such facilities before they are implemented and pilot a few before replicating to other sites. Other practical intervention options to deal with milk spoilage and marketing challenges include:

- Investing in refrigerated tankers to transport milk from supply areas to urban demand centres.
- Investing in milk retail outlets with adequate refrigeration facilities in large urban centres for sale of milk and other milk products.

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