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Gender assessment of dairy value chains: evidence from **Rwanda**

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IAKIB Cooperative board member and manager of the Milk Bar Gicumbi Byumba sector Ngondore road in Rwanda.
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Preface

Milk and dairy production are crucial for the daily food security of rural families all over the world. They are a vital source of nutrition and provide important livelihood opportunities for dairy farmers, processors, transporters, retailers and other actors in the dairy value chain.

Women play a significant role in activities related to dairy production and animal husbandry, but their participation is commonly concentrated at the production level of dairy value chains, in less profitable activities than those performed by men. They often remain excluded from the decision-making processes and governance structures of dairy value chains. Few national dairy policies or programmes adopt a gender perspective when defining their strategies. Consequently, women and girls tend to benefit much less from livestock and dairy value chains than men do.

Governments and development practitioners need up-to-date information about the different roles, responsibilities, needs and constraints of women and men involved in the dairy sector in order to inform policies and interventions that contribute to inclusive and gender-sensitive value chain development.

The Social Protection and Rural Institutions Division (ESP) and the Rural Infrastructure and Agro-Industries Division (AGS, now part of the Nutrition and Food Systems Division, or ESN) of FAO, in collaboration with the FAO Representation in Rwanda, undertook a detailed gender assessment of the dairy value chains in selected sites of the country. The resulting publication draws on the evidence gathered through fieldwork and a review of specialized background documentation. The result is a comprehensive overview of the gender issues in dairy value chains in Kigali and the Districts of Nyagatare, Nyanza and Gicumbi.

The report is an important step towards a deepened comprehension of gender issues in dairy value chains in the Rwandan context. It provides country-specific recommendations for Rwanda, which also feed into a more general knowledge base on how to develop gender-sensitive dairy value chains, thereby contributing to the ultimate goal of closing the gender gap in the agricultural sector.

This report is part of a series of country assessments:

- Gender assessment of dairy value chains: evidence from Ethiopia
- Gender assessment of dairy value chains: evidence from Kenya
- Empowering women in Afghanistan: reducing gender gaps through integrated dairy schemes.

Acknowledgements

The study was carried out in consultation with the FAO Representation in Rwanda under the direct supervision of Ms Regina Laub, Senior Officer (FAO Social Policies and Rural Institutions Division, ESP), Mr Raffaele Mattioli, Senior Officer (FAO, Animal Production and Health Division, AGA) and Dr Anni McLeod (International consultant). Francesca Distefano and Alejandra Safa, Gender and Development Consultants (ESP), provided valuable inputs and technical guidance throughout the study. Rosa Capuzzolo (FAO, ESP) provided significant administrative support.

The study benefitted from the technical inputs provided by FAO experts Juvenal Kabiligi, Marco Knowles, Sofie Lamber, Valentina Sommacal and Marcello Vicovaro as well as Mary Alice Bamusiime and Agnes Butera, independent national consultants.

In Rwanda, the assignment was facilitated by Dr Attaher Maiga, FAO Representative (FAO Rwanda), Dr. Otto Muhinda (FAO Rwanda), Ms Jeanne d’Arc Matuje (FAO Rwanda) and Alexis Ruzigana (FAO Rwanda). The author was assisted in data collection by Mr Jean Paul Safari. Thanks are extended to Juvenal Kabiligi, Mary Bamusiime and Agnes Uwera Bazimya, who reviewed the report and contributed insight.

The author would like to acknowledge the time and effort contributed by the many individuals and organizations consulted in Rwanda, including Land O’Lakes, Heifer International, Send a Cow, Nakumatt, Inyange Industries, Hadji Enterprises, Zirakamwa Dairy and Savannah Plant as well as the farmers and milk collection centres (MCCs) in all the communities visited and the guidance provided by FAO in Rome and Rwanda.

Executive summary

A socio-economic and gender assessment of dairy value chains was conducted in selected sites in the Republic of Rwanda. A gender analysis of the dairy value chain was performed, including of an assessment of the opportunities, challenges and roles of women and men, boys and girls at every node in the value chain such as production, transportation, collection, processing facilities, trade and retail of milk and dairy products.

Several data sources were triangulated, including secondary sources (reports and other literature) and primary sources (individual farmers, farmer cooperatives, government institutions, non-government organizations, international development agencies, and private sector operators). Data were collected from Kigali, Nyagatare, Nyanza and Gicumbi Districts. After data collection, analysis was performed largely by means of a content analysis, with some descriptive statistics.

Rwanda's government policies are supportive of social inclusion and gender equality. The Rwandan Constitution spearheads the legal framework for gender equality and equity, and provides for higher levels of representation of previously marginalized groups such as women, youth, and people with disabilities. This constitutional framework provides quotas for women in Government, which have resulted in an unprecedented number of women being elected or appointed to decision-making positions at all levels. The Constitution underpins the principles of gender equality and the elimination of all forms of discrimination against women, and provides a very strong platform for gender mainstreaming in the Rwandan legislation. Rwanda has a very high percentage of women in parliament, with 63.8 percent in the Lower Chamber.

The Ministry of Gender and Family Promotion (MIGEPROF) works across all sectors. There are also a number of councils, secretariats and fora that are responsible for various aspects of gender and equality. Programmes have been implemented such as the Vision 2020 Umurenge Programme (VUP), which in 2013-14 was present in 240 of the country's 416 geographical sectors, and has benefitted an estimated 630 000 people in 216 000 households. Under the VUP, 65 percent of households that benefit from direct support through unconditional cash transfers are headed by women, as are 47 percent of households participating in public works. The National Agriculture Gender Strategy (2010) provides guidance to the Ministry of Agriculture and Animal Resources (MINAGRI), its agencies and development partners to be gender-sensitive in their programming and interventions in order to sustainably transform the agriculture sector. Rwanda also participates in the New Partnership for Africa's Development (NEPAD), which has a working group on gender.

However, these strong central gender policies have yet to be fully translated at local levels and in agricultural practice. Opportunities for women score high in international statistics: according to the 2014 Global Gender Gap Index, Rwanda ranks 7th and is above many developed countries. Nevertheless, the United Nations Development Programme's (UNDP) Gender Inequality Index for 2013 puts Rwanda at the 151st position, suggesting that while the policy framework and initiatives provide opportunities for women, there is still a large gap in making gender equality a reality. The participation of women in local government is much lower than in central government. Despite the political will of Rwanda's leadership towards gender equality, social behaviours and attitudes towards women remain patriarchal. In some instances, women do not participate equally in decision-making processes with men. In some parts of the country, customary law takes priority in regulating relationships between men and women.

Traditionally, men and women's roles in agriculture were defined by traditional gender roles as well as by their social class. The post-genocide social context changed the roles and responsibilities for many women and children, who had to take over as the head of

households. However, the present study found that dairy value chains are still predominantly quite male-dominated.

The dairy value chain in Rwanda varies from location to location, but in general, it follows a pattern of production, milk collection and transportation, milk collection centre (MCC) handling and shipping to processors and then to the end-user markets. Some farmers may transport milk directly to end-user markets; some transporters may collect milk and ship to end-user markets; and milk may be sold in the informal market as well.

More than 30 percent of farmers interviewed for this study have owned cattle for more than 20 years. Most inherited animals from parents or friends; 18 percent received them from the Girinka Program (“One cow per poor family”) or from a non-governmental organization (NGO); and 21 percent purchased their animals. The 46 percent of animals owned are cross-breeds as farmers have been improving their cattle from the traditional Ankole breed to cross-breeds and Friesians. For more than 80 percent of farmers, the herd has not increased in size due to the trend of selling Ankoles and adopting improved breeds, which may demand more feeding and treatment. Artificial insemination (AI) is an ideal way of cross-breeding, but has been limited by the shortage of semen and the lack of proper training for AI service providers/veterinary officers. Zero-grazing is generally practised in all the study sites, although open (extensive) grazing is still practised in some districts such as Nyagatare.

The benefits of owning cattle include milk consumption, income generation, manure for crops, social capital and immediate cash for school fees. Women tend to emphasize social capital and the security and economic benefits brought about by asset ownership. Considering the benefits associated with owning cattle, 54 percent of farmers are willing to modernize their farms by adopting best practices for higher yield. However, there are constraints to expansion, the most commonly cited being animal diseases and concerns about cash flow, followed by increased workload and lack of land. Although the same constraints were mentioned by men and women interviewed, men are more concerned with animal diseases and financial issues than women. Other constraints include limited water and electricity supply at the farm level. Also, some farmers are concerned that their educated children lack interest in continue the dairy farming tradition, which threatens the existence of their dairy farm after the current generation. However, as dairy farming becomes more profitable, youth are becoming engaged in the business, with the majority dominating in providing services such as veterinarian services, input supplies, AI and transportation. Gendered division of labour can be observed at all nodes of the value chain; roles are influenced by the production system. In the extensive grazing system that predominates in Nyagatare, for instance, men and boys bring animals to graze and find water, while women mainly care for calves and home-processing of milk into fermented milk and butter. In the zero-grazing system, which predominates in the rest of the country and is associated with the national dairy development programmes, the workload is generally heavy, particularly for women, who are responsible for ensuring the cleanliness of utensils and stalls as well as feeding the animals.

Men are much more involved than women in the milking of the cows and transportation of the milk to the MCCs. They carry milk on motorbikes and bicycles, or hand deliver it to the MCCs. But in some cases, some women, mostly from women-headed households, milk the cows and sell the milk themselves. Benefits associated with milk delivery are affected by accessibility due to difficult terrain. In areas where infrastructure is not in good condition, milk may be wasted due to bad roads and to the long length of time it takes to reach the supply point.

Although women can join cooperatives and work at MCCs, they participate less than men, and the percentage of men’s and women’s membership varies from cooperative to cooperative. Although women are members of MCCs together with their husbands, or are members in their own right if they are single or widows, their participation in cooperative leadership is limited. Men dominate decision-making positions, but the trend is currently changing due to the strong gender equality promotion by the Government of

Rwanda. Belonging to an MCC brings about different benefits, including access to larger markets, loans to gain access to veterinary products, information and negotiation power.

At processing plants, men and women's participation varies. In unskilled labour, men dominate in some types of work such as lifting cans, loading and off-loading, while women tend to perform work requiring less physical strength, such as cleaning. Participation in skilled labour such as office work or transformation processes depends on the level of education and experience of both men and women.

Raw milk is processed into fresh pasteurized milk, low-fat milk, fermented milk, yoghurt, cheese, flavoured milk and ghee. Processing into more durable dairy products (such as powdered milk, biscuits) and the possibility to strengthen extension services and input supplies constitute opportunities for expansion. MCCs deliver raw milk to processing plants such as Inyange, a large processor that enjoys markets from the Government, supermarkets and milk zones. Hadji Enterprise, sells in Rwanda and supplies travellers to Burundi, while Zirakamwa Meza Nyanza Dairy delivers to specified shops.

The study concluded that the policy, institutional and legal environment is conducive to gender equality, but has yet to translate into fully gender sensitive dairy value chains. Women tend to be most concentrated within production and home processing, and in zero-grazing production systems, which implies a heavy, home-based workload. While they participate in MCCs and cooperatives, generally they tend to be reluctant in taking on management roles and are very little engaged in the transport and selling of the milk. More men than women provide dairy production services, which are tailored more to men than women. There is, therefore, room for improvement in enhancing the implementation of the national gender policies to local practice. As the National Dairy Strategy is implemented, emphasizing formal dairy value chains and zero-grazing dairy production, it will be essential to ensure that women are not marginalized.

The following are highlighted as general considerations for the development of gender sensitive dairy value chains:

- Gender sensitive dairy value chains must be built on the foundation of a solid business model in which the value chain is financially sustainable.
- The Rwandan dairy value chain is developed in partnership between the Government, development agents (whether private or public) and local communities, and must be implemented accordingly.
- Gender sensitive dairy value chain development is underpinned by government policies. In addition, each value chain development programme requires a gender strategy and a system to monitor gender targets.
- Development and design of value chains must be driven and owned by the communities (all ages, sexes) for whom the intervention is designed. Design must be based on the practical reality of the communities for whom the intervention is designed (including all ages and all sexes). This is true of any value chain intervention and it applies to dairy value chains. Supporting actions are likely to be needed to promote gender equality.
- In order to ensure equal participation of men and women in dairy production, technical staff of dairy development programmes and projects should be sensitized to gender issues and trained in gender analysis.
- Efforts must be made to ensure the active involvement of women in dairy development activities and to expand their involvement in cash management activities other than in production activities only. Specifically:
 - support to inputs and services provision should be gender-sensitive, promoting women's participation in providing services as well as services tailored to women;
 - support to dairy producers including linkages to MCCs should promote the involvement of women as well as men in management and leadership positions.
- For future investment in the development of dairy farming, affirmative action should be applied to ensure, encourage and finance female-owned enterprises, thus positioning them to be competitive on the market.

- Mentorship for cooperatives, MCCs and dairy small- and medium-sized enterprises (SMEs) should be emphasised, which is the only way to guarantee the sustainability of interventions.

About the author

Jeanne Françoise Umuzigambeho is an independent consultant with 15 years of experience in infrastructure, gender and social development projects for private sector companies, government institutions, United Nations agencies, non-governmental organizations (NGOs) and United States Agency for International Development- (USAID) funded projects.

Abbreviations and acronyms

AI	Artificial insemination
AGA	Animal Production and Health Division (FAO)
AGS	Rural Infrastructure and Agro-Industries Division (FAO)
AMS	Alternative Milk Sector
BCRK	Banque Commerciale du Rwanda
BPR	Banque Populaire du Rwanda
CAADP	Africa Agriculture Development Programme
EDPRS	Economic Development and Poverty Reduction Strategy
EICV	Integrated Household Living Conditions Survey
ESP	Social Policies and Rural Institutions Division (FAO)
FAO	Food and Agriculture Organization of the United Nations
FGD	Focus group discussion
GDP	Gross domestic product
IAKIB	Ihuza Aborozi ba Kijyambere Bafatanyinje (Cooperative for Modern Farmers)
IFAD	International Fund for Agriculture Development
MCC	Milk collection centre
MDG	Millennium Development Goal
MIGEPROF	Ministry of Gender and Family Promotion
MINAGRI	Ministry of Agriculture and Animal Resources
MINALOC	Ministry of Local Government
MINECOFIN	Ministry of Finance and Economic Planning
NDS	National Dairy Strategy
NEPAD	New Partnership for Africa's Development
NGO	Non-government organization
NISR	National Institute of Statistics for Rwanda
RAB	Rwanda Agriculture Board
RWF	Rwandan franc
SACCO	Savings and Credit Cooperatives
SoQ	Seal of Quality
UHT	Ultra-heat treatment
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
SNNPR	Southern Nations, Nationalities and Peoples Region
SNV	Netherlands Development Organization
UNIDO	United Nations Industrial Development Organization
UNRRA	United Nations Relief and Rehabilitation Administration
USAID	United States Agency for International Development

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 US\$1 = RWF735.

Chapter 1

Introduction

FAO has a long history of working in small-holder dairy development and has learned that well-designed dairy development programmes can improve the incomes and nutrition of poor households, as well as provide employment in milk processing and marketing. Small-scale dairy production is considered beneficial to women and children as well as men. Milk sales provide regular income that is often accessible to women, while dairy products can be important in diversifying the diets of poor people, in particular children over the age of 12 months and undernourished pregnant women (FAO, 2013).

Reviews of evidence on the importance of livestock for women have argued that, although two-thirds of the world's poor livestock keepers are rural women, limited research has been conducted in recent years on their roles in livestock keeping and the opportunities that livestock-related interventions could offer them (Kristjanson *et al.*, 2014). Some published literature is, however, available on gender and livestock ownership. Livestock has been described as an asset that women can sometimes acquire or control more easily than land or other physical or financial assets (ILRI, 2013), although the relative informality of livestock property rights can be disadvantageous to them when their ownership of animals is challenged. According to a recent survey in seven countries, it is also more common for women to

own livestock jointly with men than to have sole ownership (Johnson *et al.*, 2015). Income from livestock can be advantageous to women even if they do not solely own the animals; participation in a dairy value chain programme in Bangladesh, for instance, increased the value of assets jointly owned by women and men, and gave women a wider range of options in saving or accessing credit (Quisumbing *et al.*, 2013).

This report is one of four studies commissioned by FAO to review gender and socio-economic aspects of dairy value chains supplied by small-holder producers.¹ The objective of this study was to assess the extent to which gender equality can be built into the development of dairy value chains in Rwanda and to formulate recommendations accordingly. The analysis assesses women's and men's roles and responsibilities, and their different needs, constraints and challenges along selected dairy value chains. In addition, it identifies the contributing factors to reversing gender inequalities, and draws some general guidelines on how to design and implement gender sensitive dairy value chain development.

The assessment was conducted by a national consultant under the overall supervision of an international consultant and the FAO ESP team in Rome, and with the collaboration of the FAO Representation Office in Rwanda.

¹ A 2013 study in Afghanistan is reported in FAO (2015). Subsequently, FAO commissioned three further studies, in Ethiopia, Kenya and Rwanda (reported here).

Chapter 2

Methodology

2.1 SCOPE

The aim of the study is to assess the extent to which gender equality can be built into the development of dairy value chains in Rwanda and to suggest general guidelines for implementing a gender sensitive dairy value chain. It examines several aspects of dairy value chains, namely structure, governance, value addition and profitability. However, the aim is not to evaluate the performance of the value chains, but rather to investigate the necessary conditions for providing equal opportunities for women and men to engage in and benefit from dairy value chain development.

The study consists of a literature review to provide a broader picture of dairy development and the economic, social and gender context in which it takes place. It draws information from previous descriptions and evaluations of dairy value chains and dairy development projects, as well as field work conducted in Rwanda.

2.2 ANALYTICAL FRAMEWORK

As the study is concerned with gender issues within the value chains, the conceptual framework draws from and combines two types of analysis: value chain analysis and gender analysis.

Value chain analysis is concerned with the effective and efficient functioning of value chains and their potential to provide profit to those who participate. Gender analysis is concerned with the extent to which men and women have equal access and control over resources and assets, voice and agency, and/or have equal opportunities to achieve their chosen life outcomes. In this study, gender analysis considers the factors within the value chain and in the wider environment that affect the extent to which both men and women can participate in and benefit from the operation of dairy value chains. Combining the two, gender analysis provides a context and cultural reference in which to situate value chain analysis.

The framework was constructed based on different value chain approaches, with reference to

sources dealing with gender analysis and sources describing ways to combine both.² It also draws on experiences gained in another FAO study in Afghanistan (FAO, 2015). It aims to be comprehensive and straightforward for application within a limited time and across a range of local situations.

It considers three aspects of the value chains:

- structure, which consider both the functional links and the supporting inputs and services (such as animal health services, extension advice, and drug and feed supplies);
- flow of values along the chains and the distribution of income among actors;
- governance of the chains, i.e. the way that actors and institutions drive their operation.

It also considers gender issues³ at three levels:

- the micro level, which focuses on individuals, households and local communities, women's and men's roles and responsibilities, and how they are affected;
- the meso level, which focuses on institutions and services, who has access to them and how they cater to the needs of women and men;
- the macro level, which focuses on national policies and plans, the economy and social issues and on how women and men are affected.

2.3 DATA AND INFORMATION GATHERING

2.3.1 Sites selected for fieldwork

The study targeted Gicumbi, Nyagatare and Nyanza Districts, from Northern, Eastern, and Southern Provinces, respectively (three out of

² Kaplinsky & Morris (2003); Bolwig et al. (2008); Farnworth (2011); Mayoux & Mackie (2007); Quisumbing et al. (2013); ILO (2009); Vanderschaeghe & Lindo, 2008; Riisgaard et al., 2010; FAO, 2001.

³ Defined as access and control over resources and assets, voice and agency.

the four provinces of Rwanda) as well as Kigali City. Rwanda is subdivided into 30 districts. The geographic coverage with study sites in three provinces is representative of a range of conditions with respect to dairy production, dairy value chain development, and gender roles in dairying, as well as the annual production of milk, quality of milk, and grazing practices. There are different production systems across Rwanda: open grazing is practised in Nyagatare District, while zero-grazing is practised in Nyanza and Gicumbi Districts.

Field sites were selected based on the following criteria: (i) the importance of dairying in the community; (ii) the existence of a dairy value chain (i.e. milk production and processing); (iii) representativeness (the sites chosen were sufficiently diverse that they reflected a variety of situations with respect to culture and dairy value chain development); and (iv) lessons that could be drawn by comparing communities with differing histories of dairy value chain development.

Information to guide site selection was derived from Rwandan statistics on livestock ownership, especially on cattle (NISR, 2014) and the Integrated Household Living Conditions Survey (EICV3 survey) (NIRS 2012a, b and c). A short description of the selected sites is presented as follows. Figure 1 shows the location of the districts in which sites were selected:

Site 1. Northern Province – Gicumbi District: The EICV3 survey results (NISR 2012a) show that the total population of Gicumbi District in 2010–2011 was 572 000, i.e. 29 percent of the total population of Northern Province and 5.3 percent of the total population of Rwanda. Females comprised 52.1 percent of the population. The District is the largest recipient of Girinka⁴ cows in the Northern Province, having received 11 403 cows (Kayigema, 2014:37), and it is the highest milk-producing province, with the best quality of milk produced in terms of water content, acidity, and microbial contamination (Kayigema, 2014). Dairy farmers practise zero-grazing. The dairy value chain is developed and includes milk production and processing into butter and cheese. The District has benefitted from support from the Government and development partners including the United States Agency for International Development (USAID)/Land O'Lakes. The formal farmers' cooperatives include: *Ihuza*

Aborozi ba Kijyambere Bafatanyinje (IAKIB, Cooperative for Modern Farmers); *Bukure MCC-Cooperative d'Élevage Moderne de Bukure* (COOPEMOBU)-Rwesero; *Koperative Zamuka Mworozu* (Kozamgi)-Rutare; *Borozi Twisungane Kabuga-Nyamiyaga*, and *Giramata*. According to Land O'Lakes (2015), IAKIB is the largest cooperative in terms of membership (292 men and 392 women) and daily milk supplies (22 864 litres). The study targeted members of this cooperative together with service providers and producers in Kageyo, one of the sectors in Gicumbi District.

Site 2. Eastern Province – Nyagatare District: The estimated total population of Nyagatare District as provided by EICV3 survey results in 2010–2011 (NISR 2012b) is 424 000. This represents 16 percent of the total population of Eastern Province and 4 percent of the total population of Rwanda; women and girls comprise 50.7 percent of the population of the District (NISR, 2012). Nyagatare District has the largest number of cows of any province in Rwanda (Umworozi, 2012), but is only the second national milk producer due to its extensive farming, which does not allow milk production throughout the year (Land O'Lakes, 2015). The District's dairy value chain is developed and influenced by 14 farmer associations/MCCs and development support from the Government and partners including USAID/ Land O'Lakes. Unlike other parts of Rwanda, women and girls participate in the milking of cattle. The largest cooperative/MCC in terms of membership is Kirebe Kamate Zirakamwa with 240 men and 21 women, and an average daily milk production of 5 969 litres. The study targeted MCC and community members in its neighbourhood including service providers and producers.

Site 3. Southern Province – Nyanza District: According to data from the Population and Housing Census of 2012 (NISR, 2014), Nyanza District currently has 323 388 inhabitants, with a population density of 482 inhabitants per km². Moreover, 53.3 percent of people engaged in agricultural activities are women comprise 50.25 percent of the total population (Nyanza District, 2012). Nyanza Town and its surroundings have developed a flourishing dairy value chain with roadside sellers of milk and milk products. The area has a dairy processing plant (Nyabisindu), which started in the 1960s. Several MCCs have developed in the area with the support of the Government and other development partners including USAID/ Land O'Lakes. The study involved cooperative members who sell dairy products. According to

⁴ The One Cow per Poor Family Programme (the Girinka Programme) is discussed in detail in section 3.1.1.

FIGURE 1
Survey sites – Gicumbi, Nyagatare and Nyanza



Land O'Lakes (2015), the active farmers' cooperatives are Gwizumukamo Busoro, Nyagisozi Giramata Mworozzi, Indakemwa Mugandamure and Twiyororere Kijyambere-Muyira. Gwizumukamo Busoro is the largest in membership terms (136 men and 71 women), with an average daily milk production (744 66 litres). The Nyanza community has enjoyed a long history of cattle keeping and dairying since the district was the residence of King Mutara III Rudahigwa who ruled between 1931 and 1959. It was also the royal capital under the reign of King Yuhi V. Musinga in 1899 (Rwanda Development Board, n.d).

2.3.2 Sources of data

Literature review

A range of secondary data and information was gathered from policy documents, published reports and unpublished papers, which are listed in the References.

Key informant interviews

Key informants provided understanding on the dairy value chain in Rwanda, in general, and gender issues in dairy value chain, in particular. The key informants interviewed included representatives of international development agencies (Heifer International, Rwanda; Send a Cow, Rwanda; UN Women) and the private sector. The key private sector organizations included: large processing companies (Inyange and Masaka Farms); two major supermarkets in Kigali City (Nakumatt and Woodland); milk distributors with innovative ways (Hadji Enterprises in Nyanza and Zirakamwa); two veterinary shops in Kigali City (Agrotech and agrovet); and two minor milk sellers (Inshyushyu and/or Ikivuguto at Kimisagara and Nyabugogo in Kigali City). A complete list is provided in Annex 1.

Focus group discussions

Focus group discussions (FGDs) were held with different stakeholders involved in the dairy value chain, following a checklist survey with questions designed to engage participants in discussions.

Nine FGDs were conducted; three at each study site (see Annex 3). They involved men and women members of MCCs and other participants in the dairy value chains. Recruitment was facilitated by their leaders based on the researcher's guidelines. In Gicumbi District, an FGD for milk transporters was organized according to the members' availability at the MCC in the morning when the data collection coincided with their usual time of supplying milk at the MCC. The participants from the MCC were recruited according to gender, age, influence, wealth and category of stakeholder.

On each site, the number of participants varied from 14 to 25 in order to allow people with a range of experience to participate. The informants were familiar with the topic, share their opinions and their experiences. A total of 163 people were included in the focus groups, of whom 58 (36 percent) were women.

FGDs were moderated by the consultant. A note-taker recorded all of the participants' views on the topics discussed. The time allowed for discussions varied between one and two hours.

Individual and household interviews

A semi-structured questionnaire was developed and administered to households participating in the dairy value chain. Ten households were interviewed in Gicumbi, ten in Nyagatare, and eight in Nyanza. Households in the MCC's neighbourhood were eligible to participate if they owned at least one cow, and if there was an adult family member by the time of the researcher's visit. Questions were addressed to cattle owners. Household interviews were administered with male-headed (60 percent) and female-headed households (40 percent).

Interviews were also conducted with individuals who owned feed and drug shops, specifically from two drug shops: a woman from an agrovet shop and a man from Agrotech. Agrotech is the biggest and oldest veterinary drug shop in Rwanda with nine operational franchisees across the country, whose head office is based in Kigali City. The agrovet shop was selected because it is located in a semi-urban area with a purpose in order to compare urban and semi-urban contexts.

Field observations

Field observations were conducted in parallel with the FGDs and households interviews to triangulate data collected during which illustrative photos were taken.

2.4 DATA ANALYSIS

Data from FGDs, household interviews, observations and literature review were analysed following content analysis. The researcher highlighted major themes and sub-themes that emerged from the data and proceeded to report writing. In some cases, the narrative of the report was enhanced by verbatim reporting of participants. Quantitative data were also captured on the profitability of dairy-related enterprises and used to develop enterprise budgets using Microsoft Excel.

2.5 REPORT OUTLINE

Following the Introduction (chapter 1) and Methodology (chapter 2), chapter 3 provides the findings of this study, chapter 4, the conclusions and recommendations, and chapter 5, a checklist of gender sensitive dairy value chain development. The annexes include information on people interviewed and field visits made.

Chapter 3

Findings

3.1 DAIRY DEVELOPMENT CONTEXT

3.1.1 Economic, social, gender and institutional context

Rwanda is a landlocked country, covering an area of 26 338 km² at an altitude ranging from 1 000 m to 4 500 m above sea level. It is not endowed with vast natural resources and huge industry. It is the most densely populated country in Africa (average population density of 400 persons per km²) and its total population is estimated at 10.5 million (NIRS, 2014). At an annual growth rate of 2.3 percent, the population is expected to reach 15 million by 2020 and 20 million by 2030 (TechnoServe Rwanda, 2008).

The economy of Rwanda depends largely on agriculture, which employs over 80 percent of its population and contributes to about 33 percent of the its GDP (MINECOFIN, 2007). However, Rwanda is one of the African countries experiencing considerable demographic pressure on agricultural land: around 58 percent of households have less than 0.5 ha; family farms are continuously subdivided into increasingly smaller plots; fields are overcropped; and marginal lands (including marshlands) and pasture lands are converted to arable lands. The issue of land and farm size has, therefore, great influence on cattle production in the country (Jayne, Chamberlin and Headey, 2014).

Animal husbandry is one of the most important activities in the lives of Rwandans, and therefore finding a household owning livestock is very common. The National Census (2012) revealed that about 58 percent of households own livestock. Livestock mostly owned are poultry, cattle, goats and pigs. In Rwanda cattle keeping is rooted in the country's history. Cattle are heard in people's greetings and names. The greeting *Amashyo!* wishes the other to have cattle. Proper names *Giramata* and *Mukobwajana* mean "May you have milk", and "a hundred cows will be/were given for a dowry", respectively. Indeed, traditionally cows have represented wealth and strong

friendship. In the past, the ultimate compliment of a woman's beauty was to tell her: "Your eyes are as beautiful as those of a calf". Nowadays, the socio-economic status of people is still partially defined by the number of cattle owned. Mutamba and Izabiliza (2005) also note that cows are used to pay dowries, express condolences, compliment a new mother and to give newlyweds a strong start.

During Rwanda's 1994 genocide, many cattle were slaughtered, devastating the livelihoods of many Rwandans. In addition, cows played a significant role in peace building following the genocide:

... peace building and reconciliation efforts were clearly demonstrated in an income-generating activity known as the "Cows of Peace" project in Byumba Province. This project was initiated in 2001 by the Government of Rwanda and USAID to support vulnerable groups to acquire improved breeds of cows in order to increase incomes and livelihoods. One of the associations of this project, the Giramata Association, is made of 31 members, 19 of them being women... its membership made of widows of genocide; wives of imprisoned men suspected of having committed genocide and even demobilized soldiers... Cows have also created a healthy community environment. Since every community member is a potential beneficiary direct or indirect, everybody feels responsible for the security of the cow. Neighbours meet in the evening to talk and keep company in the home where the cow is kept. Culturally, this is a forum for sharing and building trust and solidarity and by far contributes to peace building and reconciliation (Mutamba and Izabiliza, 2005).

Rwanda has registered one of the fastest recoveries after the Tutsi genocide (1994) that claimed more than a million lives and reduced the economy to ashes. Recent demographic surveys indicate that the percentage of people living in poverty dropped by almost 12 percent from 56.7 percent in 2006 to

44.9 percent in 2011. In recent years, the service sector has gained importance relative to agriculture. The country experienced an 8.2 percent real GDP growth in 2010-2011 (NISR, 2012). The annual average inflation was at 8.3 percent for 2011 (NISR, 2012). Foreign exchange controls were liberalized and the banking system is sound and thriving (UNDP, 2012). Yet, despite recent progress, Rwanda is listed by the World Bank as a low-income economy, with a current GDP per capita in 2014 of \$695, or \$1 660 purchasing power parity (PPP) (World Bank data, 2016⁵).

An article published in the *News of Rwanda* on 21 March 2014⁶ states: “[in] the period October-December 2013, milk and cream not containing sugar brought in \$22.4 million (RWF16 billion) revenue, according to the Rwanda external trade statistics reported just released” (*News of Rwanda*, 2014). Moreover, Bingi and Tondel (2015:5) observe that, in 2013, milk contributed to 15 percent of the agricultural output and six percent of Rwanda’s GDP.

Rwanda has signed a number of international treaties and protocols that aim at promoting agricultural development to facilitate increased trade of agricultural products. Within Africa, NEPAD, of which Rwanda is a member, has called for the transformation of agriculture through its Comprehensive Africa Agriculture Development Programme (CAADP). CAADP aims to boost sustainable agricultural growth throughout the continent, and calls for a minimum commitment of 10 percent of national budgets to agricultural investment (CAADP, 2009).

NEPAD and the African Union Commission have also joined forces with the World Economic Forum to support the goals of CAADP and promote private investment in African agriculture. The new programme, *Grow Africa*, works with member countries to help build private investor interest in agriculture, address important issues, including resource management and climate change, and create a sense of shared commitment through the exchange of best practices. Rwanda is one of the first member countries to complete an investment blueprint with *Grow Africa* and offer investors a package of policy proposals (MINAGRI, 2013). Rwanda is also a member of the Common Markets for Eastern and Southern Africa (COMESA) and the East African Community (EAC), both of

which are designed to facilitate regional integration to promote economic development. EAC member states have adopted the Agriculture and Rural Development Strategy for the East African Community, and committed to the establishment of a common market (Republic of Rwanda, 2013b; Alinda and Abbott, 2012).

Domestically, Rwanda’s development strategy was woven into Vision 2020. Agriculture is among the thematic areas of Vision 2020, whose fifth pillar concerns productive high value and market-oriented agriculture. Yet Rwanda cannot focus on agriculture as a main economic activity; rather, it is necessary to create 1.4 million jobs outside agriculture to meet projected population growth (Republic of Rwanda, 2000). Indeed, the Republic of Rwanda (2012:12) notes that “the Rwandan economy has been able to generate 1.2 million non-farm jobs”.

The 2018 goals include increasing GDP per capita to \$1 000, reducing the poverty rate to below 30 percent, reducing the extreme poverty rate to below 9 percent. These goals build on significant development successes over the last decade, which include high growth, rapid poverty reduction, and since 2005, reduced inequality. Between 2001 and 2014, real GDP growth averaged about nine percent per annum. Recovering from the 2012 aid shortfall, the economy grew 7 percent in 2014, 2.3 percent higher than in 2013 (World Bank, 2015).

The Economic Development and Poverty Reduction Strategy (EDPRS 1) (2008–2012) envisaged sustainably contributing to increasing and diversifying household income while ensuring food security for all of the population. It was set to intensify and develop sustainable production systems in agriculture and animal husbandry. These include soil conservation measures, such as the construction and rehabilitation of terraces and the promotion of agro-forestry technologies for sustainable land use. During the five-year period covered by EDPRS I, economic growth averaged 8.2 percent while poverty was reduced from 56.7 percent to 44.9 percent. EDPRS II is built on lessons learned from EDPRS I and the overall Vision 2020, which highlights gender equality as a cross-cutting theme. EDPRS II also highlights family and gender as a cross-cutting theme. As such, gender budgeting applies to all government planning processes. The second priority of EDPRS II is to increase the productivity of agriculture. With this, the focus is on irrigation and land husbandry, proximity advisory services

⁵ <http://data.worldbank.org/>

⁶ <http://www.newsofrwanda.com/featured1/22770/milk-overtakes-coffee-as-rwandas-top-export-report-shows/>

for crops and livestock and connecting farmers to agribusiness (Republic of Rwanda, 2013a).

In 2013-2014, the Vision 2020 Umurenge Programme (VUP), a strategic implementation tool of EDPRS I, was implemented in 240 of the country's 416 geographical sectors, from 30 sectors when the programme was first launched in 2008. The number of poor people benefitting from the programme has grown from an estimated at between 75 000 and 180 000 in the original 30 sectors to over 630 000 beneficiaries in 216 000 households by 2014. Under the VUP, 65 percent of households that benefit from direct support through unconditional cash transfers are headed by women as well as 47 percent of households participating in public works (World Bank, 2015).

With respect to livestock, the One Cow per Poor Family Programme (the Girinka Programme), introduced in 2006, and other initiatives promoting animal resources (for example, goats, poultry, pigs) aim to increase asset ownership and promote animal husbandry among the poor. However, Girinka, as known today, dated back in the history of Rwanda as far as the kingdom of King Mibambwe Gisanura, who reigned in approximately 1660. He decreed “no Rwandan child was ever to lack daily milk again while others had plenty”. Since then, Rwandans have given cattle to one another, or milk to those in need (IFAD, 2011: 104). All beneficiaries of this programme were expected to practise zero-grazing. Since large livestock tend to be owned by individuals and not households, it was envisaged that women had to obtain the same access to this programme as men (Republic of Rwanda, 2007). Indeed, both men and women have benefitted from the programme. Baijukya, Kantengwa and Nyamwasa (2012) note that participatory training that precedes asset transfer is one of strategies that strengthens gender equity. Indeed, in a study conducted to assess the women's perceptions of Girinka in Bugesera District, it was observed that the programme promoted climate resilience among rural smallholder farmers due to its zero-grazing requirements and the resulting green manure that boosts food security. However, the expected green energy (biogas) is not easily tapped into because bio-digesters are not affordable to most women beneficiaries, yet they are the ones that carry the heavy burden for wood collection (Kayigema and Rugege, 2014).

In concert with other development initiatives, the Rwandan National Dairy Strategy (NDS) (Republic of Rwanda, 2013b) envisions both supply- and demand-side interventions. Demand for

dairy and meat products is projected to increase naturally due to increasing population, urbanization, rising disposable incomes and changes in the demographic structure of the population. In addition, the rate of natural demand is also likely to increase due to the following factors:

- a. There has been increased formalization and clean-up of the milk value chain with the introduction and dissemination of the Seal of Quality (SoQ);
- b. Generic and nutrition-related behaviour change and communication campaigns have been carried out in the past five years, which have been adopted by different partners including the Ministry of Agriculture, hence their sustainability.
- c. Government interventions and the scaling up of the One Cup of Milk per Child programme has continuously promoted the culture of drinking milk especially among school-going children;
- d. With the “last mile” milk vending counters/bars and milk zones were introduced, the price of milk has been harmonized, hence increased milk consumption and demand for quality milk and dairy products.
- e. The Girinka Programme introduced the beneficiary households to the practice of drinking milk to eliminate stunting and malnutrition as a core objective.

To create the necessary market pull to reach scale, the NDS envisions targeted marketing interventions designed to increase the consumption of milk and milk products from its present level of 40 litres per person per year to approximately 80 litres in 2020, as well as to redirect consumer demand toward processed, as opposed to raw, dairy production through promotion of its health and hygiene benefits (Republic of Rwanda, 2013b).

It is imperative to note that, given the efforts that have been devoted by different partners towards increasing milk consumption, the current consumption rate per person is estimated at 59 litres per capita (Land O'Lakes 2015-2016 Annual Survey). Indeed, the trend is expected to increase with the introduction of new processors such as Burera Dairy limited (BDL) and as a result of the ongoing soap opera by the Radio Media Urunana on behaviour change in milk consumption.

Moreover, there are untapped opportunities for Rwanda's dairy products in regional markets. The regional population of the neighbouring countries is over 150 million people and the middle-class

segment is growing with greater amounts of discretionary income. High rates of urbanization are enlarging the middle class, who will purchase dairy products. Five key urban areas of Bujumbura (Burundi), Bukavu and Goma (Democratic Republic of the Congo), Kampala (Uganda) and Mwanza (United Republic of Tanzania) have middle-class consumers who could purchase Rwandan dairy products over the next five years. The markets offering immediate opportunities are Uganda, Burundi and the Democratic Republic of the Congo.

Branded Rwandan dairy products are cost-competitive. Rwanda has embarked on ensuring that Rwandan products are of high quality, which has been and will continue to be reinforced through implementation of the quality and testing elements of the SoQ programme, combined with marketing efforts to promote the SoQ (Republic of Rwanda, 2013b).

On the supply side, the NDS envisions assisting the domestic industry to expand the number of improved cross-breed dairy cows that are more productive than local Ankole cattle, and the former have to be better fed and differently managed (Republic of Rwanda, 2013b). The Republic of Rwanda (2013b) maintains that building on the Government's efforts to develop milk collection infrastructure and the cold chain, producers would have to become more market-oriented and focus more on commercialization, selling through their milk cooperatives.

Dairy product diversification (value addition) would also help absorb additional volumes of milk produced. Promotional campaigns should continue to stimulate consumer interest in what may be new product lines for many Rwandan consumers. Given the current efforts by processors to improve quality of the products, presentation (packaging, accessibility and availability of products taking account all economic levels of the users. As a result, the domestic demand and processing volumes will grow and the cost of milk production is expected to fall, enabling processors to better tap into and regional export markets.

Gender context

Many studies have recognized the role of women in agriculture in the developing world (Sraboni *et al.*, 2014) including tending animals (Deere, Alvarado and Twyman, 2010). Studies have also underscored lack of recognition of women as key contributors to food security (Enete and Amusa, 2010).

Rwanda has put in place different institutions that directly and indirectly influence dairy sector

and dairy value chains, some of which are annually audited by the Gender Monitoring Office, which includes the Rwanda Cooperative Agency (RCA). Its mission is "to develop the cooperative sector such as it serves its members equitably, efficiently and empowers them economically" (Rwanda Cooperative Agency, n.d). As such, all MCCs (since they are cooperatives) are or should be directly influenced by RCA's interventions including capacity building and supervision.

NEPAD has formed a working group on gender that is tasked with ensuring that poverty reduction strategies take into account the specific needs of poor women. NEPAD prioritizes gender equality as one of several cross-cutting issues central to its work to enhance women's rights in Africa. Its focus is on mainstreaming gender throughout its programmes. Rwanda adopted the framework of the CAADP into its own National Agricultural Transformation Strategy – Strategic Plan for Agriculture Transformation (PSTA) (Twesigye-Bakwatsa, 2010).

Efforts and strategies have been put in place to bring about gender equality and equity in Rwanda. The Rwandan Constitution, amended in 2015, spearheads the legal framework for gender equality and equity. It provides for higher levels of representation to previously marginalized groups such as women, youth and people with disabilities.

This constitutional framework provides quotas for women in Government, which have resulted in an unprecedented number of women being elected or appointed to decision-making positions at all levels. The Constitution underpins the principles of gender equality and the elimination of all forms of discrimination against women, and provides a very strong platform for gender mainstreaming in the Rwandan legislation. At present, the participation of women at all levels of governance in Rwanda has yielded tremendous results, and women are increasingly visible in the political arena. It further provides that women will have at least 30 percent of chairs in decision-making instances. According to the Inter-Parliamentary Union (2015), Rwanda continues to lead the world in terms of number of women in Parliament, with 63.8 percent in the Lower Chamber.

Vision 2020 inspired by the Constitution highlights six pillars that guide the long-term development of the country. Gender equality is also highlighted as a cross-cutting area of Vision 2020. As such various policies ensure that different needs of men and women, boys and girls are addressed accordingly. The Agriculture Gender Strategy

(2010) provides guidance to the Ministry of Agriculture and Animal Resources (MINAGRI), its agencies and development partners to be gender-sensitive in their programming and interventions in order to sustainably transform the agriculture sector (MINAGRI, 2010). The Strategy identifies gender gaps in the agriculture sector, which are manifested by limited accountability on gender equality at the policy, social, and religious levels, and in existing institutional structures and operational modalities. In terms of limited accountability on gender equality at the policy level, it was noted that a specific gender and agriculture indicator was not taken into account in the drafting of the second Economic Development and Poverty Reduction Strategy (EDPRS 2) (MINAGRI, 2010).

Despite the political will of Rwanda's leadership towards gender equality, social behaviours and attitudes towards women remain patriarchal. In the patriarchal system, women are expected to maintain a deferential position to men throughout their lives. In some instances, women do not participate equally with men in decision-making processes. In some regions of the customary law takes priority in regulating relationships between men and women in different communities (MINAGRI, 2010).

Although the Rwandan culture predetermines men as heads of households, the Government of Rwanda has enacted laws that give equal opportunity to both women and men, such as the Land Law (50 percent ownership for each) and matrimonial/customary laws, which provide for equal rights for women and men to have access and control over family resources.

The institutional framework for promoting gender equity and equality ranges from central to decentralized entities. The Ministry of Gender and Family Promotion (MIGEPROF) is the most central institution spearheading gender equity and equality. Its role includes: (i) ensuring that gender is mainstreamed at different levels of programming that is designing, implementation, monitoring and evaluation; (ii) formulating policies, programmes and strategies to promote gender, family and children's welfare; (iii) coordinating implementation, monitoring and assessment of policies, programmes and strategies aimed to promote women, family and children's welfare; and (iv) mobilizing and coordinating resources to promote gender, children's rights and family (MIGEPROF, 2010:32). The Ministry ensures gender equality through different programmes focusing on water and sanitation, infrastructure,

private sector, environment protection, land use, employment, health and population, good governance and skills development, among others (MIGEPROF, 2010: 25-30).

The guiding gender policy's mission statement is "to contribute to the elimination of gender inequalities in all sectors of national life, in order to achieve the nation's goal for sustainable development" (MIGEPROF, 2010:19). One of the programmes suggested by the policy refers to economic empowerment for employment, growth and markets. This includes food security, supply chain transformation for local and export markets, microfinance and finance adapted to agricultural transformation, and economic empowerment for rural women (*ibid*:23). The policy also highlights environment protection, land use management and social protection (*ibid*:25).

From the policy, mechanisms were put in place and include the National Women's Council, the Beijing Permanent Secretariat, the Gender Observatory, and the Forum for Rwandan Women Parliamentarians, among others. Based on the June 2003 Constitution, the National Women's Council (NWC) was given the mandate to mobilize women and to identify their needs and their constraints, which have to be taken into consideration in development processes (EAC, 2009).

The Beijing Secretariat deals with the monitoring of the implementation of the Beijing Platform for Action. The Secretariat serves under the National Coordinating Committee that is headed by the Minister in the Prime Minister's office in charge of gender and family promotion. The Forum for Rwandan Women Parliamentarians is another mechanism that was established under the initiative of women's parliamentarians. Its mission is to promote gender equality and contribute to capacity building for women in decision-making. It is mostly involved in laws and budget. The Gender Observatory as a mechanism for monitoring the implementation of gender-sensitive indicators and gives recommendations for gender mainstreaming to various bodies as provided for in the Constitution under Article 185. It has the mandate to hold the various actors at public, private sector, civil society and donor community levels accountable for issues regarding gender.

Human rights organizations are also part of the mechanisms that the Government of Rwanda is encouraging, most of which are grouped into two main umbrella associations: Collectif des Ligues et Association de Défense des Droits de l'Homme au Rwanda (CLADHO, Collective of

Leagues and Organizations for the Defense of Human Rights in Rwanda) and Pro-Femmes / Twese Hamwe. CLADHO specializes in legal matters, while Pro-Femmes/Twese Hamwe deals with the promotion of women's rights in general. Pro-Femmes/Twese Hamwe has played a very important advocacy role in ensuring that gender is mainstreamed in the Constitution and in the legal reforms aimed at promoting gender equality.

The Republic of Rwanda has achieved nearly all Millennium Development Goals (MDGs). Rwanda has also incorporated many of the targets of the Sustainable Development Goals (SDGs) into policies and strategies including the Economic Development and Poverty Reduction Strategy 2 (2013-2018) and Vision 2020 (UNDP, 2015). It has also signed the Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) and has adopted the principle of gender equality into its Constitution, which sets quotas requiring the inclusion of women in decision-making positions, and also empowers it to promote gender equality. This has translated into positive changes in food security and rural development (Randell and McCloskey, 2014). Moreover, UNDP's Human Development Report (2014) commended Rwanda as the country where women's participation is proportionate or higher than the actual number of the female population (UNDP, 2014). Indeed, according to the 2014 Global Gender Gap Index, Rwanda ranks 7th and is performing better than many developed countries including Switzerland (11th), Germany (12th), and USA (20th). However, the UNDP's Gender Inequality Index for 2013⁷ places Rwanda at the 151st position with 0.410 score, while Switzerland ranks 3rd (0.030), Germany, 6th (0.046) and the United States of America, 5th (0.262). The scores for two different indices suggest that while the policy framework and women's involvement in the different spheres of the country provide opportunities for women, greater efforts need to be made in order to achieve gender equality.

Although data on men's and women's roles in agriculture, especially in the dairy sector, are not readily available, they were defined by traditional gender roles in the *Kinyarwanda*⁸ tales and history. Men and boys would milk and look after

cattle in extensive farming systems. Rural women would instead take care of the milk and process it into butter. Milk and milk products were essentially controlled by women who would sell them in a barter trade system to acquire other goods needed for domestic consumption.

Also, the role of women in relation to livestock depended on their social class. Women from rich households tended to maintain personal property, such as cows, which could be used to acquire friends and loyal, grateful servants. However, the post-genocide social context changed roles and responsibilities, with many women and children who had to take over the role of head of household (Uwineza and Pearson, 2009:9). "Women were forced to adopt new roles and assume "male" responsibilities, such as building houses, speaking in public or milking cows". Mutamba and Izabiliza (2005) clarify that many war widows and other single women had to undertake the heavy work of caring for families alone, taking in orphans and assuming duties traditionally carried out by men. Kabirigi *et al.* (2015) further highlight that rural women worked almost all the time without rest, taking part in all forms of activity. In addition, some types of work were exclusively reserved for women. However, this situation may not always be the same for all women. Land O'Lakes (2014) suggests that patriarchal cultural influence is weaker in female-headed households, especially those headed by widows, while it is stronger among women living with husbands.

3.1.2 The history of dairy development

Historical trends

For centuries, the cow has been considered a symbol of prosperity in Rwanda and provided a means of exchange before the colonization era. A rural technology evolved that permitted the manufacture of traditional fermented milk (*Ikivuguto*), traditional butter (*Ikimuri*) using a traditional churner (*Igisabo*) and buttermilk. As a rule, herbivorous, multipurpose animals were chosen to satisfy the need of milk, meat and clothing (Nzabuheraheza, 2005).

A whole chain of social relationships across the country has been built on and around cattle for generations, which continues today. The 20th century, however, saw a dramatic shift in the social understanding of what it meant to own cattle in Rwanda. Before colonization, there was little distinction between cattle keepers and those who farmed the land. Herders and farmers often worked together to achieve greater agricultural production.

⁷ The Gender Inequality Index: <http://hdr.undp.org/en/content/gender-inequality-index>.

⁸ *Kinyarwanda* is one of the three official languages of Rwanda (along with English and French), and is spoken by almost all of the native population.

These activities were dominated by men, since women's ownership and inheritance of land was prohibited (Debusscher and Ansoms, 2013).

During that time, while owning cattle was associated with being well-off, herders and farmers faced the challenges of drought, poor soil fertility and the country's topography. The arrival of colonization, however, brought a change in the social status of owning cattle and in cultural practices. The cow was used to divide Rwandans along ethnic lines; cattle became a symbol of elitism and a commodity reserved only for a section of the country's people. This distorted meaning was promoted by successive post-colonial governments as part of divisive and ethnic-based policies. However, during the colonial rule, the status of women remained almost the same.

The 1994 genocide against the Tutsi saw 90 per cent of the country's cattle killed. While significant progress had been made since the genocide in improving the livelihoods of its people, Rwanda continued to face high levels of poverty and childhood malnutrition. It was in 2006, with these indicators in mind, that the Girinka Programme was started. Kayigema and Rugege (2014) highlight that Girinka was initiated to pursue a threefold goal: (i) to contribute towards poverty reduction; (ii) to reduce child malnutrition; and (iii) to promote climate resilience among poor rural families. Under the programme, every family whose local community confirms that it meets the national criteria of being poor receives one dairy cow. However, the Girinka Programme is not a new concept. MINAGRI (2009) indicates that it was inspired from Rwandan culture whereby friends passed cattle to friends in a sign of gratitude. Similarly, very poor families receive a dairy cow free of charge. When that cow calves, the calf is given to a neighbour, and so on (MINAGRI, 2009). Since the launch of Girinka, major reform in dairy sector in Rwanda included the use of AI services, introduction of MCCs, privatization of veterinary clinical services, and the zero-grazing system across the country.

The zero-grazing system was introduced by the Government of Rwanda and henceforth farmers were obliged to construct sheds and feed the animals in the homestead. This has brought about major changes in gender roles. Before zero-grazing, men and boys were in charge of grazing and milking cattle. With the new system, the cleaning of the cowshed, the spraying of the animals, as well as routine de-worming and treatment have also become male activities, and women are also

responsible for cutting and ferrying fodder from the farm to feed the animals and fetch enough water both for the household members and animal needs. Currently, women in households with two or three cows are overburdened. Field evidence collected through FGDs for this assessment highlights that at times, women do almost all of the work related to animal watering, feeding and milking, especially when the male head of household has a job away from home.

Recent development

As highlighted above, there are a number of policies and strategies aimed at improving dairy production and dairy value chains in Rwanda. Vision 2020 highlights productive and market-oriented agriculture as one of its pillars. EDPRS 2 highlights agriculture as one of areas that will contribute to rural development and food security.

The Agriculture Gender Strategy (2010) addresses agriculture in the light of issues affecting men and women differently (MINAGRI, 2010). First, most farm families in Rwanda have small fields, and land fragmentation is common, limiting agriculture transformation and gender equality opportunities. In some cases, conflicts arise due to competition between cash and food crops, which becomes a gender issue because food crops are attended to and managed by women while men are heavily involved in cash crops. Since land is by large controlled by men, cash crops tend to be allocated more land. Women have to struggle to provide family food and income needs from the small quantity of food crops that they harvest. Second, when there are training opportunities, men are more likely to attend because they are the ones who receive information on opportunities and who, in many cases, do not share it with women. If men inform female members of the household about training opportunities, women farmers may and often do offer to stay at home to carry out the reproductive activities, caring for the sick, performing routine household chores, and community care. Thus, there is need for engendering the capacity-building efforts in the crop intensification programme (MINAGRI, 2010).

Moreover, despite positive changes in livestock value chain development, in general, there are some gender disparities in the livestock sector, and specifically, in the implementation of the One Cow per Poor Family Programme. Control of dairy cattle as an asset and access to income from dairy production are affected by gender and loca-

tion within the country. These issues are discussed in section 3.2.

The Rwanda National Dairy Strategy (2013) was developed, and gender is among its guiding principles. The strategy highlights that the Government of Rwanda will support both formal and informal milk channels with the long-term goal of moving actors in milk and dairy value chains from the informal to the formal market. Pilot tests will be undertaken to create small businesses and support leadership among women's groups, youth and farmers to enhance the marketing (feed, concentrates, mineral blocks, etc.) and retailing of dairy products in urban areas. It further highlights that dairy production needs to adapt to the landscape, livestock and people (men and women) of Rwanda (p.7). Women were also targeted in human resources development as one of a possible outcome (p. 18). Women and children are also targeted by the Ministry of Health's (MINISANTE) comprehensive dairy nutrition education (p. 25). It emphasizes that at least 30 percent of the new businesses will be women-owned (p.27). However, gender access gaps identified by the Agriculture Gender Strategy (2010) are not clearly addressed in terms of: access to and control over productive resources by women, men and poor households; workload impacts on women and girls; the livestock value chain; marketing; extension services; access to finance; and gender gaps in institutional arrangements (MINAGRI, 2010).

The NDS predicts a surplus in milk by 2017 and beyond based mainly on the number of improved dairy cattle. The national herd is expected to expand to 1.67 million cattle in 2017 and 1.92 million in 2020. A dairy sector without an NDS would see a production of 650 000 000 litres, thus creating a surplus of 100 000 000 litres of milk in 2017 according to a projected population growth rate of 2.75 percent. Milk production grew by 89 percent between 2010 and 2015. In his report to the Parliament, the Prime Minister revealed that milk production increased from 372 619 tonnes in 2010 to 706 030 tonnes in 2015 (Hitimana, 2015). The surplus is projected to increase to 200 000 000 litres in 2020. It is considered critical that the market, both informal and formal, absorb and monetize this production in order to drive the economic incentives that can pull the dairy industry to a scale sufficient to make it more cost-competitive domestically and regionally. Without market incentives and profitability at the producer level, farmers may cut back on feeding their dairy animals, may choose not to milk their cows (even-

ing milking), or may sell their dairy cattle for slaughter because milk cannot be sold. The potential for milk production at scale and the economic promise of the dairy sector will be lost (Republic of Rwanda, 2013b).

As mentioned, the goal of the NDS is to double milk consumption to 80 litres per person per year in 2020 matching the goal of Rwanda becoming a middle-income country. Based on population growth estimates, 1 161 million litres of milk will be required in 2020 (Republic of Rwanda, 2013b). Ntirugurirwa (2014) recorded that the annual average consumption was 50 litres as opposed to the 170 litres recommended by FAO. It is indicated that milk production will have to increase 13 percent per year to meet this target. At the same time, milk intake by current consumers will have to increase and by non-consumers to start drinking milk (Republic of Rwanda, 2013b). For the Government to achieve the NDS goals for production and consumption, whether at the time envisaged or at a later date, it will be necessary to promote and invest in further development of commercially oriented, zero-grazed dairy herds, supplying formal dairy value chains. The implications of such changes in the dairy sector for smallholder dairy farmers and gender inequalities are explored below.

3.2 BENEFITS AND CONSTRAINTS ALONG THE VALUE CHAIN

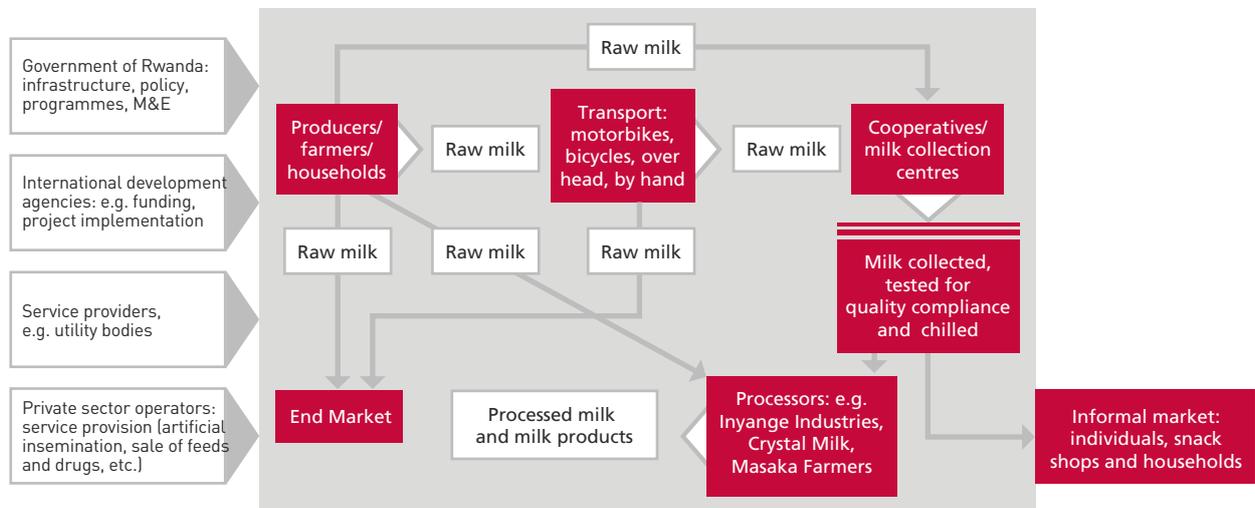
3.2.1 Value chain structure

Overview of chain structure and markets

The generic structure of the Rwandan dairy value chain is shown in Figure 2. The following sections describe value chains at the study sites and discuss each node of the chain. There are two channels for milk marketing, the informal and the formal. The formal channel is distinguished by the passage of milk through collection centres and processors and the quality-testing of milk (water content, bacterial content and acidity) before it is sold to consumers. However, the Government resolve to ensure that all milk for sale passes through an MCC may have considerable implications for the shape of dairy value chains in Rwanda in the future. Ministerial Order N° 001/11.30 of 10/02/2016 regulating the collection, transportation and selling of milk was passed with the aim to ensure order, fair competition and a reduction of health risks associated with poor quality milk.

Milk that flows throughout Nyagatare District's value chain (Figure 3) mainly comes from local open grazing farms, although some farms are currently adopting zero grazing as per the

FIGURE 2
The generic dairy value chain in Rwanda



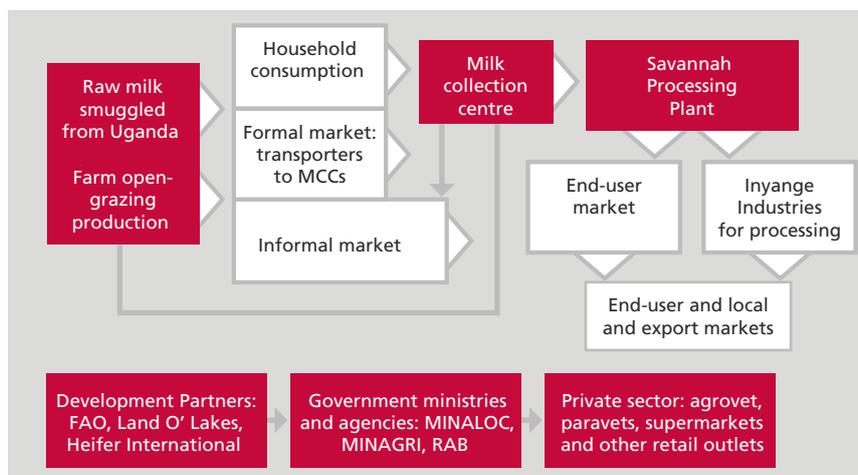
Source: Results of present study, 2015.

Government’s requirement for increased milk production, soil conservation and improved farm management. Nyagatare produces approximately 35 000 litres daily (Nyagatare Dairy Farmers’ Union), of which 85 percent is sold to MCCs through transporters who use their best available transportation means, such as motorcycles and bicycles, and even hand-deliver milk if they live in the MCCs in the neighbourhood where the

processing plant, Savannah Processing Plant, collects it (Republic of Rwanda, 2016). A quantity of milk for household consumption is decided by family members, especially parents; another portion, 15 percent, may be sold to neighbours and to informal milk traders.

In all MCCs in Nyagatare, milk is tested for quality compliance. The milk that fails to meet the standards is not accepted; it is given back to

FIGURE 3
The dairy value chain in Nyagatare



Note: MINALOC=Ministry of Local Government; MINAGRI=Ministry of Agriculture and Animal Resources; RAB=Rwanda Agriculture Board; MCC=milk collection centre.

Source: Results of present study, 2015.

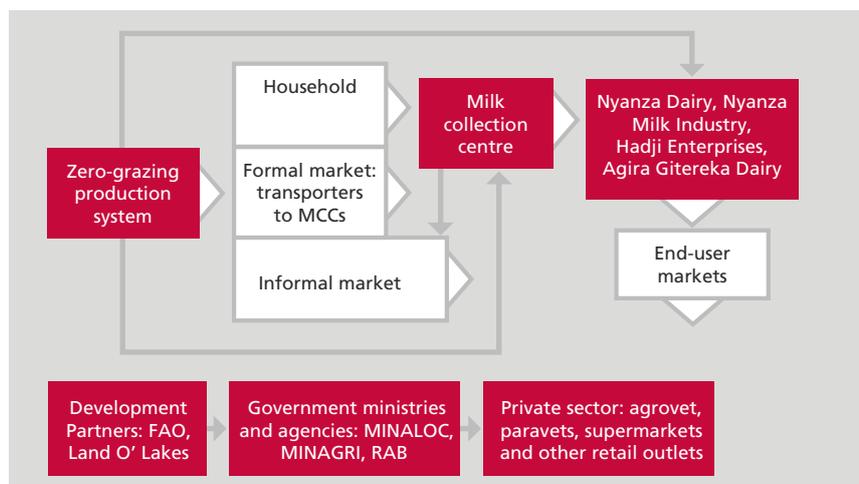
the supplier (farmers or milk transporters) who reportedly feed it back into the informal market. Efforts have been made, however, by the partners and the Government in enacting the Ministerial instructions guiding the disposal of rejected and non-compliant milk and milk products. The milk that meets standards is chilled in the cooling tanks available at MCCs, awaiting shipment by the Savannah Processing Plant to its head office in Nyagatare Town. The cooling trucks of Savannah/Inyange come to MCCs to collect milk. In low milk production seasons, all raw milk is processed at Savannah. The milk and milk products they processed are supplied locally and to Kigali. In high production seasons, some excess raw milk is shipped to Kigali at Inyange Industries head office for processing. Inyange dairy products are sold locally through privately run 'milk zones' and supermarkets. While milk zones are exclusively for Inyange Industries products, supermarkets purchase from all willing suppliers locally, regionally and even internationally. A host of actors directly or indirectly influences the Nyagatare milk value chain.

Nyanza District has the highest number of MCCs in the southern part of Rwanda. Processors and value addition cottage businesses collect milk from the MCCs, for example, Nyanza Zirakamwa Meza Dairy and Haji Enterprise. Other MCCs test and collect milk for delivery to Nyanza Dairy. Milk transporters also collect milk from the MCC

to supply the major traders. Farmers practise zero-grazing, keeping cattle in their home yards where they are fed. As in Nyagatare, a quantity of milk for household consumption is decided on by family members, especially parents; another portion may be sold to neighbours/informal milk traders. The remaining portion is supplied to the MCCs through transporters who use their best available means of transport, especially bicycles, and even carry milk by hand when they live close to MCCs. With the exception of the Nyanza Dairy, which is supplied with milk from a few individual cooperatives/producers, all of the other processors collect milk from MCCs and aggregation points using their own means of transportation. As in Nyagatare, the milk is tested at the MCC and only the milk that meets standards is accepted and its quantity is recorded with the supplier's name in order to facilitate future payment records. The milk that does not qualify is not accepted; suppliers, farmers and transporters bring it to informal traders, especially in snacks and milk kiosks. Efforts have been made by the partners and the Government to enact the Ministerial guidelines on the disposal of rejected and non-compliant milk and milk products. The aim is to immediately dispose any milk at the MCC that fails to meet the quality test in order to ensure the consumers' safety.

Nyanza milk shed is also unusual in that some processors integrate backward by owning cattle. For example, MINAGRI (2016) indicates that

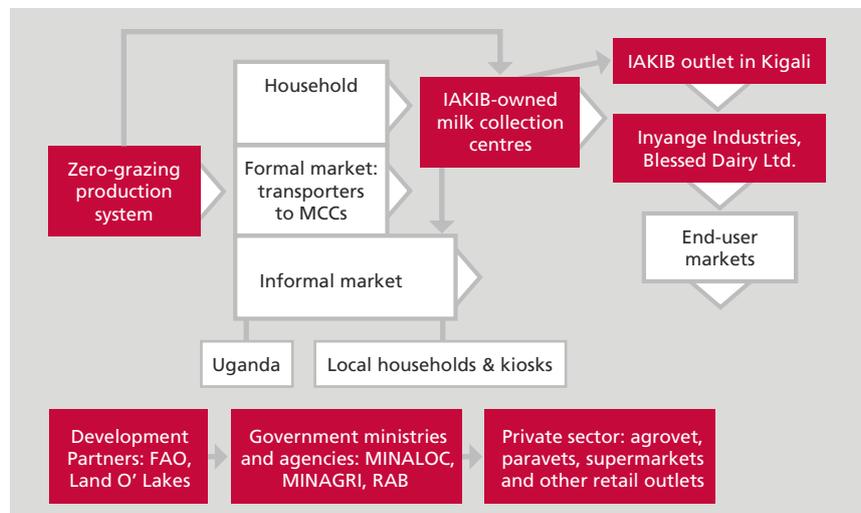
FIGURE 4
The dairy value chain in Nyanza



Note: MINALOC=Ministry of Local Government; MINAGRI=Ministry of Agriculture and Animal Resources; RAB=Rwanda Agriculture Board; MCC=milk collection centre.

Source: Results of the present study, 2015.

FIGURE 5
The dairy value chain in Gicumbi



Note: IAKIB=Cooperative for Modern Farmers; MINALOC=Ministry of Local Government; MINAGRI=Ministry of Agriculture and Animal Resources; RAB=Rwanda Agriculture Board; MCC=milk collection centre.

Source: Results of present study, 2015.

the Nyanza Milk Industries has 289 cows, which produce about 800 litres per day: its processing capacity is 4 000 litres per day.

The practice of Hajji Enterprises is worth noting. They obtain raw milk in two ways. The first consists of going to milk collection points. Depending on the location, a site has been agreed between Hadji Enterprise's milk collectors where they meet at a fixed hour in the morning, every day except Saturday (as this region is inhabited by many adherents to the 7th day Adventist Church). At the site, milk is tested by the enterprise's personnel. The second option is for farmers to transport their milk to the enterprise's head office. This is a promising option for farmers who live in the nearby neighbourhood. In either case, milk is boiled using fire wood. This enterprise consumes a considerable amount of wood every day, which may not be environmentally sustainable in the long term. Milk is sold at the Enterprise after transformation into mainly fermented milk by a designated personnel. Three destinations of their products are: (i) Hadji Enterprises' restaurant; (ii) Kigali, through sellers by the road who supply to taxis; and (iii) Bujumbura, through by-the-road sellers who supply to taxis. Following the political crisis in Burundi, the Bujumbura market has been slowing down.

In an attempt to modernize and formalize the milk processing business, some processors

such as Zirakamwa Meza Nyanza Dairy (owned by a female entrepreneur) have won recognition from different stakeholders, including the Rwanda Standards Bureau that awarded the plant with the Hazard Analysis Critical Control Point (HACCP) certificate. The USAID Rwanda Dairy Competitiveness Program (RDCP II) awarded the entrepreneur with SoQ kits and training, as well as other dairy equipment to motivate her and mitigate the risk of investment.

Figure 5 depicts the dairy value chain in Gicumbi District. This District supplies 22 000 litres of milk to Inyange Industries every day through Blessed Dairies, one of the biggest milk transporters in the country, and 4 000 litres are sold daily to Crystal Industries (UMWOROZI, 2015b). Cattle keeping is a relatively new economic activity in that part of the Northern Province. Its size has become considerable since the start of Girinka Programme. The milk that flows from Gicumbi is produced in a zero-grazing system. Milk is partly consumed at home, shared with neighbours or friends, supplied to the MCC, or sold to informal hawkers.

The formal channel targets the MCCs, which screen milk for quality compliance. Once milk meets the standards, it is supplied to Inyange Industries through Blessed Dairies, and the dairy farming cooperative (IAKIB)'s outlet in Kigali city. This Cooperative experiences systematic milk surpluses based on an estimated daily milk

production of 65 000 litres (Nkurunziza, 2016), which could represent untapped opportunities for expansion of the business. Blessed Dairies processes milk and sells it to end-user wholesale or retail markets. IAKIB owns milk bars that sell fresh and fermented milk (*ikivuguto*) mainly to increase milk consumption to eliminate malnutrition and market for their surplus.

The informal channel, in contrast, targets local and city consumers through vending milk bars, kiosks and restaurants.

While some farmers can directly supply milk to MCCs, the milk transportation in Gicumbi District is advanced in such a way that the milk collectors' association efficiently collects and ships milk to MCCs using motorcycles and bicycles. They collect milk from different sites that trucks cannot reach because of poor road infrastructure.

Production

This subsection discusses production systems and the roles of men and women in dairy production. Dairy production in Rwanda is carried out mostly by farm households, with little influence of large-scale commercial production. Rwanda has primary milk sheds, each with unique characteristics requiring selective interventions on feed, water, breeds and management. Production systems vary by milk sheds and can be either extensive (e.g. in Nyagatare) or intensive (e.g. zero-grazing in Gicumbi and Nyanza). Small-holder farmers generally own few cattle, although

open-grazing farmers tend to keep more cattle than those practicing zero-grazing. Table 1 shows the herd sizes of farmers interviewed, the majority of which (35.7 percent have less than five cows) and all of which are located in Nyagatare where open grazing is practised.

According to farmers who participated in this assessment, sources of cattle and breeds varied. Table 2 shows that 54 percent of farmers interviewed inherited cows from their parents, 7 percent were gifts from friends, 18 percent were donated through NGOs, the Girinka Programme, while 21 percent purchased the cows. Cross-breed and pure Friesian cattle made up 75 percent of the total (Table 3).

Key informant interviews indicated that “[f]rom Rwandan culture, the participation of women and men is necessary for quality milk”. However, evidence for this assessment provided by key informants suggests that men tend to be more knowledgeable about animal health than women and are the ones who are responsible for purchasing drugs and vaccinating the animals. Initially, men were targeted for animal husbandry training; i.e. when a household was invited for a training, it was implicit that it would be the husband unless a household was headed by a woman. Trainers then realized that inviting both wife and husband, there would be greater potential in sustaining animal husbandry.

Men and boys take care of stall construction, maintenance, and grazing and milking the cows.

TABLE 1
Number of cows per household

Number of cows	Frequency	%
Less than 5	10	35.7
Between 5 and 11	5	17.9
Arba Minch Zuria/SNNPR	4	14.3

Source: Results of present study, 2015.

TABLE 2
Source of cattle

Source	Frequency	%
From parents	15	54
From friends	2	7
Non-governmental organizations /Girinka Programme	5	18
Purchased	6	21
TOTAL	21	100

Source: Results of present study, 2015.

TABLE 3
Cattle breeds

Breed	Frequency	%
Ankole	7	25
Cross-breed	13	46
Friesian	8	29
TOTAL	28	100

Source: Results of present study, 2015.

However, the increasingly gendered extension work is encouraging women to milk cows since the improved breeds that are profitable have to be milked at regular times for higher yields. Women are normally in charge of cleaning stalls and milk cans, and the household's milk storage. At this level, milk is apportioned. The wife is usually the one who decides in each household on how much milk remains at home for drinking and ghee processing, and how much can be sold to neighbours, as well as what portion goes to the MCCs. Women were reported to be in charge of serving milk from their houses to family members and visitors.

Field evidence also highlights that roles of men and women, boys and girls vary according to the type of farming. Their roles in extensive farming and zero-grazing vary considerably. In extensive farming such as Nyagatare in Eastern Province, farmers depend on communal water dams, which often dry up during dry seasons, and water is far from home and cattle may walk between 10 and 20 km to find water, men are considerably more involved in physical activities than women are.

In communities where zero-grazing is practised such as Nyanza and Gicumbi, they tend to keep few cattle. Although gender roles exist for care of cattle, they may not be strictly followed, and can vary even within a district. Cows are often kept in stalls in the household yard. Whoever is at home assumes the responsibility of finding forage from the farm. Forage is often planted along anti-erosive terraces. Some households with more land keep some plots for forage farming. Farmed forage includes Napier grass, Calliandra, Mucuna and Lablab. Some communities such as Nyanza may collect natural grass that is available in Mwogo and Akanyaru marshlands. Fodder is collected by both men or women, especially in the dry season.

It is also worth noting that in zero-grazing communities, some most progressive farmers have started buying and using food supplements such as Rice bran, corn bran, molasses and mineral blocks.

Milk collection

Efficient collection of milk is a critical link between producers and processors if the dairy sector is to be competitive. Informal marketing channels handle approximately 82 percent of all the milk marketed, with 18 percent sold through MCCs to processors (Livestock Infrastructure Support Project /MINAGRI). Recent survey by MINAGRI indicates that there are 106 MCCs in the country, although some of them are not properly functioning, due mainly to poor planning and mismanagement. The location, size and operation of MCCs have been designed to the needs of producers to rapidly collect their milk (morning and evening) and convey it to bulk chilling for transporting to processors.

Farmers, mostly men, bring family milk to the village collection point, where milk is collected by individual peddlers (carrying milk on bicycles) for transportation and sale to the MCCs, to or other retail markets including restaurants and hotels. Milk is mostly carried in plastic or metal cans. Peddlers play a crucial role in consolidating the milk supply, especially in the regions where farms are scattered and production is fragmented. The dairy value chain is important to all the operators in the value chain who make a living from linking different points of the value chain (Development and Management Solutions, 2009). Here, it is also worth noting some processors have invested in raw milk transportation, hence pick up the milk from the MCCs using own means—insulated tankers or stainless steel milk cans loaded onto trucks.

The transportation of the milk to the MCCs by collectors is dominated by men, although some women participate. Women's exclusion seems to be related to bicycle transportation. In the places visited for the survey, some women overcame this limitation by buying bicycles and using hired labourers to supply milk to MCCs.

Distance has been highlighted as a major constraint in all sites involved in this assessment. Milk may travel 15 km to 20 km from the farm to the MCC, which has a negative effect on milk. The

rule of thumb has been that it should not take more than two hours before the milk reaches the MCC coolers. Exceeding two hours increases the risk of bacterial contamination. In this case, milk will not be accepted and the transporter will lose income; hence the need to use cooler tanks to keep the milk cool before transportation to markets or to processing plants.

The use of plastic cans or buckets has been observed in some places, such as Gicumbi and Nyanza. Efforts by partners have raised awareness of risks associated with these containers. In some cases, development partners have invested in providing small grants for milk stainless cans to MCCs; in other cases, stainless steel cans have been brought at MCCs. A farmer who lacks the funds to pay right away takes it on check-off payment and pays back through milk sales.

Some untapped opportunities are available at the transportation level. The model of milk collection and transportation is developed in Nyanza and, more so in Gicumbi, where individuals have developed a viable business. Transporters in Gicumbi are an informal robust body.

In Nyagatare, milk is sometimes collected by a neighbour with transportation means; transporters are not professionals. In Nyanza and Nyagatare, transporters may find it helpful to simulate the example of Gicumbi, while Gicumbi transporters may find it helpful to either join the cooperative to which they supply milk, or form their own cooperative of milk transporters. This would increase the benefits associated with formal cooperatives. Such benefits include legal protection for members, increased negotiation power, and increased financial returns.

MCCs are farmers' cooperatives. Women and men are members of dairy cooperatives, although most members are men. Table 4 provides gender-disaggregated data on members of some MCCs surveyed.

Table 4 shows a range of 13 to 54 percent of women members in the nine cooperatives included in the study. In Nyagatare District, all 16 members of the MCC are chairpersons, of whom only two are women. Also, women are less often found in cooperative management boards and tend to occupy positions that reflect traditional gender roles such as secretary.

All membership requests are granted according to the cooperatives' principle of openness. However, this is conditional on being able to pay the membership fee. This is determined by each cooperative according to assets accumulated. Interviews with farmers did not indicate that this may affect men and women differently because the ability to pay the membership fee is influenced by household-specific factors rather than gender factors. Also, it should be noted that men and women in a given household are members of a cooperative. In such a case, the household head is a representative, often a man. Where women are explicitly members, it means they are widows or single mothers who live outside their parents' roof.

It costs RWF300 000 to join IAKIB but only RWF15 000 to join Kamate Dairy Marketing Cooperative. The reason for IAKIB's high membership fee may be that, in addition to dairy farming, it has invested in a maize milling facility and also produces mineral blocks for its cows. The cooperative also has vehicles to ship milk to Kigali. With such a milling facility, it sells maize

TABLE 4
Milk collection centre membership, disaggregated by sex

	Men	Percentage	Women	Percentage	Total
01 Rwimiyaga	210	85	37	15	247
02 Kamate Dairy Cooperative	102	70	45	30	147
03 Bweya Cyensosos Rwempasha Kazaza (BCRK)	128	80	32	20	160
04 Gwizumukamo	168	80	42	20	210
05 Giramata Mworozzi	122	76	38	24	160
06 IAKIB	312	46	372	54	684
07 Kirebe	210	85	37	15	247
08 Agira Gitereka (Nyanza)	1035	67	518	33	1553
09 MCC Union Nyagatare	14	88	2	13	16

Source: Results of the present study, 2015.

flour while residues are marketed as feeds. Products are available at MCCs and cooperatives for members to consume for a loan to be paid back from milk sales.

Belonging to a cooperative yields different benefits. The first is providing the market for one's milk production, although milk is collected from every farmer regardless of their status. Second, MCCs have a social capital and negotiation role in the community. Members not only socialize, but also delegate cooperative leadership to negotiate or represent them to different stakeholders. The other benefit is access to MCC services including loans for veterinary products as well as saving opportunities. IAKIB, for instance, has been withholding RWF10 from the payment of every litre supplied by a farmer as a compulsory saving for over a year and envisages starting the IAKIB Savings and Credit Cooperatives (SACCO). For the time being, however, money is given back to farmers every year.

MCCs also face constraints to their operation, above all electricity supply. Milk is a perishable product. Rwanda has made efforts to connect all locations to electricity but supply is well below demand, which results in rationing. The quality and quantity of electricity still has deficits. Some MCCs face the risk of spoiling their milk, which would result in huge losses.

Before MCCs accept milk, it is tested for quality assurance (acidity, water, and bacteria). Milk that does not pass the test is refused. Milk collectors may add water to increase their sales, which is not checked by their clients in the informal market. Some milk cans be consumed without risks to human health, yet some milk is dangerous. Farmers whose milk is rejected do not throw it away, but rather, supply it to local informal markets. It is purchased by individuals, used for tea or ghee making. In a few cases, it feeds pigs. This description implies that milk from informal markets not only competes with quality milk, but also represents a public health danger if milk is not boiled. This is corroborated by Rawlings *et al.* (2014), who observe that poor or low quality milk potentially exposes consumers, especially infants, children, pregnant and nursing women to health risks. However, following government efforts to channel all milk through MCCs (see Ministerial Order N° 001/11.30 of 10/02/2016 regulating the collection, transportation and selling of milk), the milk flow in the informal market will substantively be reduced. However, government measures will bring about results only if

internal and external challenges facing MCCs are properly dealt with.

Although MCCs provide some benefits, there is a lack of smaller processing facilities. During the rainy season, there is oversupply of milk, which cannot be absorbed by the main processors. In addition, when processors have technical problems such as power supply failure, their milk is spoiled. In the long term, farmers' cooperatives may find it lucrative to have basic transformation units that absorb their excess milk. Some possible products include ghee and cheese.

Importantly, little milk is fed into the formal value chain. Indeed, Phiria, Benschopa and Frencha (2010) quoted in Doyle *et al.* (2015) observe that “82 percent of milk is sold in informal and unregulated markets, while 18 percent is sold in a formal (MINAGRI, 2015), urban market which requires regulatory oversight”. In the field assessment, farmers reported that their motivation to supply in the informal market is they need cash immediately:

When we supply milk to the MCC, we get paid after one month or even longer. MCCs themselves depend on the payments of Inyange Industries. How can I wait for one month while I have the option of making cash immediately? When I sell to hawkers, money may be slightly lower but payment timing is certain. I can meet the enterprise and household demands with little difficulty.

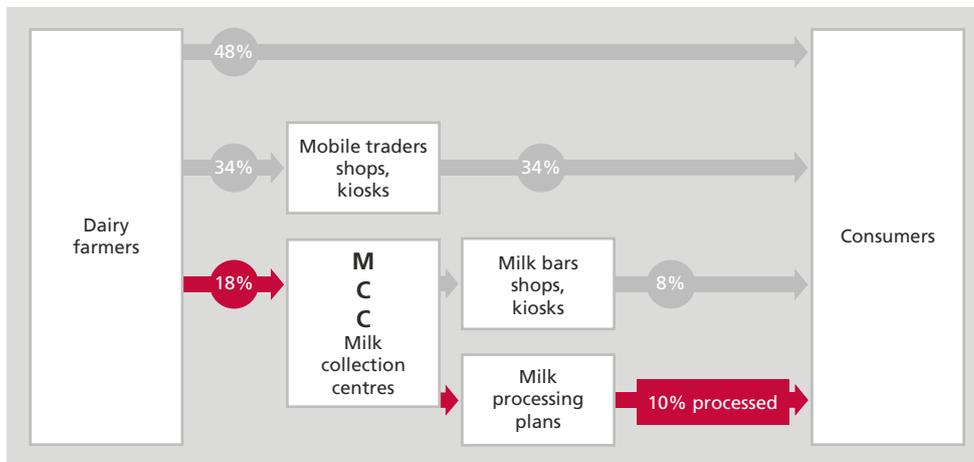
– Male farmer household interviewee, Nyagatare.

Irrespective of the cash payments provided from informal markets that farmers request, they acknowledge that the practice is not sustainable because it is associated with a number of shortcomings such as failure to receive their payments from the non-reliable buyers. However, they recognize that although payment from the formal markets may be delayed, they eventually do receive it. In addition, they also have access to services and products that are unmatched in the informal market. The chart below indicates how milk flows from farm to the different markets (LISP/MINAGRI):

Processing

Transportation between an MCC and a processing plant is dominated by men. However, it works differently for different locations. In Nyagatare, after milk is collected in MCC coolers, Inyange sends cooling trucks to collect milk and ship it to Savannah Processing Plant located in Nyagatare town.

FIGURE 6



In Nyanza, farmers get a good price by shipping their milk to processors. Some processors do not collect milk from MCCs (e.g. Zirakamwa Dairy). The same arrangement is possible with Inyange. If milk is shipped from the MCC, the processor purchases it at RWF240 per litre. Considering that processors cannot manage to collect milk from individual farmers and that not every farmer can afford to supply small milk quantities to the processor, it is operationally and economically logical for them to collect milk from MCCs where they are assured bulk and quality milk already tested for standards. However, if a farmer could afford to supply enough quantity to the supplier, which is permitted, he or she would make more revenue than being paid at the MCC level.

When milk reaches processing plants, it is tested for quality compliance before it is received. The roles of women and men, boys and girls are not entirely clear. However, it was indicated in the field informant interviews that two types of labour are involved: skilled and non-skilled labour. Men dominate the non-skilled labour, because it requires physical strength, for example, in loading and offloading trucks. Women involved in non-skilled labour are carry out work that requires less physical strength, such as cleaning. The estimated non-skilled labour force at Savannah Processing Plant consisted in 80 percent men and 20 percent women. Skilled labour, which involves both men and women, consists in office work that is in line with staff members' education and experience.

After the milk is received, it awaits processing. Possible products from raw milk include

fresh milk, low-fat milk, fermented milk, yoghurt, cheese, flavoured milk and ghee. For a long time, the processing of dairy products was carried out by the farmers themselves (traditional processing of butter, ghee, curd and skimmed milk). Then, plants supported and financed by the State took over before the private sector began showing a half-hearted interest in the sector (Development and Management Solutions, 2009). However, the evidence from this assessment suggests that some families process ghee, and this is a woman's responsibility. Some households trade off between financial benefits associated with supplying milk to MCCs and retaining some milk for ghee processing. Generally, they prefer to supply milk to MCCs rather than process it.

Industrial processing consists mainly of making pasteurized curd, sometimes fresh pasteurized milk, yoghurt and cheese. The performance of the state-run dairy plants has not always achieved the results expected from the Government has entrusted to them, and therefore there has been as trend of privatizing them (Development and Management Solutions, 2009).

Traditional processors have now emerged, who boil the milk before its delivery for consumption. The techniques used are not always well controlled, although those who practise them are currently very active operators on the market. The most reliable target market is the urban consumer. This is possible through a coordinated milk value chain, but vendors and traders and/or farmers sell most of the milk locally in the raw or fermented form. Processed milk (pasteurized and yoghurt)

is sold in supermarkets and shops, or directly to consumers (in the case of Nyanza Dairy). However, most milk plants do not operate to full capacity due to lack of sufficient quality milk, high production costs including a variety of taxes, and stiff competition from milk vendors and traders who offer better prices to milk producers and milk imports, especially powder milk (Development and Management Solutions, 2009).

As mentioned, the Government's 2013 plan has set targets for milk consumption, production and export. The target of boosting consumption in urban centres and meeting this largely from domestic production assumes an increased and more consistent flow of milk through formal channels. There are approximately 25 processing factories country-wide with a total processing capacity of 160 000 litres per day. Only 15 to 20 percent of this capacity is being utilized. For Rwandan processors to begin to utilize this additional capacity, they must undertake changes in quality, price and product diversification. The processing cost of pasteurized package milk is over 50 percent of the retail price. With increased milk production through MCCs and improved quality (lower rejection rates), processing costs could be reduced by as much as 20 percent. To reach the milk target set for 2020, the milk processing industry will need to use its established capacity, and new plants will need to be opened. The plant in Mukamira in the Northwest will be an important addition for processing milk from the Gishwati region. Processing plants will need to invest in new equipment and training to introduce new products and package types, with local manufacturing companies developing packaging materials that can help to reduce the final retail price to consumers. (Republic of Rwanda, 2013b).

The target set in 2013 for Rwandan milk exports was to reach \$18 to 20 million per year by 2017 (Republic of Rwanda, 2013b). In 2013, it actually exceeded this target, reaching \$22.4 million. For this to be sustainable, a reliable supply of exportable products will be required, with an initial emphasis on low-cost packaged milk products and value-added products. The Republic of Rwanda (2013b) suggests that the private sector processors and cheese makers could develop suitable products and packaging sizes for Burundi and Democratic Republic of the Congo, including a shelf-stable yoghurt.

Trade and retail

The retail network for milk is fragmented and competitive. TechnoServe Rwanda (2008) indicates that retailers in Rwanda can be divided into three categories based on the products they sell and their scale: sellers of raw fresh milk and some processed goods; sellers of boiled fresh milk; and sellers of processed dairy products only (supermarkets).

Sales of raw fresh milk can be very profitable due to the minimal costs of the operation. Most shop owners maximize profit by forcing the farmer or hawker to assume milk transport costs. Sellers of processed dairy products are making healthy margins, with some reporting success in selling products with 10-20 percent mark-up (TechnoServe Rwanda, 2008).

The Government encourages the creation of farmer cooperatives to manage the milk collected by MCCs. The vision for these cooperatives is to not only serve as a marketing point for milk, but also provide additional services such as wholesale agricultural inputs, farmer education and financial credit. The Government has strengthened its emphasis on the creation of cooperatives, prompting an increase in registrations (TechnoServe Rwanda, 2008).

Domestic markets are mainly urban markets for milk in the form of milk bars and retail stores. Quality measures have been taken by the Government through MINAGRI/RAILS and partners to introduce and enforce the SoQ programme and its compliance. Ultra-heat treated (UHT) milk is the most common product sold throughout the Central Lakes Region, and currently Inyange, the only processor, is not price-competitive (Republic of Rwanda, 2013b). However, there are currently other emerging processors including Masaka Farms Dairy, Blessed Dairies Ltd. and Chrystal Industries Ltd.

Many traders also sell retail, while wholesalers market large volumes, with their customers mostly consisting of small retailers. Wholesalers sell UHT milk and milk from dairy plants only (TechnoServe Rwanda, 2008).

This study investigated the destination of milk sold by processors at the study sites. The Inyange Industries sells milk to a variety of clients. Information from a key informant interview indicates that Inyange's major clients include the Government of Rwanda through the Local Administrative Entities Development Agency (300 000 litres per month), with the milk for consumption by health

centres throughout Rwanda; milk zones⁹ and automatic milk dispensers (20 000 litres per day). Inyange's products have also been supplied to the United Nations peacekeeping forces in Darfur, North Sudan (key informant interview, Kigali). In 2012, despite Inyange's processing capacity of 100 000 litres of milk per day, it could sell only 35 percent of it in existing markets, which called for other strategies, including automatic milk dispenser machines (Hope Magazine, 2012). At present, Inyange Industry processes milk (whole and low-fat), fermented milk (*Ikivuguto*), yogurt, fresh cream, butter and ghee, milk with vanilla, chocolate and cherry. The milk demand grew, and the industry developed.

There are other small-scale, value addition entities such as Hadji Enterprises, which sells milk to travellers who go to or come from Kigali. It purchases an average of 2 000–2 500 litres per day and sells an average of 2 000 litres of fermented milk per day.

There are a large number of smaller retailers in Kigali. Consumers can choose their suppliers. However, in residential areas where there are not many retailers, milk is sold at a higher price. Almost all sell three types of milk (raw milk, pasteurised milk and imported UHT milk).

Almost all of the traders have small refrigerators (with the exception of milk zones whose cooler capacities vary between 500 and 5 000 litres), which limits their storage capacity, forcing them to obtain fresh supplies every day. As mentioned, Gicumbi District is a new player in cattle keeping. They are performing well with zero-grazing, but the culture of consuming milk is new. Efforts have been invested in promoting a change from local beer consumption to milk consumption. The same is being promoted nationwide in a bid to eliminate malnutrition and stunting.

The retail trade of the milk and milk products – milk bars and restaurants – is well balanced because the businesses are equally operated by both men and women according to their financial and managerial capacities (key informant interview, Kigali).

3.2.2 Profit and value addition

Value addition

Value addition is one of the solutions available for providing guarantee for quality dairy products to consumers and it increases the life of the products. In the districts of Nyanza, Nyagatare and Gicumbi, there are MCCs, small and medium value addition entities with a number of new ones emerging. MCCs receive milk conduct platform tests, bulk and chill before dispatching to processors and other buyers. Some MCCs are already in the process of negotiating with the Government and other partners on how to start value addition units on-site. This is in a bid to enhance the hub model, diversify market, and increase consumption of quality milk and maximizing profit.

In Nyagatare, in addition to the Savannah Processing Plant, other small female-owned, value addition enterprises are emerging, such as the yoghurt processor Nyagatare Yoghurt and Ice Cream Processing Ltd., and Ghee Processors Ltd. in Matimba. Some MCCs resort to making products such as ghee but this is driven more by the need to cut losses when no reliable buyers are present. This should be discouraged because it reduces their profits; they should be supported to invest in processing butter, cheese and other products that have a longer shelf life and that are more profitable.

In Gicumbi, in addition to IAKIB milk bars established at the MCCs, there are plans to roll them out to all their MCC locations. Also, Blessed Dairies has substantially improved the quality and quantity on a range of its products such as yoghurt, cheese, fresh cream and fresh milk, and they have plans to expand the business.

In addition to the successful female-owned Zirakamwa Meza Nyanza Dairy processing plant, which was HACCP-certified, Nyanza District is host to many value addition enterprises, namely Mugandamure Cooperative, Hajji Enterprise and others, which sell to passengers and are working towards providing the highest quality milk products to their customers.

Profits

Farmgate milk prices vary between wet and dry seasons due to supply. The price of milk at every link of the chain varies according to the geographical location and season. In addition, in each case, there are various situations that influence farmgate and end-user prices. During the rainy season, there is a milk glut, which may lead to low farmgate prices and losses, whereas during the

⁹ A milk zone is an outlet where milk and milk products are sold, e.g. milk products in 500 ml, 1 litre, 2 litre and 3 litre Tetrapack containers and curd milk 2 litre containers (*Ikivuguto*) in 2 litres, Yoghurt 130 ml, 250 ml, 400 ml, fresh cream, among others. They were initiated by Inyange Industries; Crystal Milk is slowly trying to follow the same model.

dry season farmgate prices increase. Steps should support farmers to invest in small-scale processing to reduce losses caused by the flooded market. The Government is working towards introducing the quality-based milk payment system, i.e. payments made according to grade. One of the key strategic options would be to negotiate a consistent price with the buyer throughout the year, as in Nyagatare District.

With respect to the level of margins recorded, although wholesale and retail prices reflect a healthy competition in consumer markets, the prices to the producers reflect individual situations of each region. While dairies generally offer a relatively high price to their suppliers, in Mutara region, for instance, difficulties encountered in selling tend to lower the prices offered to farmers. Similarly, prices obtained by collectors and the margins of retailer depend on specific circuits they follow and on the role played in the supply and local competition (TechnoServe Rwanda, 2008).

In Nyagatare District (table 5), the processor purchase price for milk is RWF200 per litre, of which RWF1 is paid to the Union of Dairy Cooperatives, RWF5 to the dairy cooperative and RWF170 to the farmer. RWF24 is paid to Inyange Industries to cover the cost of transportation and equipment, and pay wages of employees at MCC.

However, there is an agreement between the transporter and cattle owner that the transporter will have around RWF20 per every litre transported. Nyagatare dairy cooperatives are members of a strong farmers' union, Nyagatare Farmers' Union (NDFU), which has negotiated and signed an annual supply contract at the same price throughout the year.

After processing, Inyange sells milk at milk zones at RWF400 per litre, a value addition of RWF200 for pasteurized milk, part of which is used to cover the cost of processing and fixed costs of the MCC. When milk is packaged, it is sold at RWF500 for a half litre, or RWF1 000 for a litre. Inyange has also invested in the production of UHT, butter, yoghurt, flavoured milk and low-fat milk.

Table 6 shows the prices per litre along the value chains in Nyanza.

Here, the price of milk paid to the farmer is RWF150. The transporter sells milk to the MCC, receiving RWF190 per litre. MCC usually sells to the processor at RWF230, taking between RWF200 and RWF40 in union fees and other costs associated with collection (the MCC transports milk to the processor). Milk can be sold to three possible processors: Hadji Enterprises, which sells 5 litres of fermented milk at RWF2 500; Nyanza Dairy,

TABLE 5
Prices per litre along the milk value chain in Nyagatare

	Raw milk						Pasteurized milk	
	Farmer sale price	Transporter fee (from farmer)	Dairy co-op fees (from Inyange)	MCC union fees (from Inyange)	Inyange Industries costs	Inyange Industries purchase price	Inyange Industries sale price	Other retailer sale price
Chain including processor	170		5	1	24	200	400	1 000
	150	20	5	1	24	200	400	1 000
	170	20% of sales	5	1	24	200	400	1 000
Sale to neighbour	150							

Source: Results of present study, 2015.

TABLE 6
Prices per litre along the value chains in Nyanza

	Raw milk				Pasteurized milk	
	Farmer sale price	Transporter sale price	MCC union fees and other costs	MCC sale price to processor	Processor sale price	Retail price
Chain including processor	150	190	40	230	500	1 000
Sale to neighbour	180					

Source: Results of present study, 2015.

TABLE 7
Prices/litre in along the value chain in Gicumbi (RWF)

	Raw milk				Pasteurized milk	
	Farmer sale price	Transporter sale price	Milk collection centre (MCC) union fees and other costs	MCC sale price to processor	Processor sale price	Retail Price
Chain including processor	180	200	40	240	500	1 000
Sale to neighbour	180					

Source: Results of present study, 2015.

which is currently not operating due to renovation works and school holidays; and Zirakamwa Dairy.

Zirakamwa Dairy pays milk suppliers only RWF210 and processes milk into yoghurt and fermented milk, selling at 5 litres for RWF2 500 of fermented milk and RWF250 for 200 ml of yoghurt. Processing technologies differ, and the Hadji Enterprises technology may not be environmentally sustainable in the long term because it uses too much wood.

In Gicumbi, the formal milk value chain is a recent development (see Table 7 for Gicumbi picture). Milk transporters buy milk for RWF180 and sell it to the MCC for RWF200. Farmers who use professional transporters to supply milk at IAKIB pay between RWF10 and 20 per litre depending on the distance. IAKIB transports 25 000 litres of milk per day to Inyange Industries for RWF 240 per litre. IAKIB also supplies 1 000 litres per day to Blessed Dairy Industry.

As mentioned, women's participation in milk transportation is almost non-existent: in Gicumbi, women do not participate, and in Nyagatare, women rely on men who have motorcycles to ship their milk. Yet, in Nyanza, women's participation is possible. "An enterprising woman may purchase a bicycle and hires a man who moves around to collect milk from other farmers and ships it to the milk collection centre" (FGD, Nyanza). However, this implies that the revenues generated from this activity are lower than those of men who participate. Women's revenues are reduced by salaries they must pay to the hired male transporters.

Labour is not considered a major expense since most of the farmers recur to family members to manage the cow(s). In Gicumbi, for example, it is estimated that a dairy farmer with at least two cows will make an annual profit of RWF248 800 through milk sale, average return on investment of 52 percent. Farmers earn money from the sale of milk and manure. Table 8 illustrates cost estimates and farm Annual cash profitability at the household level in Gicumbi.

In addition, an MCC makes an estimated value of RWF360 000 000 in milk sales annually, an average of 15 percent return on investment. Most of the MCCs and Cooperatives have received substantial government support, as previously mentioned. Many received support in terms of technical assistance to improve leadership, governance and business management practices and now have the skills to run MCCs as profitable business ventures. Table 9 indicates cost estimates and profit for MCCs in Gicumbi District that bulk, chill and sell 5 000 litres of milk per year (see Table 9).

In communities surveyed, some farmers do not record expenses and income. They do not know the amount of labour invested, especially when they do not hire labour from outside the household. Many say that the price of raw milk is too low to sustain dairy farming, although the previously quoted analysis from TechnoServe and estimates from the present survey indicate that dairy farmers can make a profit, particularly when all of the benefits are listed.

In line with the above, efforts have been made by different dairy partners including the Government, Send a Cow, Land O'Lakes, Heifer International and others to train farmers and model farmers to practise dairy farming as a business. During this training, farmers are taught in best practices in calculating their own farm profits.

As previously discussed, the participation of women (and therefore their ability to earn profits) is concentrated on the production node. They are more women than men in the milk retail business because milk suppliers have traditionally been women: "As the saying goes, Amata agiragitereka" (milk is served by the right person). It is worthwhile for partners (donors) to venture into supporting women to invest in retail and other profit-making dairy businesses in an affirmative way.

Field evidence suggests that milk transportation has created employment opportunities for private

TABLE 8:
Annual cash profitability at the household level in Gicumbi

A. Assumptions	
Number of lactating cows per household (HH)	2 cows and 2 calves
Quantity of milk/cow/day	8 litres/cow
Milk sold/day	14 litres
Number of lactation months per year	8 months
Average cost of a mixed breed dairy cow	RWF400 000/ cow
Depreciation of one cow (8 years, i.e. 12.5%)	RWF50 000/ year
Average cost of the stall	RWF40 000
Depreciation of the stall = 5 years (i.e. 20% / year)	RWF8 000/year
Average cost of milking tools	RWF20 000
Depreciation of the milking tools = 2 years (i.e. 50%)	RWF10 000/year
Average sale price of raw milk/litre at farmgate to collectors	RWF180/litre
Average value of a one year calf	RWF50 000
Average value of the manure from 2 cows and 2 calves/year	RWF20 000
B. Projected annual cash expenses	
	RWF
Depreciation of the cows (2 x RWF50000 each)	100 000
Depreciation of the stall	8 000
Depreciation of the tools	10 000
Enriched feeds (4 kg x RWF150/kg x 2 milking cows x 30 days/mo x 8 months)	288 000
The purchase of the drugs	50 000
Other veterinary services	20 000
Fodder and water opportunity costs (from the family land and at no cash cost)	–
Labour opportunity costs (by family members without cash)	–
TOTAL EXPENSES	476 000
C. Expected annual cash income	
Sale of the milk (14 litres/day x RWF180/litres x 30 days/ mo x 8 months)	604 800
Cash value of two calves	100 000
Cash value of the manure	20 000
TOTAL INCOME	724 800
D. Annual average net profit (C – B)	
	248 800
% of the average return on investment (net profit / total expenses)	52

Source: IAKIB cooperative member-farmer in Gicumbi.

TABLE 9
Annual cash profitability at the MCC level in Gicumbi

A. Assumptions	
Milk collection and sale	5 000 litre/day
Buying price from the collectors	RWF200/litre
Selling price to the transporter	RWF240/litre
Value of the MCC shelter	RWF10 million
Depreciation of the shelter (20 years, i.e. 5%)	RWF500 000
Cost of the milk cooler	RWF20 million
Depreciation of the cooler (20 years, i.e. 5%)	RWF1 000 000
Average cost of other equipment and tools	RWF500 000
Depreciation of the other equip and tools (5 years, i.e. 20%)	RWF100 000
B. Projected annual expenses	
	RWF
Purchase of the raw milk (5000 litres x RWF200 per litre x 300 days/year)	300 000 000
Depreciation of the shelter	500 000
Depreciation of the cooler	1 000 000
Depreciation of other equipment and tools	100 000
Annual salaries of the staff and workers	6 000 000
Water for cleaning of the equipment and the working place	600 000
Other cleaning products	1 200 000
Electricity	120 000
Office expense	60 000
Spare parts and maintenance	1 200 000
Communication	360 000
Miscellaneous expenses	1 000 000
TOTAL EXPENSES	312 140 000
C. Expected income	
Sale of the chilled raw milk (5000 litres/day x RWF240/litre x 300 days/year)	360 000 000
D. Annual average net profit (C – B)	
	47 860 000
NB: % of the average return on investment (net profit/total expenses)	15

Source: IAKIB MCCs in Gicumbi

transporters, mostly men (who may not necessarily be farmers). Transporters have purchased either bicycles or motorcycles to ease their transport.

Nationwide, those who transport milk as a business charge farmers RWF10–20 per litre. This is because most of them are not farmers but do this as service for them. It is important to note that transporters make profits because they deliver milk in the morning and evening, and the rest

of the hours are used to transport other on- and off-farm products, or carry out other income-generating activities such as transporting people and goods.

Many MCCs received government subsidies in form of buildings and milk equipment. However, MCCs and cooperatives are expected to pay back some of the RWF20 million. If and when they fulfil their obligation to pay back, they will be given

a chance to own the facilities. MCCs and cooperatives are also expected to meet the facilities' daily operating expenses, including of electricity or diesel for the generator, and maintenance cost, as well as cover all the expenses arising from operational expenses, such as staff salaries, among others.

Decisions on the use of income from dairy production

This assessment found that women participated in decision-making on dairy incomes in different ways. Field evidence suggests that men are predominantly in charge of cash collection from milk zones or transporters. Indeed, at the MCC level, the amount milk is recorded with the name of the head of the family. Farmers reported that when money is paid through a bank account, either the wife or the husband can withdraw. Money is reportedly used in the interest of the entire household, such as for purchasing food items, paying for medical insurance, and paying school fees.

However, cases of low involvement of women were reported to spark possible domestic conflicts. Despite their hard work, women might not always be able to keep the money earned from milk sales. For example, when a woman is not involved in the purchase of veterinary drugs, she may not know how much was spent for their purchase and she might be easily made to believe a higher cost. This will give the men an additional amount of money to be spent of recreational activities, such as drinking.

My husband often collects money from the so-called joint account. He goes to drink with other men. When he comes back home, I try to ask why he is drunk and the source of money he spends on beer. The response is obvious. He beats me up. He always replies that I married him when he had most of the cows. So, I have to shut up for my safety.

– Household female respondent, Nyagatare.

Evidence moreover clarifies that “[w]omen still do the donkey work but their share of the profits is minimal (key informant interview in Kigali). It was also revealed that:

when there is a cow in a household, especially in the zero-grazing farming, it adds up on the number of children who must be cared for. As you know, women are better at caring. They are mostly doing household chores while men are engaged in community affairs, so women must ensure cows are fed, their stalls cleaned...

– Key informant interview in Kigali.

Finally, the assessment team learned that some women do not engage in dairy chores when they do not receive the benefits and are not involved in decisions regarding the dairy income, which leads to a dwindling of milk volumes produced. A solution would be for the men to share the responsibility of the dairy business in order to avoid losses. One man interviewed in Gicumbi explained:

I used to involve my wife in the work but she I did not allow her to tell me how to advise me on how to spend the money. I could do whatever I wanted including drinking beer with other men. I alone decided on what she needed. She later boycotted. She would not feed the cows even when I left forage and feed at home. Whenever I asked her why, her answer was that she would not work as long as she was excluded from sharing the benefits from the enterprise. My cows were suffering. I learned to listen. I finally changed my mind. My enterprise is better-off.

– Male FGD participant, Gicumbi.

3.2.3 Other benefits

Table 10 shows that the benefits of owning cattle vary from individual to individual. Of the dairy farmers interviewed, 54 percent were strongly motivated by income from milk and 25 percent

TABLE 10
Benefits of owning dairy cattle

Perceived benefit	Frequency	Percentage
Income	15	54
Milk consumption	7	25
Compost	2	7
Social capital	3	11
Status	1	4
TOTAL	28	100

Source: Results of present study, 2015.

by milk self-consumption. Other benefits include social capital, for example cows can be given to a friend and milk can be used to support a friend or relative in need (especially in cases of urgent need for organization of social events such as weddings, and immediate cash for medical expenses).

Additional benefits mentioned were employment alternatives, a balanced diet, school fees, access to household energy (from biogas), compost manure and building houses, gifts, among others. A recent evaluation (cited in TechnoServe Rwanda, 2008) found that over 88 of the farmers involved in the Girinka Programme had increased their income through milk sales and by growing more vegetables and other crops using compost manure.

During the fieldwork, it was indicated that dairy farming has contributed to employment creation to both the young and retired individuals. For example, one FGD participant stated:

I am a retired teacher. My husband passed away three months ago. All my children are grown up; they are working to earn a living. My cows not only give me a regular income, but also keep me active. I feel important to the community because I am not a burden to anyone. Some community members rather depend on me for employment.

– Female farmer, FGD in Nyanza.

Diet has been enhanced by increased milk consumption.

Our children used to suffer from Kwashiorkor. Check out our neighbourhood; [now] no child suffers from malnutrition. This was achieved because those with milk cows that live nearby those who do not have them have been sensitized to spare some milk for their neighbours as they wait for the first calf, which is given to the next farmer under the Passing on the Gift (POG) [principle], especially under the One Cow per Poor Family programme. Communities that do not keep cattle are in danger.

– Female farmer, FGD in Gicumbi.

This is corroborated by MINAGRI (2016c), which suggests that consumption of calories from non-staple crops has increased, which places Rwanda above the Africa's average (50 percent against 37 percent, respectively). However, hunger remains a challenge, as 19 percent of households are food insecure and 38 percent of children suffer stunting.

Third, household energy was affordable due to milk sales. Some individuals accessed biogas, while

others accessed the prepared energy provided by Mobisol,¹⁰ as illustrated by the following:

I never dreamt of having lighting in my house at night. The sector officer visited me and talked about a possibility of accessing electricity thanks to my cows. I thought he was joking... Look, this is a facility where I mix cow dung with water; the solution is channelled to that pit (bio digester). With my four cows, I have access to electricity 24/7. I just make sure their stall is clean; I feed my cows. For some of us, we are already enjoying benefits of Vision 2020.

– Male farmer, FGD in Gicumbi.

I am 62. When I was growing up, I never saw electricity in our home. There was none, [not] even in my neighbourhood. We used to see lights in town and at the parish. It is, however, interesting to learn that I was the first to introduce electricity in my neighbourhood. After learning about Mobisol, I just called their number. The following day, they sent technicians to install their equipment. I am paying on a monthly basis. I will be done this December. How could I have imagined myself having light in my house? Cows are wonderful. I feed them, milk them, and supply them to the cooperative. God bless cows.

– Male farmer, FGD in Gicumbi.

Social capital has been enhanced by access to dairy products. This benefit has been highlighted by women. In Rwandan culture, friends contribute to parties and other social events. One participant indicated:

My friends may have sick children admitted in the hospital. Because I have cows, it is easy for me to have milk and share with friends. We even use milk in weddings. A friend who contributes milk is a friend indeed.

– Female farmer, FGD in Gicumbi.

Farmers can educate their children and afford school tuition fees. It was indicated that some families managed to educate their children up to the secondary level. After receiving the cows through the Girinka programme, the milk sales contributed to further education:

My son respects my cows; he could not go to university without them. We had no income.

¹⁰ Mobisol sells solar energy equipment and installs them for clients free of charge as part of the after-sale service.

Thanks to Girinka, my cow produced a male calf. I sold it to the Government. They paid RWF700 000. This was a start-up for my son's higher education. Nowadays, he takes care of the cows and attends an evening programme. I easily pay the tuition fees.

Female farmer, FGD in Gicumbi.

Dairy production has positively influenced other agricultural activities. This is a mostly a reality in communities that practice zero-grazing.

Before I owned a cow, I used to sell my labour to neighbours. I sometimes even migrated to Uganda and came back. I hardly had enough food for my family, let alone pay the fee for medical insurance (mutuelle de santé). I supply 10 litres to this cooperative every day. This money is not a big deal as such. I am building a decent house. However, the manure is my focus. My land is fertile that I produce good crops every time. I no longer sell my labour. I would rather have labourers when I want to.

– Male farmer, FGD in Gicumbi.

For some farmers, keeping the cattle in the neighbourhood comforts them, especially when one is old and has no children at home. However, they may also create tension between parents and children, especially when the investment is not worth the return. This narrative from a farmer in Gicumbi illustrates:

I am old. All my children are working. I recently had issues with my daughter. She thought my efforts in cattle keeping were not worth it. She offered to cover my expenses for subsistence if I were ready to forego the cows. I resisted. For me, cows are family members. When I am lonely, I speak to them. They listen. When I come home, they greet me. My daughter only considers the expenses they incur. No, I do not want to be spoon-fed. I do not want to die of loneliness in that house. She spent eight months without coming back home. But she gave up her stand. She finally came to see me.

– Female farmer, FGD in Gicumbi.

3.2.4 Inputs and services

Animal health supplies and equipment

Over 1 000 agrovet shops (drugs and agriculture inputs shops) operate throughout the country, which opens access to inputs for dairy producers. However, there is a shortage of practising veterinarians (only 90, of which only 11 are in private practice), and of trained para-veterinarians

to work with producers. The Government of Rwanda's sector veterinarians¹¹ each have to care for 3 150 cattle, on average. Training and education institutes will have to be upgraded and expanded to meet the deficit in trained specialists according to the Vision 2020. It is important to note that the Agriculture Gender Strategy (2010) highlights gendered gaps in extension services since extension workers are mostly men, thus making it difficult to adequately serve female farmers. Male extension workers more easily serve male farmers (Republic of Rwanda, 2013b). However, the Government in collaboration with other partners have embarked on training extension service workers to embrace gender mainstreaming/integration, thus, positioning skilled extension workers to service both female and male clients through a gender lens. In addition, the local network of agriculture extension service providers (Twigire Muhinzi/Mworozi Programme) was created to expand the network of gender-sensitive extension service providers, hence many of the network members/representatives are women who undergo and acquire similar training to their male counterparts before they become extension service providers.

Agrovet officers interviewed (one man and one woman) are aware of the shortage of female veterinarians and recognize that the farmers they serve have no gender biases towards either female or male shop attendants. They also concur that there is more work than they can handle and that efforts have to be made to provide more qualified veterinarians.

MCCs liaise with farmers, and all MCCs visited had basic drugs. In addition to the sector veterinary officer, some MCCs are in touch with a private provider who not only provides advice, but also may provide drugs on a credit basis. Farmers pay back when they sell milk. However, these services are not adequate because farmers reported that some sector veterinary officers are either overwhelmed with work or lack training, for example, in AI.

Breeding and genetics

Until recently, the dairy sector did not have a clear policy on the future genetic profile for Rwanda's dairy herd. The Government of Rwanda's bull station, the quality of the semen and the delivery ser-

¹¹ These are trained veterinarians who work as government employees at the sector level. A sector is an administrative entity below a district consisting in of a number of cells and imidugudu (villages).

vices are in need of review if the goal for production in 2020 is to be realized. The Government's subsidy for semen keeps the price low for farmers; however, the performance of the programme is not advancing the industry (Republic of Rwanda, 2013b). Privatization of the AI service, removal of the subsidy and greater reliance on imported semen may be a better alternative for the Government. Attaching private AI inseminators to a milk collection centre (MCC) may be a method to improve outreach to producers. Sustained genetic improvements will not occur using locally bred dairy bulls with these tracking programmes. Complementary work with the Girinka Programme could improve cow identification, as well as cooperation with the MCC system as first points of contact with dairy farmers.

The Agriculture Gender Strategy (2010) highlights the lack of women's access to technologies including breeding and genetics. It is estimated that the number of trained AI inseminators is around 600. However, farmers interviewed for this study, while commenting on the shortage of AI services, did not mention that gender issues underlie this shortage. They did complain of the lack of trained veterinarians to help them with AI. A farmer in Nyagatare commented:

Last month, my cow ovulated. I went to see the sector veterinarian so he could help me with artificial insemination. He advised me to go back home so he would come shortly. I waited for 2 days. When I followed up by phone, he came, but it was too late for a successful artificial insemination. He apologized that he was attending to other pressing office duties.

– FGD with a male farmer, Nyagatare.

The role of international development agencies is to be noted. The transfer of assets (cattle) by Send a Cow through Heifer International has largely supported the Government's initiative, One Cow per Poor Family.

Feeds and feeding

The main constraint to increasing milk production is feed and feeding practices. No available literature clarifies how this affects men and women in Rwanda. However, field data for this assessment showed that there is a difference between open and zero-grazing systems: in open systems, men are more engaged; and in zero-grazing, women's cattle-related duties, including gathering fodder, are added to other household chores. This may become an important issue in government plans

for increased milk supply, including the promotion of zero-grazing.

The Crop Intensification Program (CIP) utilizes most of the high quality crop production areas, constraining the production of quality forages. Furthermore, producers lack the modern techniques to conserve forage in the dry season and profitably prepare feed rations for crossbred and purebred dairy cows. Producers need to increase their production of quality forages and the use of alternative feeds including hay, silage, crop by-products, agro-industrial by-products and concentrates in the feed mix. Private suppliers of forage seeds and hay are attractive business opportunities, which are important in the commercialization of the dairy industry, and producers with access to land could benefit from this activity going forward. Rwanda needs to develop and enact a national animal feed policy (Republic of Rwanda, 2013b).

Concentrate feed is important in a modern dairy sector. However, in Rwandan small-scale dairy herds, it costs around RWF160-190/kg, and for most of the year, milk prices do not justify them. With oilseed rice and maize plants being introduced by next year these feed factories may help to lower the cost of feed ingredients. A national animal feed policy needs to examine the investment in these facilities and other processing and mixing plants in future investments. There is a private sector feed industry emerging, and dialogue is needed on the best pathway for growing the private industry (Republic of Rwanda, 2013b).

This assessment highlights some untapped opportunities in the production of feeds from local inputs. Currently, farmers depend on suppliers in urban centres and complain that these services are located far from their households, which leads to an increased purchase price due to transport costs. However, the example of IAKIB in investing in feed milling facilities is an encouraging case study.

Greater efforts could be made to promote forage conservation. The rainy seasons brings about abundant fodder. In addition, many pastoral neighbouring communities grow maize and rice, and use residues from farms, which may be important ingredients in feeds as a supplement to other feeds.

Access to finance

Smallholder dairy enterprises offer a steady source of cash flow for rural households. In a recent

study, 43 percent of dairy farmers were deemed creditworthy, which is positive for reaching the NDS production goal set for 2020. Creditworthy producers tend to be those who can hold down investment costs in fixed assets, keep production costs per litre of milk low, and sell both morning and evening milk. Financial lenders – micro-finance institutions (MFIs), savings and credit cooperatives (SACCOs) and banks – need skills to identify worthy producers, train loan specialists, and conduct appraisals.

There is opportunity for special lending programmes that adopt structured trade financing strategies so that repayment of the loan is recovered through deductions from milk sales, as is practised in Kenya, South Africa and Uganda. This repayment programme will minimize borrowers' default risk. Once finance is flowing, the increased milk supply can create other opportunities for commercial processors and wholesalers to access financing based on economic volumes of through-put. At that point, commercial lenders can be assisted to develop strategies and products to finance these larger investments.

However, the Agriculture Gender Strategy (2010) is concerned about gendered access to finance. Women tend to be disfavoured by financial institutions and opportunities, for example, as a result of higher illiteracy levels among women, which do not allow them to deal with formal financial institutions requirements (Republic of Rwanda, 2013b). Indeed, the National Bank of Rwanda data (March 2011) analysed by Republic of Rwanda (2011) indicates that only 12.7 percent of the women benefitted from the Rural Investment Facility 2, while 36 percent of the women benefitted from aggregate agricultural credit. While there are no specific data on dairy, field evidence for this assessment highlights different experiences, as expressed by two participants:

I was given a cow by a neighbour had gotten a heifer in Girinka Munyarwanda ("pass it on"). I took care of it until it was pregnant. It begot an ox. I reared it and sold to a government agency to enable their artificial insemination efforts. That made RWF600 000. I had never earned such an income in my life. I deposited it in my bank account in the local Savings and Credit Cooperative (SACCO). Some weeks later, I withdrew some RFW200 000 to extend my piece of land and grow more forage. The SACCO agent informed me that I was eligible for a loan if I wanted to purchase more assets (cows). I borrowed RWF300 000. I serviced it

by milk sales and some savings. I have three cows now.

– Female respondent, Household interview, Gicumbi).

I am a widow. My cattle help me meet some basic needs. However, I am not ready for a SACCO loan. I am afraid my cattle will be sold off if I fail to service the loan. Besides, I would need permission for my sons before I provide the land titles for a security.

– Female interviewee, Household interview, Nyanza.

Extension

Considerable efforts have been made to create a conducive environment for women to tap into the opportunities that training offers. These interventions include consulting women on convenient times and venues for training and meetings, facilitating women to come with their nannies, and giving those without nannies the freedom to carry their babies into the training rooms and providing them with healthy meals so that they can feed their babies properly. In addition, with the introduction of model farmers (farmer trainers of Trainers, or ToTs), this has encouraged training at the grass-roots level, thus facilitating women to access the training without trekking long journeys and requesting permission from their husbands, as the case is for residential training. However, this is not an extended practice and there are still challenges to be addressed. Women in agriculture often encounter technologies/machineries that are not gender-sensitive, for example, the size of some agricultural machines are too large for women to operate conveniently. Practical needs and gender interests are not researched, such as energy efficiencies, access to clean water, proximity of water sources, nutrition enhancement, food processing and storage. Extension workers work long hours due to the large number of households/workers (3 500, where a manageable number would be 600 to 700). In such a situation, they tend to work with highly resource-endowed farmers, excluding the poor, who in many cases are in women-headed households. Planning and design of interventions does not always consider women's specific needs. Meetings and training are planned to begin very early, competing with women's domestic work; not all training centres have childcare facilities, thus women with children, even when they attend meetings, are distracted from paying attention and facilitators are mostly men who do not understand

their practical needs. Again, women are impaired to attend training or seminars organized far from their communities because they first have to obtain approval from their husbands for staying overnight (MINAGRI, 2010).

There are gendered gaps in institutional arrangements and implementation procedures. In 2010, only 25 percent of MINAGRI's Senior Management staff and only 14 percent of the Directors were women. However, most women hold staff positions. It is at the Director and Senior Management levels where major implementation decisions are made, such as gender mainstreaming. Similarly, women represented 28 percent of professional staff and 38 percent of technical staff, which is also of great concern because they are the frontline personnel dealing with technology development and interfacing with farmers. This may restrain women's access to some services (MINAGRI, 2010).

Dairy producers lack information on modern dairy practices necessary to put their dairy enterprises on a more commercial footing. This includes improving cow husbandry, nutrition and feed sources, animal health and genetics. Extension is a critical constraint to attaining higher targets of milk through increased productivity of dairy cows. The Government of Rwanda carries out agricultural extension with its funds or with assistance from donors such as the International Fund for Agricultural Development (IFAD) and NGO projects – RDCP, East Africa Dairy Development (EADD) – and the IFAD-supported Kirehe community-based Watershed Management Project (KWAMP) and Support Project for the Strategic Plan for the Transformation of Agriculture (PAPSTA) implemented by NGO staff or the Government of Rwanda contracting local staff. There are currently six dairy specialists and one veterinary drug shop in each sector (416 in total), but they are constrained by a lack of mobility and dairy knowledge to service an expanding dairy industry that is becoming more sophisticated. The Rwanda Agriculture Board (RAB) has identified MCCs through the MCC Hub project for transfer of knowledge, but this programme will stretch its existing resources to service the planned number of MCCs (Republic of Rwanda, 2013b).

While it was noted that at least 30 percent of Girinka beneficiaries would be women, one of the major barriers identified was the cost associated with developing a zero-grazing infrastructure, bearing in mind that it costs around RWF300 000 (\$400) and there is no mention of how poor

families especially those headed by women would overcome that. In addition, there are gendered barriers to accessing extension services. These include lack of gender-related knowledge and skills by extension personnel, resulting in low uptake of agricultural knowledge and skills by farmers, especially women and poor male farmers along the whole value chain. There are very few women who embrace science subjects, which also affects agriculture. Illiterate farmers (often women) feel embarrassed to attend meetings and training where they will not have opportunities to actively participate (MINAGRI, 2010).

Support to farmer co-operatives

At MCC level, Send a Cow, Land O'Lakes and Heifer International have worked with farmers' cooperatives through training to ensure increased milk volumes, more and better quality milk, cooperative development and market access. They have also provided training regarding gender equality in dairy production. For example, Send a Cow uses the *household transformation methodology* to empower members of a household. It focuses on roles played by men and women, boys and girls, and how they may affect the development of their household (IFAD and Send a Cow Ethiopia, 2015). The role of the private sector is not to be ignored. Private companies and development partners have provided equipment's (coolers) and supported cooperatives with technical skills to better manage their businesses and creating farmer organizations where members are represented and are satisfied with the services provided.

3.2.5 Constraints

Overview

Approximately half of farmers interviewed (15 out of 28) said that they would be interested in expanding their dairy herds. However, the number of improved dairy cattle is not increasing as rapidly as was expected – only four of the farmers interviewed had increased their herds, although 23 had owned cattle for more than five years. The top four constraints mentioned by farmers in this study are shown in Table 11. Animal health and finance were mentioned by the largest number, followed by workload and lack of land. Although men and women mention the same constraints, they prioritize them differently. Men are more concerned with animal diseases than women, and as previously mentioned, tend to assume more responsibility for animal health care. They also prioritized financial issues more than women.

TABLE 11
Challenges to expanding the herd

	Men	Women	Combined frequency	Percentage
Animal diseases	8	2	10	35.7
Finance issues	7	3	10	35.7
Workload	2	2	4	14.3
Lack of land	2	2	4	14.3
TOTAL	19	9	28	100

Source: Results of present study, 2015.

Additional constraints mentioned were lack of feed, shortage of water during dry seasons, lack of semen and AI providers, the low price of milk, and the lack of buyers for milk, creating monopsonic prices or leading to a total lack of reliable markets.

Additional constraints can be identified for MCCs, which face low and uneven supply as well as limited demand. Some MCCs open only occasionally or have very low volumes of milk. This issue of closing occasionally is due to poor planning and poor management and frequent and long breakage in power supply, especially in the rural areas etc. Below are constraints examined separately.

Animal health constraints

Presently, the main livestock disease problems affecting dairy production are endemic infections such as tick-borne diseases (for example, theileriosis and anaplasmosis), and endo-parasites, reproductive diseases such as mastitis in milking cows and bovine brucellosis. They are usually exacerbated by poor management systems and malnutrition, suggesting widespread ignorance on safe and better husbandry practices. They cause significant losses due to deaths especially in young stock, and reduction in reproduction levels (TechnoServe Rwanda, 2008). It seems no change has taken place since 2008 as the same diseases were still mentioned in the current study. Private veterinarians and other partners have worked with MCCs/cooperatives to train and equip farmers with best farm practices such as heat detection, AI, herd hygiene and health, feeding and breed identification among others.

In the rural areas, veterinary services are sometimes inadequate. There are very few veterinarians and when the services of a veterinarian are required, at times he or she often arrives too late and/or without the necessary equipment or product. Due to the low purchasing power of breeders in rural areas and the weak geographical

concentration of the cattle population, private veterinarians and pharmacists prefer to settle in urban areas to the detriment of the rural areas (TechnoServe Rwanda, 2008).

During the FGDs it was indicated that veterinary drugs are available at veterinary shops. Each MCC has a veterinary shop that serves farmers on a credit basis. The veterinary medicines industry is led by Agrotech, which opened its doors in Rwanda in 1988. Its repeat customers include all modern farmers, NGOs including Heifer International and Send a Cow, and wholesalers. Agrotech extends its services to farmers through its 11 franchisees, nine of which are operational and seven are owned by women. At Agrotech, there are two male and two female veterinarians. Other workforce positions are dominated by men because, as indicated by an informant from Agrotech, it “involves too much physical strength (loading and unloading products)”. In addition, Agrotech, farmers can access veterinary drugs through operators who import them from India and China. However, the quality strategy of Agrotech needs to be underlined. It was indicated that 90 percent of its products come from Europe and are relatively more expensive. Indian and Chinese products have been criticized by Agrotech for low quality yet some farmers may prefer them because of their low cost.

Although veterinary drugs are available, farmers complain that some veterinary drugs are expensive and sometimes very rare. Each sector has a veterinary worker but they may be overwhelmed by the sector coverage, some may not respond despite their phone commitment to provide service. Some farmers have resorted to treating cows themselves. In other instances, MCCs have contracts with private veterinary clinics that help farmers, sometimes on the basis of a loan that is paid off through retaining money from milk sales.

My cow was sick. Temperature was very high. I called the veterinarian. He said he was going

to come. I waited until evening. When I called again, he was not accessible. I chatted with a neighbour on that. He suggested a drug that I went and bought. The cow recovered. I can now do it myself. If you wait for them they will not come, will you allow your cows to die?

– Male farmer, FGD in Nyagatare.

Field evidence suggests that there is an acute shortage of AI. At times, the cow ovulates and farmers do not have AI facilities. To cope with the issue, farmers may use the neighbours' oxen. The problem with this option is twofold: sick oxen sometimes transmit diseases to other cows; and one ox that fertilizes the cows for the entire neighbourhood will end up fertilizing their offspring. The effect of consanguinity on herds development cannot be overemphasized. To combat this, the Government and other partners have made great efforts in using AI and providing training for AI service providers and paravets.

Financial issues

Although it is possible for dairy farmer to make reasonable profits, as discussed in section 3.2.2, cash flow can be a problem. Farmers observed that the low price of raw milk had created a vicious cycle of low feeding. Their testimonies indicate that feeds and animal health are far more expensive than milk sales. Farmers also indicated that they injected money from other sources to maintain their cows. The effect of low feeding is that milk production will decrease in the long term. However, household finances are complex. In general, the farmers who participated in this assessment do not record their incomes and expenses, and may not have a clear, full grasp of the performance of their enterprises. They also rely income from dairying for a variety of purposes, which may contribute to temporary cash shortages.

With regard to cattle keeping, the analysis of specimen enterprises highlights another constraint, i.e. the burden of the workforce in total operating costs. Indeed, the TechnoServe report (2008) indicates that the workforce costs can amount to between 30 and 42 percent of variable expenses. Its control considerably improves livestock returns.

Impacts on workload

Women are predominantly involved at the household (farm) level, especially in communities where zero-grazing is practised. An average milk production per day is estimated at 5 litres per cow. Milking is usually carried out twice a day, between

5:00 a.m. and 6:00 a.m. and between 3:00 p.m. and 4:00 p.m. There may be some exceptions to this rule, however. For example, some farmers in Nyanza indicated that they milked once a day (around 11:00 a.m.). However, some participants indicated that in cases where women are not involved in dairy production, performance is bad. For example:

When men do not share milk profits with women, they [women] may boycott by withholding their labour and cows will suffer. If you therefore want to be rich, involve your wife, ensure she is not needy, your cows will in turn be cared for.

– Key informant interview in Kigali.

In some communities, however, cases of child labour were noted. These include school dropouts and children who never went to school, most of whom are boys. Efforts to understand why these children are employed in farms revealed three main issues, including conflicts with their parents, poverty and the death of parents. In some cases, such children are paid RWF10 000 per month, while others just drink milk and eat food, declaring that they are happy working because at least they “*get what they could not get from their homes*” (female farmer, FGD in Nyagatare). This poses a sustainability challenge because it goes against the policy of the Government of Rwanda on universal 12-year basic education.

Feed and water

There is a major protein gap in animal nutrition in Rwanda; due to the gradation of grazing land and the relative weakness of the only available fodder grass, the feed value of pastures can be qualified as poor in most cases. Further, the planted fodder, which is not available in sufficient quantities, is cut late when at the shrub stage and are rarely associated to leguminous plants. In addition, the commercial concentrates feeds are unbalanced and their high price seriously affects the yields of the farms where they are used (TechnoServe Rwanda, 2008).

Moreover, fodder conservation techniques (silage or haymaking) that could be effective during the dry season are poorly adopted. Indeed, there is a relative overproduction of fodder during the rainy season and the opposite in the dry season. For most of the family farms, the quantities of fodder produced are not enough to make silage possible. However, haymaking can be carried out anywhere (*ibid.*).

Finally, in some regions of the country, particularly in Mutara and Bugesera (both in Eastern province), water availability in the required quantity and quality, especially during the dry season, continues to be a major problem. Livestock development in these regions requires the construction of water dams or water wells for cattle watering throughout the year (ibid.). In regions such as the highlands, the widespread adoption of zero-grazing has amplified the problem of water availability and access. With the cattle being kept within stalls, the animals can no longer drink from rivers. This requires water collection and transport to the zero-grazing units, generally on the head and over long distances. This chore is often performed by the household's women and girls, who are already overburdened with their households' responsibilities. Therefore, the animals often do not have enough water to drink.

Other constraints

At the MCCs, typical constraints include low milk supply to most MCCs and hence to processing plants, challenges with poor hygienic handling of milk, lack of adequate input and service providers in some areas, and lack of an adequate supply of local qualified dairy technicians (TechnoServe Rwanda, 2008). Lack of infrastructure is a major constraint to the expansion of dairy production and dairy value chains. Producers without good road receive the lowest average cost per litre of milk and face challenges in delivering it to MCCs.

There are still issues regarding the participation of women in value chain governance. There is still room for improvement regarding their participation in the decision-making boards of cooperatives. It has been indicated that both men and a women in the same family are members of a MCC and the head of the family (often a man) represents the both in the meetings. Cooperative members also comprise other single women or widows. However, with respect to participation in decision-making boards, at best women take roles that are traditionally gendered, for example, as secretaries. Cooperatives are generally chaired by men.

Moreover, farmers at the study sites also expressed a concern with poor youth participation in dairy farming. Farmers, especially in Nyagatare, are worried that dairy farming will disappear with their generation. One elderly male farmer explained:

I sold off my oxen to educate my children. Three of them are attending higher education. Their

younger sister is still in high school. Those who finished higher education are not yet employed. Surprisingly, they are not interested in farming. I discussed it with them as an alternative employment option and all of them laughed at me. I am worried that if I die, my cows will follow me. This young generation is lazy. Just putting on trousers and shoes, and you are proud of your education, nonsense!

– Male farmer, FDG in Nyagatare.

However, another participant explained why the young generations are not interested in dairy farming.

When your child was born, he saw you poor with cattle. You looked after them but you became poorer. Every man's dream is to be rich. The day when you will convince your children that they can be rich through selling milk, they will join your project. However, if you are still struggling with your cows, you have no power to influence them.

– Male farmer, FDG in Nyagatare.

Finally, it should be recognized that land scarcity is also a major constraint (TechnoServe Rwanda, 2008). Many households live on less than 0.5 ha of land. Dairy farming competes with other agricultural activities, all of which are negatively affected. Farmers cannot produce forage and the family has no land to farm food items. They become poor and poorer. Further, it is noted by Kairaba and Simons (n.d) that at an estimated population growth rate of 2.9 per annum, the problem of land scarcity is likely to become worse (ibid: 4). Finally, it is made clear by UNDP (n.d) that “[I] and scarcity drives environmental degradation, while environmental degradation exacerbates the effects of land scarcity” (ibid: 9).

3.2.6 The influence of dairy development programmes on gender equality

The Girinka Programme has been the most widespread dairy development initiative in recent years, supported by the government and NGO programmes.

When the Girinka Programme was initiated in 2006 by President Kagame, the aim was to use livestock asset transfers to increase productivity in the livestock and agriculture sectors, and hence drive improvements in household incomes and poverty reduction among the rural poor. Over 130 000 of the poorest rural families have received a Girinka cow (Argent, Augsburg and Rasul, 2014). Girinka

is one of the tools of social protection whereby farmers with more than 0.7 ha received a cow while those with less than 0.7 ha received small animals like goats, rabbits and chickens. After asset transfer, the sector level veterinary officers control the progress (UNICEF, 2011).

The Programme was implemented by government agencies and development partners. In general, the programme has been a success in terms of increased agricultural production, enhanced food security, increased livestock ownership and improved nutrition, as well as increased social cohesion (Ingabire, 2013). While some assets have been transferred by the Government and development partners, the “passing on the gift” makes the scheme more productive. According to the United Nations Children’s Fund (UNICEF, 2011) *“the system includes parameters that require recipients to pass on the offspring of their initial cow onto others, creating a multiplier effect to maximize and pass on the benefits of the initial investment and ensure a sense of communal responsibility for the success of the Programme.”*

In terms of gender outcomes, as previously mentioned in section 3.1.2, both men and women have benefitted from the programme and the participatory training that comes before asset transfer has strengthened gender equity (Baijukya, Kantengwa and Nyamwasa, 2012). The programme increased economic power of women which not only reduced poverty among poor women beneficiaries but also promoted gender equality both at household and community levels (Gender Monitoring Officer, 2010).

However, the programme has not overcome one important challenge to women dairy farmers, namely access to finance. As noted in section 3.2.5, women’s access to credit for agriculture was low. It is not evident (although not study has yet specifically addressed this issue) that their ability to access loans to invest in dairy production or bio-digesters for biogas has increased during the life of Girinka. Biogas energy from cow dung was expected to reduce deforestation and greenhouse gas emissions in the atmosphere. While some farmers have achieved this, evidence suggests that affordability of bio-digesters has limited uptake. As such, women and girls traditionally responsible for the collection of wood for their households are not yet being relieved (Kayigema and Rugege, 2014).

Further, women’s access to extension has not notably improved, as discussed in sections 3.2.4 and 3.2.5. In addition, since Girinka is focused at the producer level, it has not influenced another

important gender issue, which is the relatively low participation of women in other parts of the dairy value chain. Some farmers perceive that engaging in dairy farming is a risky business as cross-breed dairy animals are less apt to cope with unpredictable fluctuations in the environment or disease outbreaks and require more careful feeding to realize their potential (Argent, Augsburg and Rasul, 2014).

3.2.7 Value chain governance

The Government of Rwanda and development partners have been supporting the dairy value chain from policy to implementation levels. The Government has provided both policy and institutional support to inclusive dairy development. International development partners including FAO, Heifer International, Land O’Lakes and Send a Cow have worked to ensure that dairy development is gender sensitive.

Dairy value chains are heterogeneous, with many actors in both the formal and informal chains. In the informal market, no individual node or actor has a notably stronger influence than others over the operation of market channels.

In formal chains, MCCs and processors are influential, acting as concentration points within the chains and influencing the quality of milk accepted into the chain, and in some cases, the quality of services provided.

MCCs have some negotiation power with bulk purchasers but may also be vulnerable since they are dependent on the presence of large processors to provide an assured market. In the surveyed sites, monopsony was noted with prices highly influenced by large processors, and it is exacerbated by the lack of proper transport infrastructure from MCC to processor. With proper connections from MCC to processor, farmers have a guaranteed market, but the market is not always assured, which limits the power of formal value chains to attract farmers.

Large processors such as Hadji Enterprises and Inyange are undoubtedly powerful partners in the dairy value chain, yet they compete with informal milk markets. Most processors do not operate at their full capacity.

Field evidence from this study highlights gender issues in the governance of formal dairy value chains, with men being most influential in the running of MCCs and processing plants and hence in the governance of the chains. Table 13 outlines dairy value chain governance.

TABLE 12
Gender in dairy value chain governance

Value chain link	Organizations/institutions involved and participation of women and men	Governance mechanisms
Production	Household/family. Men and women participate unequally in dairy value chains. Women's participation is intense at the production level.	Household decision-making influenced by community norms. Some men seek advice from their wives on major decisions. In women-headed households, women are more involved but may seek support from a male member of the family or neighbourhood.
Service providers	Inputs and services providers: Sector veterinarians, drug shops, private veterinarians. Some participation of women but dominated by men. NGOs provide training and or assets in line with government guidelines. NGOs have gender mainstreaming guidelines, whereas most service providers do not.	Sector veterinarians serve farmers when called upon and also provide Government-organized services such as vaccination and control of outbreaks of notifiable disease. Other input providers respond to needs of their clients but have no formal contract with them. MCCs may have agreements with private veterinarians.
Milk transportation and trading	Farm-level milk transporters: Usually individual operators, generally young men but there are a few cases of women who hire men to transport their milk.	Verbal agreements between farmers and transporters. Formal contracts between transporter and MCC; not essential but many transporters operate on account with MCC. MCC may mediate between farmers and transporters in case of disputes.
	Milk traders: May be individual operators or small businesses. Generally male-run but a few examples of female-owned businesses.	Purchase milk and milk products from different suppliers with no contractual obligation to guarantee purchases.
MCCs/ chilling plants	Dairy producer organizations: Generally, run by formally established co-operatives, each with a governing board and management hierarchy. Married women are members but represented by their husbands. Both men and women are employed by MCCs but few women hold leadership positions. However, some women may be deputies or assume secretarial jobs on management boards.	MCC are cooperatives and are expected to abide by government guidelines, which include participation of all members and free accession. Regular meetings are held (ordinary and extraordinary). This is a formal structure with a governing board. MCCs have no contracts with transporters. They receive all suppliers of milk whether members or not, as long as milk abides by quality standards. Some are supported by processors and may have formal contract with them.
Processing	Processing plants: Inyange Industries, Masaka Farms, Nyanza Dairy Industries, Agrira Gitereka, Crystal Milk, Blessed Dairies and Hadji Enterprises with different sizes, processing capacities, technologies and markets. Women and men work for processing firms, but women have limited representation in leadership and management.	Practices are different. Inyange, for example, supports Nyagatare farmers in terms of training and some equipment within a five-year contract. Other processors are in informal agreements for milk supply.

Source: Results of present study, 2015.

3.2.8 Scalability of dairy development

The contribution of milk on Rwanda's GDP has room for expansion based on demand for milk and dairy products, but as previously discussed, meeting the demand will require investment at all levels: national investment in transport and electricity infrastructure; investment in cold chain infrastructure within formal value chains; investment in technology and training at the farm level; and investment in service provision to farmers.

These investments are needed to make distribution more efficient and reduce the current 38 percent of loss due to spoilage so that processors can operate at more than the current 20 percent of their installed capacity (USAID, 2009). They

are also required to ensure that smallholder dairy farmers, who are likely to be the main suppliers of milk for the foreseeable future, can reliably supply milk of good quality and be assured of a market. Specifically, new interventions would target opening and running dairy farms and milk processing plants; collecting, cooling and marketing milk and milk products from farmers; strengthening the links between farmers, milk processors and distributors; conducting market research and education relevant to specialized groups within the dairy industry; and providing essential services to dairy farmers and processors (registration, licensing, veterinary services, and livestock inputs) to promote private sector investment.

Regarding scalability of the Rwanda's dairy value chains, it is important to consider gender mainstreaming along the value chain. For instance, farmers not only need technical training on disease prevention but also the role of men and women, boys and girls needs to be harnessed in such a way that all equitably benefit from dairy farming. It is evident from the information gathered during this study that despite Rwanda's central gender policies and the Gender in Agriculture (2010) policy, the formalization of dairy value chains does not automatically addresses gender inequalities; rather, women have largely remained in production and within traditional roles. The next chapters discuss what efforts can be made to promote gender equality in the implementation of the national dairy strategy.

Chapter 4

Conclusions

This assessment sought to understand the roles of men and women in the Rwanda's dairy value chains and the economic opportunities that each can access. It also highlighted different challenges and constraints that hamper the performance of the dairy chains and how they affect men and women.

Findings of the study must be seen in the context of the NDS, which proposes to expand national milk production through increased productivity of animals and promotion of more efficient and expanded formal dairy value chains.

The shift from extensive towards zero-grazing production promoted by Girinka and other smallholder dairy development programmes has already changed gender roles in many locations. The effect of this shift can be seen by differences between Nyagatare and the other two study sites. It brings the possibility of a higher income for the family farm, but also a larger workload for both men and women and a greater responsibility for women in daily care of cattle. At the same time, women are disadvantaged by their lack of knowledge and skills, particularly related to animal health, and training provided by government agencies and NGOs is often channelled through men.

Expanded milk production is likely to rely heavily on production from small herds. Many farmers may be willing to expand herd sizes but have limited opportunity to do so, with land and workload being major limitations. Moreover, there is inconsistent availability of water, proper roads, electricity and drugs. The national plan relies on increased volumes of production without increases in milk price, yet many smallholder farmers hardly value the profits in their enterprises and lament about low prices. They appear to value other non-financial benefits more – yet evidence from this study and others points to profits made by the dairy enterprises. Improvement in support services is likely to be key to increased productivity, providing an opportunity to promote gender equality, since services such as AI, feed sales and provision of animal health services are currently

dominated by men and not tailored to the needs of female clients.

It is government policy to promote formal dairy value chains (i.e. those passing through an MCC). This has positive implications if, for example, it will include improvements to transport infrastructure so that less milk is wasted because long transport time from supply sites to collection centres and processing plants is reduced. Improvement of electricity supplies to MCCs would also be a positive feature, making these centres more competitive.

However, there may be negative gender implications, as the study found that women are less represented than men in most parts of the formal chain. Promotion of formal chains without due attention to equality might tend to marginalize women even further.

At the transportation level, women's participation is almost non-existent. Men carry milk on motorbikes, bicycles, or hand deliver milk to MCCs. Women can only participate through men who are hired to use their bicycles, which reduces their revenues. Increased participation in this area would require a local culture change to expand the use of bicycles and motorcycles by women.

While women are members of MCCs together with their husbands, or on their own if they are single or widows, their participation in cooperative leadership is not significant. Men dominate decision-making positions. The non-participation of women in management and leadership may arise for many reasons – workload, inconvenient timing of meetings, unfamiliarity with management procedures, or discomfort at being the only women on a board – but it is often possible to overcome them by positive action. The large number of women elected to central government demonstrates that it is possible for Rwandan women to function effectively in public office.

Processing plants face the problem of operating well below their production capacity – and therefore with low profits – due to lack of milk

supplies. For the NDS to succeed they will need to process a larger share of the national milk supply and, in the process, can be expected to expand their already visible influence in the operation of dairy value chains. If these chains are to be gender sensitive, it will be essential for women to be well represented in processing plants and the organizations that own them. Currently, men and women are employed by the plants, but there could be opportunities to increase the participation of women by encouraging younger, educated women to apply for skilled labour positions. As with MCCs, women are little represented in the leadership and management of processing organizations, and this will need to change if dairy development is to be truly gender sensitive.

Processors face competition from the informal market milk as well as imported milk and milk products. Informal markets, for which quantities are hard to assess, have been competing with formal value chains as they charge lower prices and do not follow quality standards. Even with the promotion of formal chains, it is unlikely that informal outlets will disappear, particularly in rural areas. They play a valuable role in supporting local livelihoods and are important for women's livelihoods. However, by being in the informal market, women producers remain small, with limited room for economic improvement; consequently, incentives would be needed to encourage formalization.

Chapter 5

Important considerations when developing gender sensitive dairy value chains

The points made in this section draw on the conclusions from chapter 4 to provide general guidance for gender sensitive development of dairy value chains in Rwanda. They are intended as a companion to technical recommendations on the sustainable development of dairy value chains, not a substitute.

- **Gender sensitive dairy value chains must be built on the foundation of a solid business model in which the value chain is financially sustainable.** A successful gender sensitive value chain is one in which all actors, including women and men, can make a sustainable profit without long-term, external interventions. A chilling plant is an essential component of a formal dairy value chain, and external support may be needed in the early stages of development to ensure that the chain as a whole benefits women and men participants.
- **Gender sensitive dairy value chain development is underpinned by government policies. In addition, each value chain development programme requires a gender strategy.** Largely, the Government of Rwanda has put in place a gender strategy. Each ministry and government agency is challenged to gender mainstream its interventions. The Ministry of Agriculture has a tailored gender strategy dubbed *Gender in Agriculture Strategy*. While this serves as an overall guideline, each NGO involved in developing dairy value chains is required to have its gender mainstreaming policy or strategy to guide all the project stakeholders, especially staff members. For example, Send a Cow uses its *household transformation methodology*. Land O'Lakes is inspired by the *Women's Empowerment in Agriculture*. Efforts are being made by the Land O'Lakes Gender Specialist to fine-tune the in-house gender strategy. Both the *Gender in Agriculture Strategy* and the *Women Empowerment in Agriculture* may be useful resources for future projects.
- **Development of a Rwandan dairy value chain is a partnership between the Government of Rwanda, development agents (whether private or public) and local communities.** Before a dairy value chain is put in place, the promoter (an NGO, for example), consults the Government, especially the Ministry of Agriculture and its agencies, for policy and data guidance. Targeted farmers must also be consulted both in needs identification and initial programme implementation. Their participation is ensured through awareness raising, and capacity building. Moreover, the private sector federation and its members involved in milk and processing need to be consulted, as they are key partners in value addition. Finally, other NGOs operating in the same domain and geographical area of intervention need to be consulted in the District's joint action for development forum. As women tend to be under-represented in local decision-making bodies related to dairy value chains and in the management of private companies, it is important to build consultation mechanisms that solicit their ideas.
- **Development design must be driven and owned by the communities (all ages, sexes) for whom the intervention is designed.** It is important to consider whether communities are used to participating in the initiative, and at what level. Each dairy value chain development initiative should consider how participation of both women and men be enhanced
- **Development design must be based on the practical reality of the communities for whom the intervention is designed (including all ages and all sexes).** This is true of any value chain intervention and it also applies to dairy value chains. Supporting actions to promote gender equality may involve carrying out a quick baseline survey including: an

assessment of the political and institutional framework; listing of possible and actual partners, their activities and interests; listing and talking with other stakeholders and identifying their interests, especially regarding the policy, practice and experience related to gender equality; unveiling gender roles and responsibilities and the use of time; clarifying household management and functioning dynamics; clarifying asset ownership dynamics (including land and livestock); reviewing social capital dynamics; and ensuring that there is distinction between what the community can do themselves, and what they cannot do without external support

- **Efforts must be made to ensure the active involvement of women in dairy development activities and to expand their involvement in activities other than milk production.** While this varies geographically, women tend to be more active in production rather than in other post-production nodes. For example, women who try to participate in the transport of milk from farms to MCCs have depended on men since they do not ride bicycles and motorbikes. Women are less involved in decision-making bodies of cooperatives other than general assemblies.
- **In order to ensure equal participation of men and women in dairy production, all technical staff of dairy development projects should be sensitized to gender issues and trained in gender analysis.** This will avoid repetition of previous examples of exclusions, for example, when development projects organizing awareness raising and capacity building have sent invitations to farmers, with men involved as the invitees. At the same time, experience suggests that even if targeting women only, men should also be involved; otherwise, they will resist changes. Both men and women still need more capacity building in the management and marketing of dairy products, basic milk transformation, and forage production. However, a more in-depth needs assessment is required since needs vary geographically.
- **Support to dairy value chain inputs and services should be gender-sensitive.** Actions may include the following:
 - Assessing the availability of inputs (e.g. vet services – who provides them, what is the perception of farmers towards the service provider? Is the perception founded

on good evidence? Are service providers accessible to women and men?

- Including both men and women in input needs assessments and seeking perspectives both men and women beneficiaries.
- Providing opportunities for women and men to be trained in service provision activities such as artificial insemination.
- **Support to dairy producers including linkages to MCCs should be gender-inclusive.** Actions may include:
 - organizing study tours for men and women farmers to draw on best practices recorded to date from their peers;
 - training women and men farmers in book-keeping so they may know the actual expenses and incomes in their dairy production.

Government and development partners may find it essential to organize more training and awareness-raising campaigns for women to actively participate in milk value chain governance right from input provision throughout the value chain. Such training opportunities may target both men and women at different levels of the value chain.

- **Promote the involvement of women as well as men in MCC management leadership positions.** Actions may include:
 - locating MCCs at a distance that is convenient to both men and women members;
 - holding meetings at times when all members are available considering men's and women's roles outside dairy enterprises;
 - increasing awareness-raising regarding women's participation in MCC boards;
 - supporting opportunities to address issues that are a concern for household nutrition and health, such as contamination and recontamination of milk.
- **Promoting responsible management of businesses associated with ethical and gender responsive dairy value chains that include principles of “decent work” and no child labour.**
- Monitor the development of the dairy value chain to ensure that it is responsive to age, gender and diversity. The following actions help towards compliance with these principles:
 - A policy to share resources on gender should be developed by implementing partners, including evaluation reports, gender strategies, and other guiding documents in

easy, user-friendly and accessible formats (e.g. their websites), which may help avoid a duplication of efforts.

- A list of gender inclusivity indicators against which to monitor progress should be developed. These may include qualitative and quantitative indicators on gender equality as well as on how the performance of the dairy value chain affects women and men differently.

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Annex 1

List of Key Informants

SN	Position	Organization
01	Supply chain Director	Inyange Industry
02	Farmer mobilization Team Member	Inyange industry
03	Production Manager	Masaka Farmers
04	Gender Specialist	Land O'Lakes
05	Dairy Value Chain Specialist	Land O'Lakes
06	ProgrammeManager	Heifer International
07	Country Director	Heifer International
08	Project Manager	Send a cow
09	Director of Operations	Hadji Enterprises
10	Executive secretary	UN Women
11	Country Manager	NAKUMATT
12	Plant Manager	Savannah Processing Plant
13	General Manager	IAKIB
14	MCCs Coordinator IAKIB	IAKIB
15	Milk seller	Inyange MIJO Milk zone
16	Milk seller	Inyange Mijo Milk zone
17	Milk Seller	Twine milk suppliers
18	Milk seller	Cristal Milk
19	Executive Secretary	CNF
20	Executive Manager	Woodland Super market

Annex 2

Milk collection centres visited

SN	MCC name	Location
01	Agira Gitereka	Nyanza – Huye
02	Bweya Cyenjojo Rwempasha Kazaza (BCRK)	Nyagatare
03	IAKIB	Gicumbi
04	Giramata	Busoro / Nyanza
05	Gwizimukamo	Nyanza
06	MCC Union	Ny
07	Kamate	Nyagatar
08	Kirebe	Nyagatare
09	Twitezimbere Bacunda	Gicumbi

Annex 3

Focus group discussion participants

		Males	Females	
Gicumbi District				
FGD1	Milk transporters	20*	0	
FGD2	Milk transporters	5	0	Motorcycles
	Milk traders	2	4	Milk bars
	Dairy farmers	2	3	Milk bar attendants
	Provides support services	2	1	Agrovet shop
	Sector agronomist	1	0	Livestock extension worker
	SUB-TOTAL FGD2 (20)	12	8	
FGD3	Milk transporters	3	0	Motorcycles
	Milk traders	3	5	Milk bar
	Dairy farmers	4	4	Milk bar attendants
	Provides support services	2	2	Agrovet shops
	Sector agronomist	1	1	Extension worker
	SUB-TOTAL FGD3 (25)	13	12	
TOTAL GICUMBI FGDS		45	20	

*This is an association of milk transporters

		Males	Females	
Nyagatare District				
FGD1	Milk transporters	4	0	Motorcycles
	Milk traders	2	4	Milk bars
	Dairy farmers	2	2	Milk bar attendants
	Provides support services	2	1	Agrovet shop
	Sector agronomist	1	0	Livestock extension worker
	Sub-total FGD1(18)	11	7	
FGD2	Milk transporters	2	0	Motorcycles
	Milk traders	2	3	Milk bar
	Dairy farmers	4	2	Milk bar attendants
	Provides support services	2	1	Agrovet shops
	Sector agronomist	1	1	Extension worker
	Subtotal FGD3 (18)	11	7	
FGD3	Milk transporters	3	0	Motorcycles
	Milk traders	3	5	Milk bar
	Dairy farmers	2	2	Milk bar attendants
	Sector agronomist	1	1	Extension worker
	SUBTOTAL FGD3 (17)	9	8	
TOTAL FGDS NYAGATARE		31	22	
Nyanza District				
FGD1	Milk transporters	3	0	Bicycles
	Milk traders	2	2	Milk bars
	Dairy farmers	2	2	Milk bar attendants
	Provides support services	2	1	Agrovet shop
	Sector agronomist	1	0	Livestock extension worker
	SUB-TOTAL FGD1(15)	10	5	
FGD2	Milk transporters	2	0	Bicycles
	Milk traders	2	2	Milk bar
	Dairy farmers	4	3	Milk bar attendants
	Provides support services	1	1	Agrovet shops
	Sector agronomist	1	0	Extension worker
	SUB-TOTAL FGD3 (16)	10	6	
FGD3	Milk transporters	3	0	Bicycles
	Milk traders	3	5	Milk bar
	Dairy farmers	2	0	Milk bar attendants
	Sector agronomist	1	0	Extension worker
	SUB-TOTAL FGD3 (14)	9	5	
TOTAL NYANZA FGDS		29	16	

Annex 4

Households interviewed

Position in value chain	Male	Female
Dairy farmers	1	1
Milk transporters	3	0
Milk traders	1	2
Agrovet owner	1	1
SUBTOTAL (10)	6	4
Dairy farmers	1	2
Milk transporters	2	0
Milk traders	1	1
Agrovet shop owner	1	1
Milk bar employee	0	1
SUBTOTAL (10)	5	5
Dairy farmers	1	1
Milk traders	1	2
Agrovet shops	1	1
Milk transporters	1	0
TOTAL (8)	4	4
OVERALL TOTAL (28)	15 (53.5%)	13 (46.5%)

**Gender assessment of
dairy value chains:
evidence from Rwanda**

The present study is a gender assessment of the dairy value chain in selected sites in Rwanda: Gicumbi, Nyagatare and Nyanza Districts as well as Kigali City. It relies on evidence gathered through fieldwork complemented by a review of specialized background documentation. The findings confirm that women's empowerment is vital for sustainable dairy value chain development and that projects supporting dairy production need to increase their efforts to be gender inclusive. The study provides country-specific recommendations for Rwanda, which also feed into a more general knowledge base on how to develop gender-sensitive dairy value chains.

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