



PERFORMANCE OF MILK COLLECTION CENTRES IN UGANDA

"Facilitating evidence-based policy dialogue on performance of the dairy value chain"



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ACRONYMS AND ABBREVIATIONS

ABCD	-	Area Based Community Development
aBi	-	Agricultural Business Initiative
ACSS	-	Agricultural Consulting and Sector Structuring
AFD	-	Agence Française de Développement (French Development Agency)
AfDB	-	African Development Bank
AGM	-	Annual General Meetings
CAIIP	-	Community Agriculture Infrastructure Improvement Project
DANIDA	-	Danish International Development Agency
DCL	-	Dairy Corporation Limited
DDA	-	Dairy Development Authority
EAC	-	East African Community
EADD	-	East Africa Dairy Development Project
EKN	-	Embassy of the Kingdom of the Netherlands
EU	-	European Union
FAO	-	Food and Agriculture Organisation of the United Nations
FMD	-	Foot and Mouth Disease
GDP	-	Gross Domestic Product
HI	-	Heifer International
ICT	-	Information and Communication Technology
IFPRI	-	International Food Policy Research Institute
KfW	-	Credit Institute for Reconstruction (
MAAIF	-	Ministry of Agriculture, Animal Industry and Fisheries
MAFAP	-	Monitoring and Analyzing Food and Agricultural Policies
MCC	-	Milk Collection Centre
MoFPED	-	Ministry of Finance, Planning and Economic Development
NAADS	-	National Agriculture Advisory Services
NAGRC&DB	-	National Animal Genetic Resources Centre and Data Bank
NARO	-	National Agricultural Research Organisation
NDP III	-	Third National Development Plan
NGO	-	Non-Government Organisation
NPA	-	National Planning Authority
PDM	-	Parish Development Model
SALL	-	Sameer Agriculture and Livestock Limited
SDG	-	Sustainable Development Goal
SIDA	-	Swedish International Development Cooperation Agency
UBOS	-	Uganda Bureau of Statistics
UGX	-	Uganda Shilling
UKAid	-	United Kingdom Agency for International Development
UN	-	United Nations
UNBS	-	Uganda National Bureau of Standards
UNDP	-	United Nations Development Programme
URA	-	Uganda Revenue Authority
USAID	-	United States Agency for International Development
USDA	-	United States Department of Agriculture
WFP	-	World Food Programme

EXECUTIVE SUMMARY

Dairy farming is one of the important and fast-growing sub-sectors of Uganda's economy with more than 2.7 million households depending on it, as a source of regular household income, nutrition and food security. The dairy industry in Uganda contributes to more than 50% of the total output from the livestock subsector, estimated at 3.8% of the GDP and 15.8% of the Agricultural GDP. The industry is therefore crucial for socio-economic development of Uganda and achievement of Sustainable Development Goals. More over, Dairy is one of the 10 priority commodities selected to drive the Agro-Industrialisation agenda under the third National Development Plan owing to its potential impact on improving export earnings and contributing to household nutrition and food security.

In order to promote production and collection of milk, the Government of Uganda established Dairy Corporation in 1967 by an Act of Parliament. A network of about 90 milk collection centres (MCCs) was setup to supply milk to the sole milk processing company in the country to support the corporation. Milk collection started well but later declined drastically due to civil strife. The NRM Government which assumed leadership of Uganda in 1986 prioritized rehabilitation and equipping of MCCs as an attempt to revamp and develop the dairy industry. With support from development partners and civil society, most of the milk collection centres in southwestern Uganda were rehabilitated together with other dairy infrastructure. Following adoption of the Dairy Master Plan in 1993 which recommended liberalization and privatization of the dairy industry as well as establishment of the Dairy Board, the Dairy Industry Act, 1998 was enacted to provide a legal framework for implementing reforms in the dairy industry, including restructuring and privatization of Dairy Corporation and its network of milk collection and bulking centres. Liberalization and privatization of the dairy industry in 1993 attracted significant local and foreign direct investment in the infrastructure for milk collection, bulking, transportation and processing. The increased investments by the private sector, government, development partners and civil society has led to significant growth in milk production, processing, consumption and export. The national annual milk production increased slowly from an estimated 450 million litres in 1990 to 2.81 billion litres in 2021. The proportion of marketed milk going through the formal marketing channel increased from less than 5% in 1990 to an estimated 46% in 2020. The number of rural MCCs also increased to a total of 475 MCCs with a total storage capacity of 2.21 million litres in 2021.

In spite of the growth in cold chain infrastructure across the country, milk collection centres continue to face many operational challenges. Owing to lack of up-to-date information on performance of MCCs, this study was undertaken with technical and financial support from the Food and Agriculture Organisation of the United Nations to Dairy Development Authority, through the AgrInvest Initiative. The study was commissioned to assess the performance of the milk collection centres in the country and to facilitate evidence-based policy dialogue. It covered small-scale rural milk collection centres in the Central, Mid-Western, and South Western dairy regions also referred to as milk sheds. The three regions host more than 87% of the functional rural milk collection centres in the country. A cross-sectional survey was therefore conducted in 12 districts during the last week of October and first week of November 2021 which was a wet season. A sample of 103 MCCs was randomly selected from a list of 384 functional MCCs provided by Dairy Development Authority. Data were collected using a structured questionnaire that was digitized and administered by trained enumerators. Key aspects of MCC ownership and governance, management of the MCC business, Service delivery, and the enabling agribusiness environment were studied as performance measures.

Findings reveal that a total of 51 (49.5%) out of 103 MCCs in the study are owned by dairy farmer cooperative societies and unions. Only 23 (22.3%) belong to milk traders and the remaining 28.2%

belong to milk processing companies, government and individual farmers. Where MCCs are owned by farmer cooperatives, operational decisions are made by the MCC managers while strategic decisions are made by the Board or Executive Committee of the Cooperative. MCCs owned by processing companies and traders tend to have a more well streamlined decision-making process which is more efficient and enable the MCC business to perform more efficiently than MCCs owned by producer cooperatives. Only 49 (47.6%) of the 103 MCCs in the study hold regular Annual General Meetings.

In regards to hiring professional staff, MCCs reported employing an average of four employees with only 15.4 percent being female workers. A total of 99 (96%) of the MCC employed a fulltime Managers and 73 (71%) employed a Milk Assistant who can also perform the duties of a manager. Only 41.6% of the MCC manager had a university degree or diploma, the rest (54.5%) were secondary school leavers who may not have the capacity to supervise the financial accounting function. Meanwhile, with Milk testing and Quality, almost all MCCs (98%) use lactometers and 95% of MCC use alcohol test to measure the quality of milk while 71% of the MCCs carry out visual inspection of the milk. MCCs also reported average monthly expenses of UGX 7,138,647 while the average monthly cost of milk supplied was UGX 50,979,078. High expenditure, was reportedly incurred on milk transportation, diesel, electricity and salaries of employees. Majority (77.7%) of the MCCs pay the milk suppliers every 15 days. Some MCCs (17.5%) pay weekly while a few MCC (2.9%) pay on a daily basis. These has an implication on membership numbers. Farmers with very small income from milk sales cannot afford to wait for a long time. They prefer to sell to buyers who pay cash on a daily basis or after a shorter interval such as one week. Meanwhile, Processing companies prefer to pay MCCs every 15 days while milk traders take a shorter interval. The common method of payment for farmers or members of MCCs is cash used by 33% of the MCCs, followed by a combination of cash and credit at 31%. Bank transfer is used by 14% of the MCC and mobile money by 2%.

Farmgate prices of milk are reportedly determined by, mainly the MCC owners with 31.4% of the MCCs, followed by Executive Committee of the cooperative at 24.6% of the MCCs and milk processing companies at 16.1%. The Cooperative Union and Management of the MCC also determine the price. However, Government stopped setting the price of milk when it liberalized the dairy industry in 1993. MCCs get the highest mean price of UGX 1,193 per litre when they sell milk to local consumers and the lowest mean price of UGX 1,127 per litre when they deliver to bulking centres. They also get a higher mean price of UGX 1,159 per litre when they sell directly to processing companies than when they sell to traders or deliver to bulking centres. Also, the high cost of energy affects the operations of MCCs. The tariff of grid power and the frequent power interruption (average 2.7 times a week) makes the majority (59.5%) of MCCs to depend on diesel generators as the main source of energy. Only 38% operate mainly on grid power. There are no MCCs that use renewable energy sources like solar or biogas for chilling milk. MCCs are encouraged to develop and operate a Hub- Model of delivering a wide range of livestock and business development services. Survey results indicate that majority (80.2%) of the MCCs reported providing at least one service apart from collection, storage, chilling and marketing of milk. The most popular services include milk marketing, milk testing and grading, farmer training and milk transportation. Despite availability of the milk chilling equipment, MCCs incur significant post-harvest losses estimated at 13.6% of the volume received/ collected in a year. Milk is reportedly lost due to rejection of milk by processing plants due to poor quality and the lack of market for the milk collected due to increased supply in the wet season.

Although many MCCs have been set up in the country and are functioning, their performance as a business is sub-optimal. The study proposes increasing the amount of milk available for collection and bulking through an aggressive adoption of climate smart improved technologies for increasing milk production and productivity. It further recommends, scaling up implementation of the one-hub model, linking milk producers to reliable milk markets, promoting application of digital innovations for management of MCC businesses and also promote investment in renewable energy sources for operating the milk cooling equipment in rural areas.

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The field data collection team, leaders of the milk producer cooperative societies and unions, Milk Collection Centre Managers, District Veterinary Officers and the field Veterinarians played a key role in facilitating field data collection. We greatly appreciate the data provided by milk processing plants, milk transporters, milk collection and bulking centres, as well as the dairy farms. The effort of everyone who contributed to the successful implementation of this study is greatly appreciated.

1. INTRODUCTION

1.1. Background

Dairying is one of the important and fast-growing sub-sectors of Uganda's economy. More than 2.7 million households depend of dairying as a major source of livelihood (MAAIF, 2021). Many resource poor households in rural areas depend on sale of milk as a source of regular household income. Milk is also a very important source of nutrition and food security for herders/ cattle rearing households in the semi-arid cattle corridor of Uganda which extends from the south-western districts bordering north-western Tanzania and northern Rwanda through the central region of Uganda to the north-eastern districts bordering north-western Kenya as shown in Annex I. The dairy value chain provides numerous employment opportunities starting with supply of inputs and provision of support services to milk production, aggregation, transportation, processing and marketing of value-added dairy products.

The dairy industry is estimated to contribute more than 50% of the value added by the livestock subsector, estimated at 3.8% of the GDP and 15.8% of the agricultural GDP which was estimated at 24% of the GDP in 2019/20 (UBOS, 2020). The dairy industry is therefore crucial for socio-economic development of Uganda as well as achievement of Sustainable Development Goal (SDG) number 1, which is to "end poverty in all its forms everywhere", and SDG number 2, which is to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture".

Dairy is one of the 10 priority commodities selected by Government of Uganda to drive the Agro- Industrialisation agenda under the third National Development Plan (NDP III) 2020/21 – 2024/25 (NPA, 2020). The list of priority commodities was later expanded to 18 following guidance from the Cabinet to integrate more commodities into the Parish Development Model (PDM) (MoFPED, 2021). The commodities were prioritized owing to their potential impact on improving export earnings and the significant contribution to



household nutrition and food security (MoFPED, 2021). The prioritization also considered the Area Based Commodity Development (ABCD) approach which ensures representation of all agro-ecological zones.

The Agro-industrialization programme promotes value addition to agricultural raw materials such as milk in order to increase export, achieve import substitution and reduce post-harvest losses (NPA 2020). Government supports interventions to increase production and productivity, improve post-harvest handling and storage, as well as increase agro-processing and value addition, market access and competitiveness of agricultural products in the domestic and international markets. Government also supports interventions to increase mobilization, access and utilization of agricultural finance and to strengthen the institutional capacities for delivery of the agro-industrialization agenda (NPA, 2020).

1.2. Description of a typical milk collection centre (MCC)

A milk collection centre is a facility where small scale milk producers in rural areas deliver milk from their farms for aggregation before it is delivered to a larger facility called the bulking centre. The MCC may also sell milk directly to processing companies, traders and other consumers. The MCC infrastructure is composed of the premises (land and building) and the milk chilling equipment or milk cooler with accessories such as the dump tank and hose pipe, as well as milk testing equipment, milk cans, buckets, jugs, cleaning materials. The MCC may also have other assets such as office equipment, furniture, motor cycle or motor vehicle, veterinary and artificial insemination equipment among others. The milk cooler may be connected to grid power but most MCCs also possess power generator sets operated on diesel. The MCC may employ a manager or Milk Assistant, Accountant or Accounts Assistant, and Laboratory Technician, as well as temporary labor providers, and drivers depending on the size of the MCC business. The MCC may be owned by a dairy farmer cooperative, milk processing company or an individual entrepreneur / milk trader. Some MCCs are owned by government and farmers. In some cases, the MCC owner may rent the premises (land and buildings) or even the entire MCC infrastructure.

1.3. Establishment of milk collection infrastructure

Historically, organized milk collection and processing in Uganda began in the 1960s. According to FAO (<http://www.fao.org/3/t3080t/t3080T04.htm>) milk processing and distribution in Kampala was initially operated by a private company, Uganda Milk Processing Limited, that was importing fresh milk from Kenya. In order to promote production and collection of milk locally, Government established Dairy Corporation in 1967 by an Act of Parliament. The Corporation established a network of milk collection centres in different parts of the country. By 1972, almost 20 million litres were collected by a network of about 90 milk- collecting centres. Milk collection rapidly declined to almost nil by 1977 due to civil strife.

Since 1986 when the National Resistance Movement (NRM) took over the leadership of Uganda, government has continued to prioritize development of the dairy industry, resulting in increased investments in rehabilitation of old milk collection infrastructure and establishment of new MCCs by government, development partners, civil society and the private sector. Many development partners have participated in financing the rehabilitation and establishment of new milk collection infrastructure since 1987. An earlier report by FAO (Balikowa, 2011) gives details of the financial contribution of different development partners towards rehabilitation and development of the dairy industry since 1987.



World Food Programme (WFP) provided skimmed milk powder and butter oil that were reconstituted into liquid milk and marketed by the government owned Dairy Corporation between 1988 and 1993. The financial proceeds were invested in rehabilitation of the infrastructure for milk collection, bulking, transportation and processing (Balikowa, 2011). The African Development Bank (AfDB) provided a loan to the Government of Uganda, part of which was used to purchase new milk coolers. United Nations Development Programme (UNDP) provided funds that were used by FAO to implement the Dairy Industry Development Project -whose objective was to coordinate the dairy industry rehabilitation programme, in collaboration with the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Dairy Corporation, Dairy Development Committee and farmer groups.

Government adopted the Dairy Master Plan in 1993 which recommended liberalization and privatization of the dairy industry. The Dairy Industry Act, 1998 provided legal framework for implementing the recommendations of the Master Plan including restructuring and privatization of the sole government owned milk processing company in the country, Dairy Corporation. The latter was restructured into a commercial company, Dairy Corporation Limited (DCL), that took over all the functional government owned MCCs before it was privatized. The non-functional government milk collection centres were allocated to the newly created Dairy Development Authority. The latter has since, invested in rehabilitating several dilapidated MCC infrastructure in different parts of the country and handed them over to organized farmer groups for milk collection.

Many development partners have participated in financing the rehabilitation and establishment of new milk collection infrastructure since 1987. An earlier report by FAO (Balikowa, 2011) gives details of the financial contribution of different development partners towards rehabilitation and development of the dairy industry since 1987.

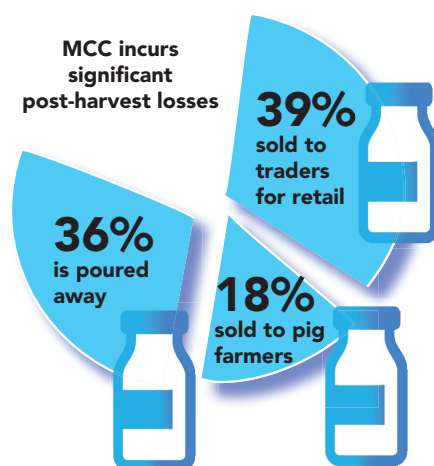
Sameer Agriculture and Livestock Limited (SALL), the private investor that acquired Dairy Corporation Limited (DCL) expanded the network of milk collection centres in different parts of the country. The dairy industry has continued to attract massive public and private sector investments in the infrastructure for milk collection, bulking, transportation, processing and marketing. The private sector, civil society (dairy sector NGOs) and government financed the procurement of a large number of milk coolers and establishment of many new milk collection centres in different parts of the country. By 2010, Uganda had 398 milk cooling tanks in rural areas with a total storage capacity of 591,000 litres (Balikowa, 2011). By 2021, the country had 475 milk collection centres with a combined storage capacity of 2.21 million litres (DDA, 2021). A large number of milk collection centres have more than one milk cooler, each of which has a storage capacity ranging between 3,000 and 10,000 litres. Many of the MCCs financed by civil society and government are given to the primary cooperative societies and unions of dairy farmers.

Dairy Development Authority, through the Agricultural Consultation and Sector Structuring (ACSS) funded by the French Development Agency (AFD), procured and donated many milk coolers to dairy farmer cooperative societies and Unions in south western Uganda.

The Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) facilitated the establishment of milk collection centres in different parts of the country. The Ministry of Local Government through the Community Agriculture Infrastructure Improvement Project (CAIIP) funded by AfDB provided milk coolers to dairy farmer groups. Dairy Development Authority, through the Agricultural Consultation and Sector Structuring (ACSS) funded by the French Development Agency (AFD), procured and donated many milk coolers to dairy farmer cooperative societies and Unions in south western Uganda. The National Agricultural Advisory Services (NAADS) also procured and donated milk coolers to many farmer groups. In 2015, the Agricultural Business Initiative (aBi) funded by development partners such as DANIDA, USAID, SIDA, UKAid, KfW, EU and EKN facilitated dairy farmer cooperatives and dairy enterprises to acquire a total of 100 milk coolers and 10 insulated road tankers through a combination of loans and grants (cost sharing) (aBi 2015). The farmers were able to sell 66 million litres of milk through the milk collection centres (MCC). The volume of milk sold increased to 78 million litres in 2017 (aBi 2017). The East Africa Dairy Development (EADD) Project of Heifer International supported many milk producer cooperatives to acquire milk coolers with credit from financial institutions. Land O' Lakes funded by USAID and USDA also supported farmer groups to establish the infrastructure for milk collection.

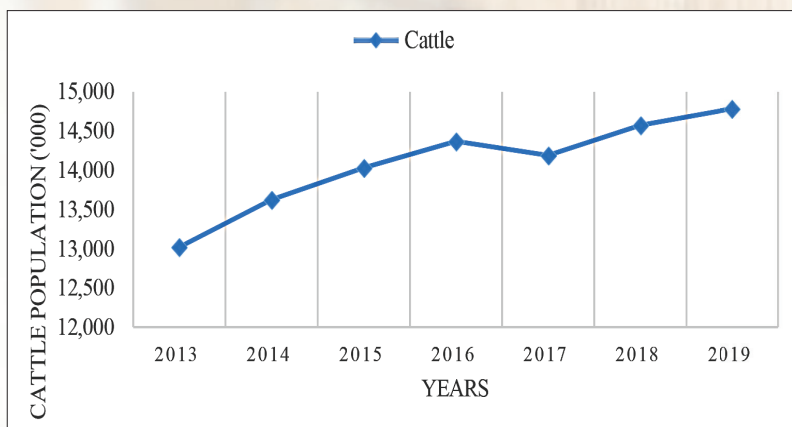
1.4. Milk production and collection capacity

The expansion of milk collection, bulking, transportation and processing capacity have had a profound impact on the production, processing, domestic consumption and export of milk and dairy products. Milk production is still dominated by small scale producers keeping indigenous breeds of cattle (Balikowa, 2011). Out of the national herd of 14.6 million cattle, 9 in every 10 (13.6 million) are



indigenous (UBOS, 2020). Productivity levels are very low owing to the low input-low output production system. Animals are mainly grazed on poor quality natural pastures, with little or no supplementation with commercial feeds. The cattle population has been increasing slowly from 13.02 million head of cattle in 2013 to 14.785 million in 2019 (UBOS, 2020). Figure 1 shows the cattle population growth curve between 2013 and 2019.

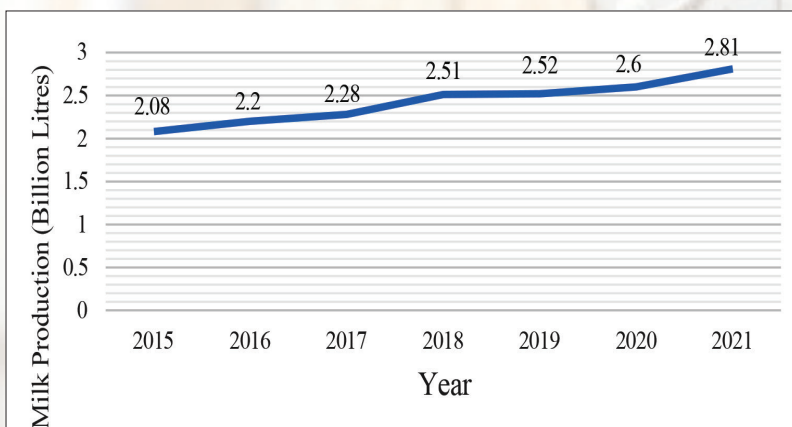
Figure 1: Uganda's cattle population, 2013-2019



Source: (UBOS, 2020)

National annual milk production has also been increasing slowly from an estimated 2.08 billion litres in 2015 to an estimated 2.81 billion litres in 2021 (DDA, 2021). Figure 2 shows the annual milk production curve between 2015 and 2021. Much of the increase in milk production is attributed to the increase in cattle population and widespread adoption of improved dairy breeds particularly in the southwestern region.

Figure 2: Annual milk production estimates, 2015-2021



Source DDA Annual Report, 2021

It is estimated that the proportion of marketed milk increased from 64.8% in 2010 to 82% of the total quantity produced in 2020. The proportion of marketed milk going through the formal marketing channels also increased from 12.7% (Balikowa, 2011) to an estimated 46% (DDA, 2021).

In order to access the formal milk marketing channel, small scale milk producers require access to milk collection centres which test and aggregate the milk before delivering it to the bulking centres from where it is taken by insulated road tankers to the processing plants.

The government of Uganda together with development partners and civil society have played a key role in helping organized small scale milk producers to acquire the necessary infrastructure for establishing rural milk collection centres.

The private sector, particularly milk processing companies and individual entrepreneurs (traders) also established many milk collection centres in different parts of the country.

According to DDA, the number of rural milk collection centres in Uganda increased from 335 with a storage capacity of 1.5 million litres in 2014 to a total of 475 with a storage capacity of 2.21 million litres in 2021 (DDA, 2021). It has been observed that much of the infrastructure for milk collection, as well as bulking, transportation and processing in Uganda is grossly underutilized in the dry season due to the short supply of milk.

The low capacity-utilisation of milk collection centres impedes achievement of economies of scale and leads to poor performance of the milk collection business. It has also been observed that many milk collection centres incur post-harvest losses as a result of rejection of milk by the bulking centres and processing plants due to poor quality.



1.5. Rationale for the study

Most milk collection centres are established in remote rural areas close to the small-scale milk producers where they encounter challenges to operate efficiently. Owing to the small scale level of operations, many MCCs lack the capacity to hire qualified human resources such as Manager, Accountant and Laboratory Technician. They often lack funds to purchase milk testing equipment and laboratory consumables leading to the inability to test and grade milk. The poor condition of rural feeder roads makes it difficult to transport milk from MCCs in remote rural areas to the bulking centres and urban milk markets leading to higher post-harvest losses. Access to reliable and cheap sources of energy, clean water, and waste water disposal facilities is a major bottleneck in the operations of rural MCCs. The reduced supply of milk in the dry season affects the ability of MCCs to attain economies of scale and optimum performance of the agribusiness. Owing to lack of up-to-date information on performance of milk collection centres, this study was undertaken with technical and financial support of the Food and Agriculture Organisation of the United Nations to Dairy Development Authority, through the AgrInvest Initiative. The findings will be used to facilitate evidence-based policy dialogue on performance of the dairy value chain and to guide future policy and investment decisions.

1.6. Objectives

The objectives of the study were to:

- i) assess the performance of milk collection centres with a view to recommending the necessary measures to improve performance of the milk collection agribusiness; and
- ii) facilitate evidence-based policy dialogue on performance of the dairy value chain.

1.7. Scope of the Study

The assessment was restricted to the small-scale rural milk collection centres. It did not include the large bulking centres and the urban milk sales outlets.



2. METHODOLOGY

2.1. Study Area

Uganda is divided into six dairy regions referred to as milk sheds basing on agro-ecological factors, as well as the milk production and marketing situation (Balikowa, 2011). Annex II is a map of Uganda showing the six milk sheds, namely Central, Eastern, Mid-Western, Northern, North Eastern, and South Western (DDA Strategic Plan, 2021). The Central and South western milk sheds dominate milk production and marketing, accounting for over 60% of the milk produced and 71% of the milk marketed in the country.

The study was carried out in three milk sheds namely Central, Mid-western and South western. The three regions host more than 87% of the rural milk collection centres in Uganda. The Central and South Western milk sheds are the most important sources of marketed milk which is aggregated by the milk collection centres (MCCs) and sold through both the formal and informal marketing channel. Data were collected in twelve districts namely Kayunga, Masaka, Mukono, and Wakiso districts in the Central milk shed; Kiboga, Kyankwanzi and Kabarole districts in the Mid-western milk shed; and Bushenyi, Ibanda, Kiruhura, Mbarara, and Ntungamo districts in the South western milk shed.

2.2. Conceptual Framework

Figure 3 is a schematic representation of the factors that influence performance of MCCs, including ownership of the MCC infrastructure, the governance structure, MCC management, and service delivery as well as the agribusiness environment in which the MCCs operate.

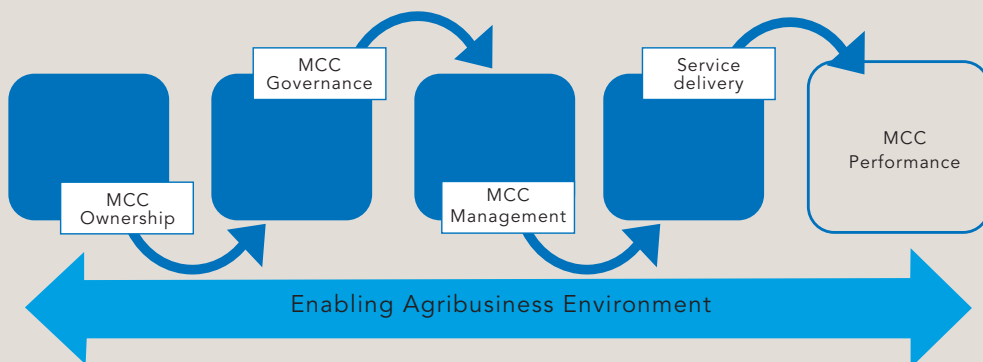


Figure 3: Schematic representation of factors that influence performance of MCCs

MCC ownership and governance

The operational success and sustainability of milk collection centres is influenced by the governance structure, and ownership of the MCC infrastructure, particularly the land, buildings and the equipment. The owner of the MCC infrastructure determines the governance structure which makes the important policy and strategic decisions. Where the MCC is owned by a farmer cooperative, involvement of members, particularly women and youth in decision making and management of the MCC business and assets is essential for sustainability of the MCC business. The MCC governance structure influences management of the MCC.

MCC management and service delivery

Good MCC management enhances the performance and sustainability of the MCC business. The study examined the qualifications of human resources employed by the MCCs, especially the Manager, , Accounting and milk testing and grading staff as well as the engagement of women and youth. Efficient delivery of a diverse range of livestock/ business development services attracts more members to deliver milk which helps the MCC to achieve economies of scale. The study examined the range of livestock and business development services rendered to members/ milk suppliers, the methods of payment for services rendered, availability of check-off systems, and the application of ICT/ digital innovations to deliver services.

Regulatory Compliance

Other management practices analysed included waste water management, compliance with statutory obligations such as MCC registration and inspection by DDA, payment for the municipal trading license and remittance of withholding tax obligations as well as regular health examination of milk handling staff and hygiene practices at the MCC especially cleaning of the milk cooler, accessories and the MMC premises.

Performance of MCCs

Performance of milk collection centres is a broad concept that has not been defined in terms of one measurable indicator. The feasibility and sustainability of milk collection centres depends on efficient deployment of resources, adequate care for the environment and good business management practices. The type ownership of the MCC, governance structure, management practices and service delivery all impact the performance of MCCs in different ways.

2.3. Data Collection

A cross-sectional survey was conducted in the last week of October and first week of November 2021 which is a wet season in the study area. Data were collected using a structured questionnaire that was digitized and administered by trained enumerators using electronic devices (tablets). A full list of functional and non-functional milk collection centres (MCCs) in the study area was provided by DDA. A list of 384 functional milk collection centres in the study area was generated and used as the sampling frame from which a simple random sample of 103 MCCs was selected.

Table 3 shows the distribution of MCCs selected from three different milk sheds. Field data were supplemented by extensive document review, Internet search and Key Informant Interviews of purposively selected dairy value chain actors, including officials from MAAIF, and DDA as well as Managers of milk processing companies, leaders of dairy farmer cooperative societies and milk traders in south western Uganda. Interviews were conducted using interview guides prepared in advance.

Efficient delivery of a diverse range of livestock/ business development services attracts more members to deliver milk which helps the MCC to achieve economies of scale.



Table 1: Number of MCC observations per district and mean installed capacity

Milk Shed	District	Number of observations (n)	Mean storage capacity (L)
Central	Kayunga	2	5,500
Central	Masaka	7	4,123
Central	Mukono	3	1,550
Central	Wakiso	1	3,500
Mid-western	Kiboga	10	6,860
Mid-western	Kyankwanzi	23	5,735
Mid-western	Kabarole	9	3,128
South western	Bushenyi	3	35,333
South western	Ibanda	9	11,863
South western	Kiruhura	11	5,242
South western	Mbarara	16	5,184
South western	Ntungamo	9	6,878
	Total	103	6,718

2.4. Data Analysis

Field data captured using digital devices (tablets) were transferred to online servers, downloaded to a remote computer and cleaned, organised and checked for inconsistencies using Ms Excel prior to the analysis. The data were analysed using SPSS software to generate descriptive statistics for the different variables.

2.5. Limitation of the Study

The MCC performance indicators were not defined in advance, making it difficult to define the scope of analysis

3. KEY FINDINGS

3.1. Ownership of milk collection centres

There are many models of ownership and operation of milk collection centres (MCCs) in Uganda. The MCC may be operated using infrastructure (land, buildings and the milk cooling equipment and accessories) that is owned or hired. Most milk collection centres are owned and operated by cooperative societies and unions of milk producers, as well as milk processing companies, and individual entrepreneurs (traders and farmers). Some MCC infrastructure belong to government but are given to milk producer groups to use free of charge. The infrastructure remains property of government. Out of the 103 milk collection centres assessed, 51 (49.5%) belong to milk producer cooperatives (societies and unions) while 23 (22.3%) belong to milk traders. The remainder (28.2%) belong to milk processing companies, government and individual farmers. A total of 101 MCC had milk coolers. Only one MCC had a fridge/deep freezer and another one had a cold room. Table 4 shows the mean storage capacity of the MCCs assessed in the different districts.

Table 2: Mean storage capacity of MCCs

District	Mean	n	Std. Error
Bushenyi	35,333	3	32,354
Ibanda	11,863	9	4,221
Kabarole	3,128	9	494
Kayunga	5,500	2	500
Kiboga	6,860	10	3,049
Kiruhura	5,242	11	728
Kyankwanzi	5,735	23	971
Masaka	4,123	7	371
Mbarara	5,184	16	1,606
Mukono	1,550	3	454
Ntungamo	6,878	9	2,013
Wakiso	3,500	1	.
Total	6,718	103	1,108



3.2. Governance of milk collection centres

The governance structure of a milk collection centres influences the way decisions are made that impact performance of the MCC. Some of the important decision include hiring of qualified management staff, management of MCC assets particularly the financial resources and effective delivery of services to members. MCCs owned by individual traders (Sole Proprietor) and Processing companies tend to have a quicker and more streamlined decision-making procedure. However, MCCs operated by milk producer organizations (associations, cooperative societies and unions) have three decision making levels which may result in delays to make strategic decisions. The MCC Management staff make day to day operational decisions but receive policy and strategic guidance from the Executive Committee or Board of the farmer Organisation. In case of a dairy farmer cooperative, the top decision-making body is the General Assembly or the Annual General Meeting (AGM) which is convened once a year. Sometimes there are delays to hold the AGM due to lack of resources leading to delays to approve the work plan and budgets of the MCC as well as any strategic investment decisions and business plans of the MCC. Only 49 (47.6%) of the 103 MCCs in this study hold Annual General Meetings every year.

According to my experience, having established and worked with many dairy farmer cooperative societies and unions in the country between 2001 and 2011, poor leadership of a milk producer organisation is one of the common reasons for poor management and collapse of milk collection centres/ businesses. Poor leadership is characterised by lack of transparency and accountability, employment of unqualified staff, usually family members or children of friends; misappropriation of the MCC revenue; misuse of other MCC assets such as vehicles; failure to adequately supervise the MCC management and staff and inability to mobilize more farmers to join the milk producer organisation have been the common reasons for the poor performance MCC businesses. In some cases, leadership wrangles affect operations of the MCC and may eventually lead to collapse of the MCC business. Majority 51 (49.5%) of the 103 MCCs in this study belong to milk producers' cooperative societies and unions and are therefore managed in accordance to the governance structure of farmer cooperatives

Involvement of women and youth in the leadership of the farmer organisation and in supplying of milk to the MCC and delivering extension services was a good strategy to enhance sustainability of the MCC. Participation of women and youth in decision making was a good way to empower them with the experience to manage the cooperative and MCC business in future. During a group interview with leaders of Abesigana-Kashari Dairy Farmers' Cooperative Society in Mbarara City, it was indicated that the Board of the cooperative was constituted by seven (7) elected members which include two women and one youth.

The youth on the Board was a son of the former chairman of the Board who had passed away. They highlighted the importance of women and youth participation in the leadership of the cooperative. The youth are expected to inherit the shares of their parents in the cooperative.

3.3. Management of milk collection centres

Milk collection centres are business enterprises that must be managed professionally in order to ensure profitability and to sustainably and efficiently render services to the milk producers in the surrounding areas.

MCC management and staff and inability to mobilize more farmers to join the milk producer organisation have been the common reasons for the poor performance

3.3.1. Hiring of professional staff

MCCs are expected to employ experienced professional staff to handle management, and finance as well as testing and grading of the milk. Results of the study show that 99 (96%) of the MCC employed a fulltime Manager and 73 (71%) employed a Milk Assistant. In absence of a Manager, the Milk Assistant oversees the management of MCC activities, including supervising milk delivery and loading as well as maintaining the MCC records. Only 26 (25%) MCCs employed qualified Accounts Assistants. In absence of qualified accounting staff, the MCC cannot maintain accurate financial records which can be audited by government in order to assess compliance with the Withholding Tax obligations. All cooperative societies and Unions are required by government to deduct and remit to the Uganda Revenue Authority withholding tax from farmers that earn at least one million Uganda shillings per month from the milk they deliver to the MCC. Fig 4 show the numbers of different staff positions at the MCCs.

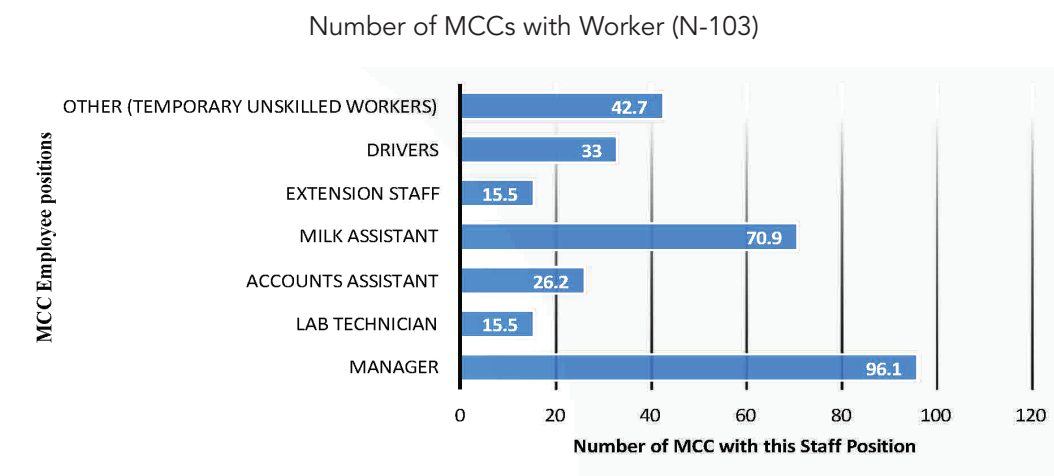


Figure 4: Types of MCC employees

Some of the skills of qualified and experienced MCC management staff that can improve the performance and sustainability of the MCC business include:

- i) Professional financial Management and accountability;
- ii) Efficient records management
- iii) Preparation and interpretation of financial statements
- iv) Presentation of financial statements to the AGM
- v) Regular auditing of the MCC financial records
- vi) Meeting all Statutory obligations (Registration with DDA, Local trading licence, UNBS and DDA inspection and remittance of Withholding Tax to URA)
- vii) Supervision of MCC hygiene and milk testing
- viii) Efficient delivery of services to members
- ix) Digital innovations in the delivery of services, especial financial transactions and communication with members
- x) Incentives to members for example cash advances for medical and school fees,
- xi) Extension services to members to improve the quality of milk and to increase productivity
- xii) Ensuring proper management of time for milk reception, chilling and loading;
Diversification of revenue sources to supplement the MCC business

Out of the 101 Managers of MCC, the holders of University degrees and diplomas were only 41.6%. Majority (54.5%) of the Managers were secondary school leavers who generally lack the capacity to perform important managerial functions such as supervision of the financial accounting function and milk testing and grading. Table 5 show the different levels of education of MCC Managers.

Table 3: Levels of education of MCC Managers

Qualification	Frequency (n)	Percent
Bachelor's degree	16	15.8
Diploma	25	24.8
Masters	1	1.0
Others	2	2.0
Primary	2	2.0
Secondary	55	54.5
Total	101	100.0

Many MCC are not able to attract qualified and experienced MCC management staff owing to the small scale of the business that cannot raise enough revenue to pay the salaries and wages of staff

3.3.2. Gender considerations

Table 6 shows the proportion of male and female MCC employees performing different roles. Only the financial accounting function had a reasonable proportion of female employees. The average number of MCC employees was 4 and the proportion of female workers was 15.4%. The proportion of youth employees was not analysed.



Table 4: Proportion of male and female MCC Employees (N=103)

Position/ Role of MCC Staff	Total No. of employees	No. of males	% Male	No. of females	% Female
Accountant	32	14	43.8	18	56.3
Temporary unskilled workers	86	79	91.9	7	8.1
Extension agent	24	22	91.7	2	8.3
Driver/ Boda Boda Rider	79	71	89.9	8	10.1
Lab personnel	22	17	77.3	5	22.7
Manager	103	87	84.5	16	15.5
Milk Assistant	84	71	84.5	13	15.5
Others	25	24	96.0	1	4.0
Total	455	385	84.6	70	15.4

3.3.3. Milk quality testing and grading

Milk collection centres are supposed to accept milk that meets the minimum quality requirements. Uganda has a number of national standards for milk and dairy products. Like other East African Community Partner States, Uganda adopted the EAC harmonised regional standards for milk and dairy products. However, while receiving milk from farmers, MCCs do not refer to the harmonised regional standards for fresh milk. Instead, they follow a few quality parameters set by the milk buyer, which are less comprehensive than the official milk standards.

The milk buyers determine the concentration of alcohol to be used as well as the minimum lactometer reading. Processing companies also recommend the appropriate milk testing/analysis techniques to be used by MCCs or milk bulking centres to grade the milk.

Table 7 shows the most common platform tests/ analytical methods used by MCCs to test and grade milk during reception. Almost all MCCs use the lactometer (98%) and alcohol test (95%) to screen the milk during delivery. The other important method is visual inspection which is carried out by 71% of the MCCs.

Table 5: Platform Tests and analytical methods used by MCCs

Platform Tests and analytical methods	No. of MCC reporting	Percent (%)
Lactometer reading	101	98
Alcohol test	98	95
Visual inspection	73	71
Organoleptic/ Taste	51	50
Resazurin Test	40	39
Milk Analyzer	12	12
Clot on boiling	7	7
Total number of observations (N)	103	

3.3.4. Financial Management

Prudent financial management practices are essential for successful operation of MCC business. Hiring of competent or qualified accounting staff and an experienced MCC Manager coupled with adequate supervision from the leadership of the milk producer organisation is a prerequisite for good financial management. Regular professional auditing of all financial transactions helps to unearth rogue financial transactions. Promoting transparency and accountability and a high degree of integrity among the MCC management and leadership of the farmer organisation is one way to ensure proper management of the MCC financial resources. Maintaining accurate financial records is one of the financial management practices that must be promoted. The study showed that 102 (99%) of the MCC keep business records. This is a statutory requirement because the records have to be audited by the Uganda Revenue Authority (URA) in order to assess compliance with deduction of withholding tax from the milk suppliers who earn at least Uganda shillings one million per month, equivalent to US\$ 280.

Management of the MCC should endeavour to minimise the cost of operating the MCC business by managing all expenses efficiently. Table 8 shows the average monthly operating expenses of the MCCs. The top five operating expenses of MCCs include transport, diesel for operating the power generator sets, salaries and wages of MCC workers, and electricity as well as the expenses of the Executive Committee or Board of the milk producer organisation where the MCC is owned by a cooperative. The average monthly expenses amounted to UGX 7,138,647 while the average monthly cost of milk supplied amounted to UGX 50,979,078.

Table 6: Major operating expenses of MCCs

Expenditure	Mean (UGX/Month)	Std. Error
Transport	2,454,898	652,063
Diesel	1,382,636	295,291
Salaries/ Wages	1,262,854	203,508
Electricity	987,845	213,176
Temporary unskilled workers	606,692	305,206
Executive Committee	452,098	270,355
Other expenditure	288,112	123,520
Rent	284,151	33,330
Office admin costs	184,903	80,274
Milk testing materials	176,600	26,513
water	127,249	16,330
Cleaning Materials	108,846	13,906

MCC management must ensure that reliable and quick means of transferring funds to the milk suppliers are used. Failure to effect payment for milk in a timely manner is one of the reasons for milk suppliers to look for other milk buyers, usually the traders because they can pay cash on delivery. Technological innovations such as mobile money and availability of banking services in the areas are good methods to effect payments for milk supplied. Figure 5 show the methods commonly used by MCC to effect financial transactions. It should be noted that the most unreliable method which is cash payments is the most popular method

used by MCC. In order to eliminate dubious financial transactions, it is better to avoid cash payments and adopt other means of cash transfer such as direct bank transfer and mobile money. However, the challenge is that many farmers and other milk suppliers are not familiar with ICT/ digital technologies and do not like to open bank accounts because they are not well educated. This what make cash payments the most favoured means.

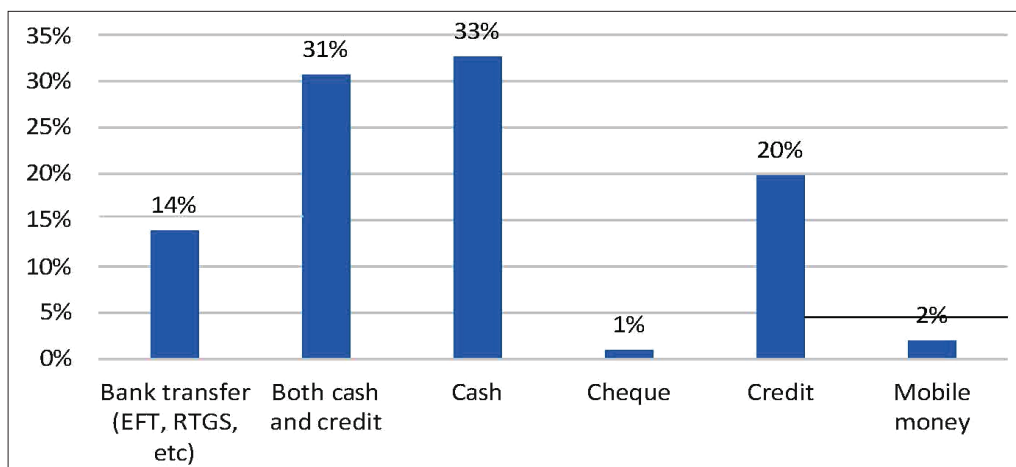


Figure 5: Common methods of financial transactions by MCCs

The time interval between milk delivery and payment for the milk is a key factor in deciding to sell milk to the MCC or other buyers. Poor farmers earning very small income from the sale of milk cannot afford to wait for a long time to receive the payment. They prefer to sell to buyers, usually milk traders that pay cash on delivery. Table 9 shows the interval between milk delivery and payment. Majority (77.7%) of the MCCs pay milk suppliers after an interval of 15 days. Some MCCs (17.5%) pay weekly while a few MCC (2.9%) pay on a daily basis.

Table 7: Interval between milk delivery and payment

Time interval between milk delivery and payment	Frequency	Percent
15 days	80	77.7
30 days	2	1.9
Daily	3	2.9
Weekly	18	17.5
Total	103	100.0

3.3.5. Membership/ Supplier mobilisation

The number of farmers that remain active, delivering milk to the MCC in both the wet and dry seasons and the volume of milk delivered influence the MCC's ability to achieve economies of scale and optimum profitability. Mobilising new cooperative shareholders and MCC milk suppliers requires deliberate effort by the MCC management and cooperative leaders to reach out to all farmers in the area with a view to enticing them to join the cooperative and deliver milk to the MCC. High cooperative entry fees and price of shares may hinder recruitment of new members.

Some farmer may be interested to join the cooperative but lack the funds to pay the entry fees and to buy the minimum number of shares MCC which are not owned by cooperatives do not require members or suppliers to pay entry fees nor buy shares. The average entry fee for cooperative societies (N=39) was UGX 192,077, equivalent to about US\$ 55. The cooperatives recruited an average of 76 members over a period of five years.

In order to attract and retain a large number of shareholders/ MCC milk suppliers, some cooperative societies offer a wide range of incentives to their members such as loans for investment, cash advances for urgent household expenses such as medical bills and school fees, subsidized price of farm inputs such as mineral salts, human food, pasture seed as well as free inputs such as forage sorghum seed.

The price of milk offered by the MCC and the volume of milk produced by individual farmers influence their decision to deliver milk to the MCCs or to sell to other buyers.

Some cooperatives/ MCCs give a premium price of UGX 50 above the normal price for farmers delivering more than 500 litres of milk per day. The ability of MCCs to offer competitive milk prices and to effect timely payment for the milk supplied impact their ability to attract more suppliers and to increase the volume of milk received per day.

The number of farmers supplying milk to MCCs fluctuates in the wet and dry seasons. Table 10 shows the average number of farmers that deliver milk to MCCs in the dry seasons decreases by 22.7% from 66 to 51. The price of milk offered by the MCC and the volume of milk produced by individual farmers influence their decision to deliver milk to the MCCs or to sell to other buyers. The decrease in the number of farmers that deliver milk to MCC in the dry season could be due lack of milk to sell or a decision to sell to traders that offer a better price.

Table 8: Average number of suppliers of milk to the MCCs

District	Wet		Dry	
	Mean	Std Err	Mean	Std Err
Bushenyi				
Ibanda	60	10	41	12
Kabarole	39	17	18	11
Kayunga	16	4	18	3
Kiboga	201	91	145	79
Kiruhura	104	35	101	35
Kyankwanzi	39	8	28	6
Masaka	24	8	21	6
Mbarara	88	22	69	21
Mukono				
Ntungamo	22	8	17	5
Wakiso				
Total	66	16	51	13

3.3.6. Milk supply and pricing

Seasonal fluctuation in supply of milk

The volume of milk received by milk collection centres (MCC) per day fluctuates in the wet and dry seasons depending on the productivity of farms in the area where the MCC is located. The breeds of cattle kept by farmers, availability of adequate amount of nutritious forage, and water as well as the practice of supplementing milking animals with concentrate feeds determine the productivity of dairy animals and the volume of milk which farmers are able to sell or deliver to MCCs. In general, most milk producers experience a decrease in the productivity of animals in the dry season owing to shortage of water and good quality forage/ pastures.

Number of milk suppliers

In order for cooperative MCCs to maintain a good supply of milk, they need to maintain a large number of loyal members/suppliers that continue to deliver milk even when other buyers offer higher prices. Providing incentives and delivering services to members motivates more farmers to join and actively participate in the affairs of the cooperative. Involving the members to discuss and determine the farmgate price allows them to easily accept the price offered by the MCC.

The study shows that all MCCs operated by cooperatives receive milk from both members and non-members. However, the number of members and non-members that supply milk varies in the wet and dry season. Table 9 shows that the total number of non-cooperating farmers that deliver milk to MCCs is higher than that of cooperating farmers. This means that many farmers prefer to operate outside the cooperative structure. Either the farmers are not able to fulfill the requirements to join the cooperatives which includes paying the entry fee and buying a minimum number of shares or the farmers do not want to be bound by the cooperative byelaws.

Table 9 also shows that the number of cooperative farmers that deliver milk to MCCs in the wet season is higher than that of non-cooperating farmers. This means that when the supply of milk is good, MCCs prioritize buying milk from the cooperating members. During the dry season when the milk supply reduces, MCCs accept milk from more non-cooperating members. This is possible because the processing companies which are the major customers of MCCs will be willing to raise the milk price which entices even the non-members to deliver milk to the MCC.

Table 9: Average number of cooperating and non-cooperating milk suppliers

Category of milk supplier	Mean number of milk suppliers			
	Wet	Dry	Total	%
Cooperative members	4,819	3,747	8,566	41
Non-cooperating suppliers	2,752	9,461	12,213	59
Total	7,571	13,208	20,779	100

Volume of milk supplied

The fluctuation in number of milk suppliers affects the volume of milk received by MCCs. Table 10 shows average volume of milk delivered to MCC in wet and dry seasons. The cooperating members deliver more milk than the non-cooperating suppliers in both the wet and dry seasons.

Table 10: Average volume of milk delivered to MCC in wet and dry seasons

Category of milk supplier	Mean volume of milk delivered (L/day)			
	Wet	Dry	Total	%
Members	2,956	1,797	4,753	62.5
Non-Members	1,805	1,044	2,849	37.5
Total	4,761	2,841	7,602	100

Majority (53.4%) of the MCC receive milk only in the morning. Only 44.7% of the MCC receive milk both in the morning and evening. In locations where MCCs do not receive milk in the evening, farmers are compelled to find alternative uses of the milk, including forced consumption. However, majority of the farms do not milk in the evening, allowing only the calves to suckle. Failure to collect the evening milk reduces the farmers' potential revenue from the dairy farming.

Competition between formal and informal sector

There is competition for milk among different buyers. The competition is more intense in the dry season. Milk traders and the processing companies compete with organized farmer groups to buy milk directly from farmers. Milk traders and some processing companies operate milk collection centres in the vicinity of MCCs operated by farmer cooperatives. Competition between MCCs operated by processors, traders and farmer cooperative results in higher farmgate prices particularly in the dry season when the supply reduces. Not all processing companies buy milk directly from farmers. Some processing companies buy milk from traders/ bulk transporters as well as MCCs and bulking centres operated by farmer cooperatives. Indeed, some processing companies receive more milk from traders/ bulk transporters than farmer cooperatives. The milk collected by traders MCCs ends up in both the informal and formal marketing channels. The formal marketing channel involves processing of milk into high-quality value-added products sold in the domestic and export markets. The informal marketing channel involves sale of unprocessed milk directly to the consumers in both rural and urban areas. A recent report by DDA indicates that 82% of the 2.81 billion litres of milk produced in 2020 was marketed and that 46% of the marketed milk went through the formal marketing channel while 64% was sold by the informal sector (DDA, 2021).

Competition between MCCs operated by processors, traders and farmer cooperative results in higher farmgate prices particularly in the dry season when the supply reduces. Not all processing companies buy milk directly from farmers.

Milk price paid by MCCs to farmers/ suppliers

Milk collection centres operated by farmer cooperatives pay different milk prices to members and non-members of the cooperative.

Table 9 shows the average milk prices paid by MCCs to cooperative members and non-members. The average price paid to non-members in the dry season is lower than that paid to members. This is probably intended to motivate the members to continue supplying to the MCC even when other milk buyers in the area raise the price of milk due to reduced supply. Overall milk prices are higher by 25% in the dry season than in the wet season. The annual average price of milk received by cooperating farmers was higher than that received by non-cooperating farmers by 3%

Table 11: Average price of milk paid by MCC to farmers in wet and dry season

Category of milk supplier	Mean price (UGX/L) in wet season	Mean price (UGX/L) in dry season	Average
Cooperative Members	893	1,163	1,028
Non-cooperating suppliers	905	1,090	998
Total	899	1,126	

Milk price determination

The price of milk paid to farmers (farmgate price) is determined by different stakeholders of value chain actors. Fig. 6 shows the different stakeholders that determine the price of milk paid by MCCs to the farmers/ suppliers. Individual MCC owners take the lead at 31.4% of the MCCs followed by Executive Committee of the cooperative at 24.6% and milk processing companies at 16.1%. Others include the Cooperative Union and Management of the MCC. Government stopped setting the price of milk when it liberalized the dairy industry in 1993.

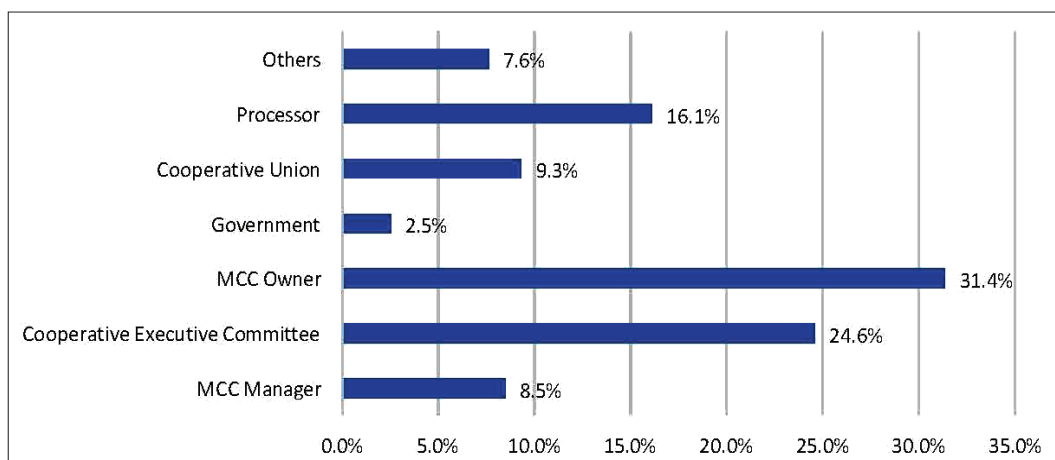


Figure 6: Dairy value chain actors that set the price of milk

Milk prices paid to MCC by different buyers

Milk collection centres receive different prices when they sell milk to different categories of buyers. Table 11 shows the prices of milk paid by different buyers to the MCC. The highest mean price of UGX 1,193 per litre is paid by local consumers while the lowest average price

of UGX 1,127 per litre is paid by the bulking centres. MCCs get a higher average price of UGX 1,159 per litre when they sell milk directly to processing companies than when they sell to traders or deliver to bulking centres. This demotivates the MCCs from delivering milk to the bulking centres. As a result, many dairy cooperative unions that were operating the bulking centres have run out of business. Many MCCs prefer to sell milk to traders/ bulk transporters who pay a higher average price of UGX 1,144 per litre than that paid by bulking centres. Some processing companies now receive more milk from traders/ bulk transporters than farmer cooperatives.

Table 12: Average price of milk paid to MCCs by different buyers

Milk buyer	n	Mean Price (UGX/L)	Std. Error
Local consumers (individuals and Institutions)	43	1,193	30
Traders	39	1,144	24
Bulking Centres/ Cooperative Unions	34	1,127	23
Processors	47	1,159	26

3.3.7. Energy and water sources

The cost and reliability of the energy used to operate milk cooling equipment is one of the major factors that influence the performance of milk collection centres. The government rural electrification programme increased access to grid power in many rural areas of Uganda and enabled establishment of more MCCs in different parts of the country. Despite the increased access to grid power, the supply is not reliable and the tariffs are high. As a result, all MCCs are compelled to acquire power generator sets which operate on expensive fossil fuel, mainly diesel. Figure 6 shows proportion of MCCs that use different sources of energy. Majority (59.5%) of the MCCs use diesel generators. Only 38% operate mainly on grid power.

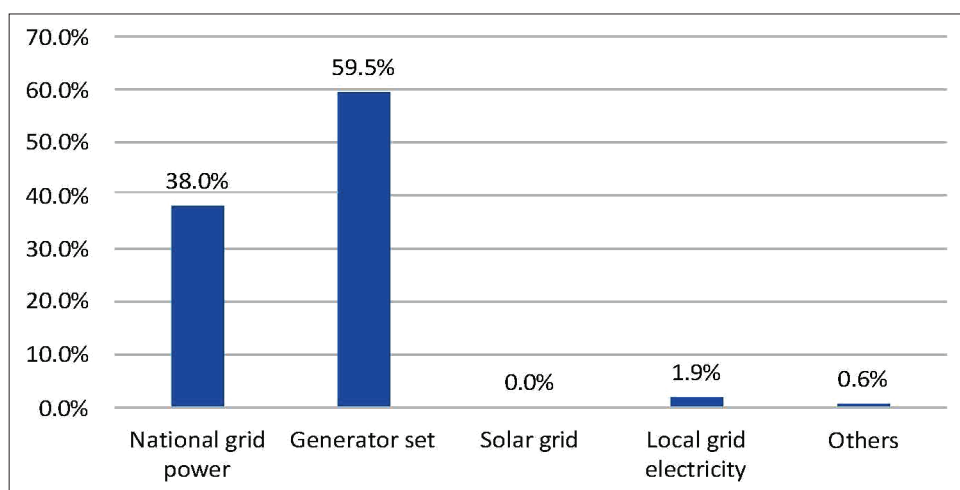


Figure 7: Common MCC energy sources

Although grid power is cheaper for operating the milk coolers than diesel, the frequent power cuts make grid power less reliable. This study established that power cuts occur 2.7 times

a week on average. Although it is expected to vary, the average duration of power supply interruption was not determined. Access to reliable sources of clean water is essential for ensuring adequate cleanliness of the milk coolers and accessories as well as the MCC premises. Access to clean water was still a major challenge in most rural areas where MCC are located. Only 44% of the MCC had access to piped water and 79.6% of MCCs purchase the water used. Failure to access cheap clean water prevents the MCC from cleaning the milk coolers and accessories thoroughly.

3.4. Service Delivery

Provision of livestock/ agricultural extension services to members of a cooperative is one of the strategies to attract more members to join and remain active in the affairs of the cooperative. The East Africa Dairy Development (EADD) project of Heifer International piloted a Hub- Model of delivering support services to members of a cooperative that supply milk to a given milk collection or bulking centre. The Dairy Hub is a concentration of services embedded with the milk collection and marketing service to members.

Some of the services that can be accessed by cooperative members at one central location, the Dairy Service Hub included: 1) milk marketing, 2) clinical veterinary services/ animal health, 3) Artificial insemination (AI), 4) animal feeds manufacture and sale, 5) veterinary input shop, 6) fodder supply, 7) training, 8) financial services including savings and credit, 9) bicycle/ motorcycle repair, 10) milk transport and even 11) a human food store depending on the priorities of the cooperative members.

There are various models for delivery of services:

- i) the cooperative can employ the service providers such as the AI Technician and Veterinarian and pay them a monthly salary to provide services to the cooperative members. The cooperative has to purchase all the inputs required by the service provider, including the transport vehicle;
- ii) outsourcing the services to a private service provider who signs a contract with the cooperative society/ union to render a dedicated service to the members. The motivation for the cooperative members to access services from the contracted service provider is rendering the service on credit and payment is done through a check-off system. The cooperative deducts the money owed to the service provider from the members at the time of paying for the milk;
- iii) entering into an understanding with a public extension work to render services to members of the cooperative on credit and submitting a claim for payment through a check-off system at the time of payment for milk.
- iv) Some services can be provided directly without employing a service provider for example transporting milk from the farm or designated pick-up points to the MCC, operating an input shop and selling farm inputs to members and non-members, feed manufacture and sale, milk marketing of behalf of the members and transporting milk to the bulking centre of processing plant.

The Dairy Hub is a concentration of services embedded with the milk collection and marketing service to members. Some of the services that can be accessed by cooperative members at one central location

Entering into a contract with private service providers who render services on credit and receive payment through a check-off arrangement is one of the best options for service delivery. Owning the service is less efficient and not cost-effective. Majority (80.2%) of the MCCs reported providing at least one more service apart from marketing the milk. Table 13 shows a list of services rendered by MCCs or the cooperatives to the members. Some MCCs can opt to render the service even to non-members as a way of making it more profitable. The most popular services provided by at least 40% of the MCCs/ Cooperatives include milk marketing, milk testing and grading, farmer training and milk transport. In principle, every MCC should provide milk testing and grading, and marketing to all its members. And where it is economically viable, the MCC can arrange transport to pick milk from the members farms or designated pick-up points.

Table 13: List of services provided by MCCs to cooperative members

Service provided by MCC	MCC providing the service	Percentage
Milk marketing	58	56.3
Milk testing and grading	54	52.4
Farmer training	44	42.7
Milk transport	43	41.7
Supply of Drugs & Chemicals	24	23.3
Veterinary services	22	21.4
Supply of Pasture seeds	11	10.7
Supply of Feeds and Fodder	10	9.7
Exchange Visits	9	8.7
Others	8	7.8%
Artificial Insemination	4	3.9
Total number of observations, N	103	



3.5. Post-harvest Losses of milk at MCCs

Mean monthly milk losses

The mean monthly milk losses incurred by MCCs is 7.7% of the volume collected in the dry season and 19.5% in the wet season as shown in Table 14. The higher post-harvest losses in the wet season may be attributed to the increased supply of milk leading to failure to find a market for all milk received by the MCC. In some cases, the condition of the rural feeder roads deteriorates in the wet season, making difficult for road tankers to pick milk from MCCs in the remote areas.

Table 14: Volume of milk received and lost by milk collection centres in a month

Variable	N	Wet Season	Dry Season
Average volume (L) of milk received per month	103	142,830	85,230
Average monthly milk loss (L)	103	27,860	6,583
Std. Error		12,955	3,995
Monthly milk loss as of volume received		19.5%	7.7%

Mean annual milk losses and causes

The mean annual milk losses incurred by MCC was 13.6% of the volume received/ collected. Figure 7 shows the main causes of milk losses at MCCs. Rejection of milk by processing plants, usually due to poor quality was the main reason. Failure of the milk supplied by farmers to meet the minimum quality requirements during testing and grading was the second major cause of milk losses at the MCC. Milk that fails to pass the quality tests is rejected and returned to the farmer/ supplier. The loss is therefore incurred by the farmer and not the MCC. Lack of market for the milk collected due to increased supply of in the wet season is another major reason for the high annual post-harvest losses. Other reasons include spillage during measuring and testing. A field observation mission revealed that some MCCs do not use appropriate materials and procedures for cleaning the milk coolers, loading horse pipe, and dump tank. This may lead to accumulation of microbial agents and contamination of milk. Most MCCs do not have well equipped laboratories and qualified Lab Technicians. They also lack adequate supplies of laboratory consumables. The main tests carried out on the milk include alcohol (80% concentration), lactometer reading and observation. These tests may not be reliable to test the milk for microbial and antibiotic contamination.

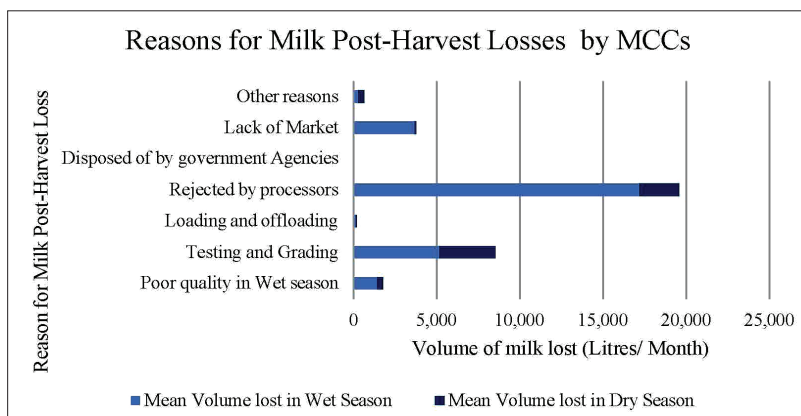


Figure 8: Different reasons for the milk loss at milk collection centres

Use of inappropriate devices to measure the milk delivered by farmers and during loading of road tankers may result in losses due to inaccurate measurements. Figure 8 shows the devices used by MCCs to measure milk. Majority (58%) of the MCCs use milk cans to measure the milk followed by the pail or bucket which are used by 32% of the MCCs.

The two devices are not accurate and may result in losses incurred by the farmer and the MCC itself due to inaccurate measurements. Apart from the weighing scale, other devices used include the dip stick, and measuring jug.

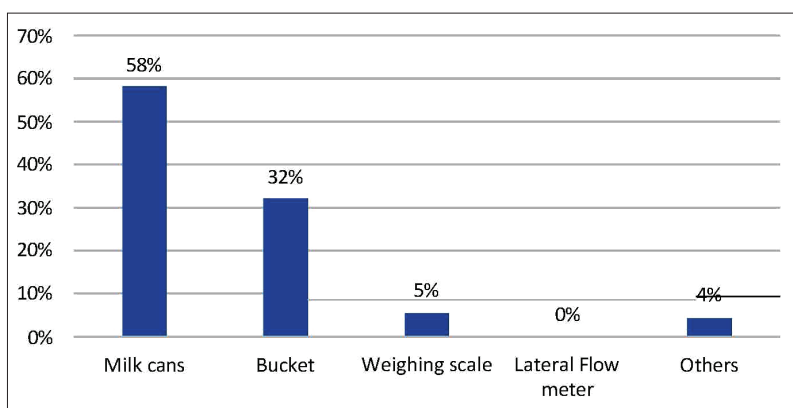


Figure 9: Devices used by MCCs to measure milk

Uses of milk rejected by the major MCC buyers

Figure 9 shows that a large proportion (39%) of the milk rejected by the major MCC customers is sold to traders for retail sales in the informal market. An estimated 36% is poured away while 18% is sold to pig farmers at a much lower price. In some cases (3%) the milk may be accepted by other processing companies. Where an alternative use for the milk is found, the loss may be only in terms of reduced price of the milk.

Uses of milk rejected by the major MCC customers

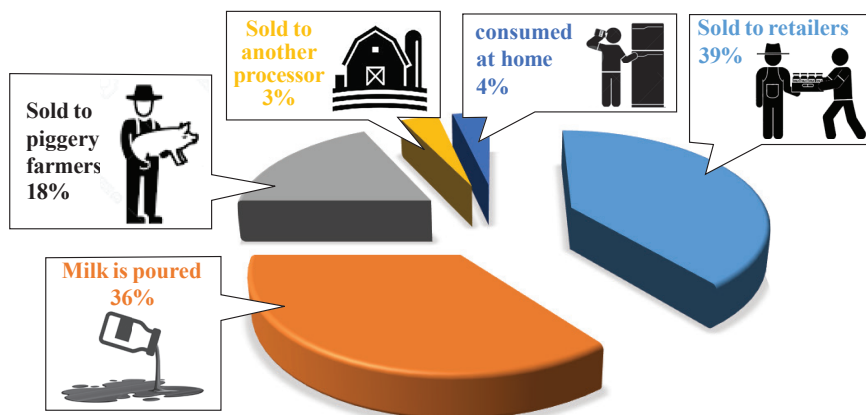


Figure 10: Uses of milk rejected by the major MCC customers due to poor quality

3.6. Enabling Agribusiness Environment

The government of Uganda is responsible for establishing a conducive agribusiness environment in which milk collection centres and other nodes of the dairy value chain operate.

The Parliament of Uganda enacted the Dairy Industry Act, 1998 which provides the legal framework for development of the dairy industry. In 2003, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) issued the The Dairy (Marketing and Processing of Milk and Milk Products) Regulations, 2003, which were later amended in 2006 and 2015. Established by the Dairy Industry Act, 1998, Dairy Development Authority (DDA) is the public sector institution mandated to develop and regulate the dairy industry with overall policy guidance from the Ministry of Agriculture, Animal Industry and Fisheries. DDA Secretariat began operations in 2000.

DDA established six (6) Regional Offices that are responsible for implementing the dairy industry regulations and ensuring compliance with the code of hygiene practice and milk quality standards.

Dairy Development Authority (DDA) in collaboration with Uganda National Bureau of Standards (UNBS) and other dairy industry stakeholders developed the national quality standards for milk & milk products as well as the Code of Hygiene Practice. Implementation of the latter has led to a great improvement in the quality and handling of milk and dairy products in the dairy value chain. DDA established six (6) Regional Offices that are responsible for implementing the dairy industry regulations and ensuring compliance with the code of hygiene practice and milk quality standards.

Other Public Institutions whose actions impact the dairy industry and performance of MCCs include the Uganda National Bureau of Standards (UNBS), National Agricultural Research Organisation (NARO), Academic Institutions, National Animal Genetic Resources Centre and Data Bank (NAGRC &DB) and National Agricultural Advisory Services (NAADS). The activities of other government Ministries, Departments and Agencies also impact performance of the dairy industry, including the operations of milk collection and bulking centres. The Uganda Investment Authority provides guidance to investors in all sectors of the economy and administers a number of incentive regimes for investors, including assisting foreign investors to acquire land and the necessary documentation to start the investment.

The Uganda Land Commission issues land titles and is the custodian of government land but there are also District Land Boards responsible to allocating land to investors in the rural areas. The national Rural Electrification programme has been instrumental in extending grid power to rural areas. This has helped to expand the network of milk collection centres in the country. The Ministry of Works and National Roads Authority together with District Local governments are responsible for maintenance of the rural feeder roads, which enables motor vehicles to pick milk from MCCs in remote areas.

Good feeder roads also enable milk producers to use motor vehicles and motor cycles to deliver milk to MCCs from distant locations. The Ministry of Finance, Planning and Economic Development together with the Uganda Revenue Authority administer the tax incentives for investors in all sectors of the economy.

3.7. Impact of COVID-19 and other shocks

During the Key Informant Interviews, it was noted that the outbreak of COVID-19 pandemic adversely impacted the supply and logistics in many agricultural value chains including dairy. The lockdown measures put in place by the Government affected the sourcing of inputs, procurement of raw materials, marketing of milk and milk products in both the formal and informal markets as well as export of dairy products.

The lockdown measures also affected the movement of milk consumers, reducing their access to the sources of milk and dairy products. In general, many urban dwellers lost the sources of livelihood leading to reduced income and purchasing power. Although it was established that farmers received lower farmgate prices, this study did not establish if consumers paid a lower price and if the processing plants reduced their milk intake.

Extended drought is the most common and recurring shock impacting performance of MCCs and the entire dairy value chain owing to shortage of water and forage resources which impacts the productivity of milk animals. The frequent outbreak of Foot and Mouth Disease and the increased impact of East Coast Fever as associated with tick-acaricide resistance are among the major bottleneck in the dairy industry. Recent challenges to access regional market for milk and dairy products include export bans and quotas closure of borders and insecurity.

4. CONCLUSION

A large number of milk collection centres (MCC) have been set up in different parts of Uganda to help small scale milk producers in rural areas aggregate and market their milk collectively. The marketing of milk through MCCs is one of the most important cooperative agribusinesses for most milk producers in Uganda. It is essential for milk collection centres to operate efficiently and profitably in order to benefit the local milk producers, increase efficiency in the dairy value chain and contribute to sustainable development of the dairy industry.

Although majority of the milk collection centres in the country are functioning, their performance as viable agribusiness enterprises is generally suboptimal. The main reasons for the suboptimal performance include: i) inability to receive adequate volumes of milk leading to low capacity-utilisation of the milk cooling equipment particularly in the dry season, ii) the high operating costs, iii) bottlenecks in the dairy value chain and iv) post-harvest losses that result from failure to access the market throughout the year.

Failure to receive adequate volumes of milk is common in the dry season and hinders attainment of economies of scale and optimum profitability of the MCC business. Low capacity-utilisation of the milk cooling equipment increases the unit cost of chilling milk and reduces the net returns per litre of milk chilled, hence, making the MCC business less profitable.

The main reasons for failure to receive enough milk include: i) low productivity of animals due to shortage of nutritious forage and water particularly in the dry season, and the poor dairy breeds ii) small number of milk producers in the area either due to shortage of land for livestock farming or existence of alternative and better sources of livelihood, iii) animal health constraints such as Foot and Mouth Disease, East Coast Fever and tick-acaricide resistance.

The high cost of operating the milk collection centre may be attributed to the high energy tariffs, particularly grid power and diesel, high cost of transport, labour and other services as well as possible prohibitive statutory requirements such as collection of withholding tax from the milk producers. Struggling MCCs are not able to generate enough net revenue that can allow them to hire competent / qualified MCC workers.

Although majority of the milk collection centres in the country are functioning, their performance as viable agribusiness enterprises is generally suboptimal.



5. RECOMMENDATIONS

A. In order to increase the volume of milk available for collection by MCCs, increase the storage capacity utilised and achieve economies of scale:

- i) Government, development partners and civil society should promote adoption climate smart improved technologies for increasing milk production and productivity by dairy farmer for example improved pastures, forage preservation, water harvesting and storage for dry season feeding, and appropriate genetics;
- ii) Government and civil society should partner to scale up implementation of the Dairy Service Hub-Model piloted by the East Africa Dairy Development (EADD) Project of Heifer International is a tested approach for increasing access to agricultural extension and business development services for milk producers.;

B. In order to strengthen the linkages between MCCs and the milk suppliers and buyers as well as the horizontal and vertical linkages among all dairy value chain actors with a view to improving the flow of milk from the producers to processing companies:

- i) Linking milk producers to reliable milk markets is essential for successful and sustainable operations of MCCs. Processing companies should explore opportunities for strengthening the relationship with milk producer cooperatives by entering into well negotiated and mutually beneficial supply contracts;
- ii) DDA should partner with milk processing companies and dairy sector NGOs to promote the testing of milk for antimicrobial agents by all MCCs in order to improve the quality of milk available for processing and contribute to the on-going global effort to address the growing problem of anti-microbial resistance,
- iii) Government and civil society should strengthen the capacity of milk producer cooperatives to deliver services and implement sustainable incentive regimes that attract more milk producers to join and participate in the activities of the cooperatives;

C. In order to increase the efficiency, profitability and return on the MCC investments, the following interventions are recommended:

- i) Government and civil society should partner to promote application of digital innovations for management of MCC businesses and improving delivery of support services and improving access to input and output markets;
- ii) Government, civil society and the private sector should partner to promote investment in renewable energy sources for operating the milk cooling equipment in rural areas in order to address the problem of high energy tariffs that impacts the profitability of milk collection centres.
- iii) MCCs should acquire the necessary technologies and adopt management practices that can address the causes of high post-harvest losses for example by acquiring appropriate equipment for milk handling, adopting proper cleaning procedures and maintaining the cooling equipment in a good working condition.

6. REFERENCES

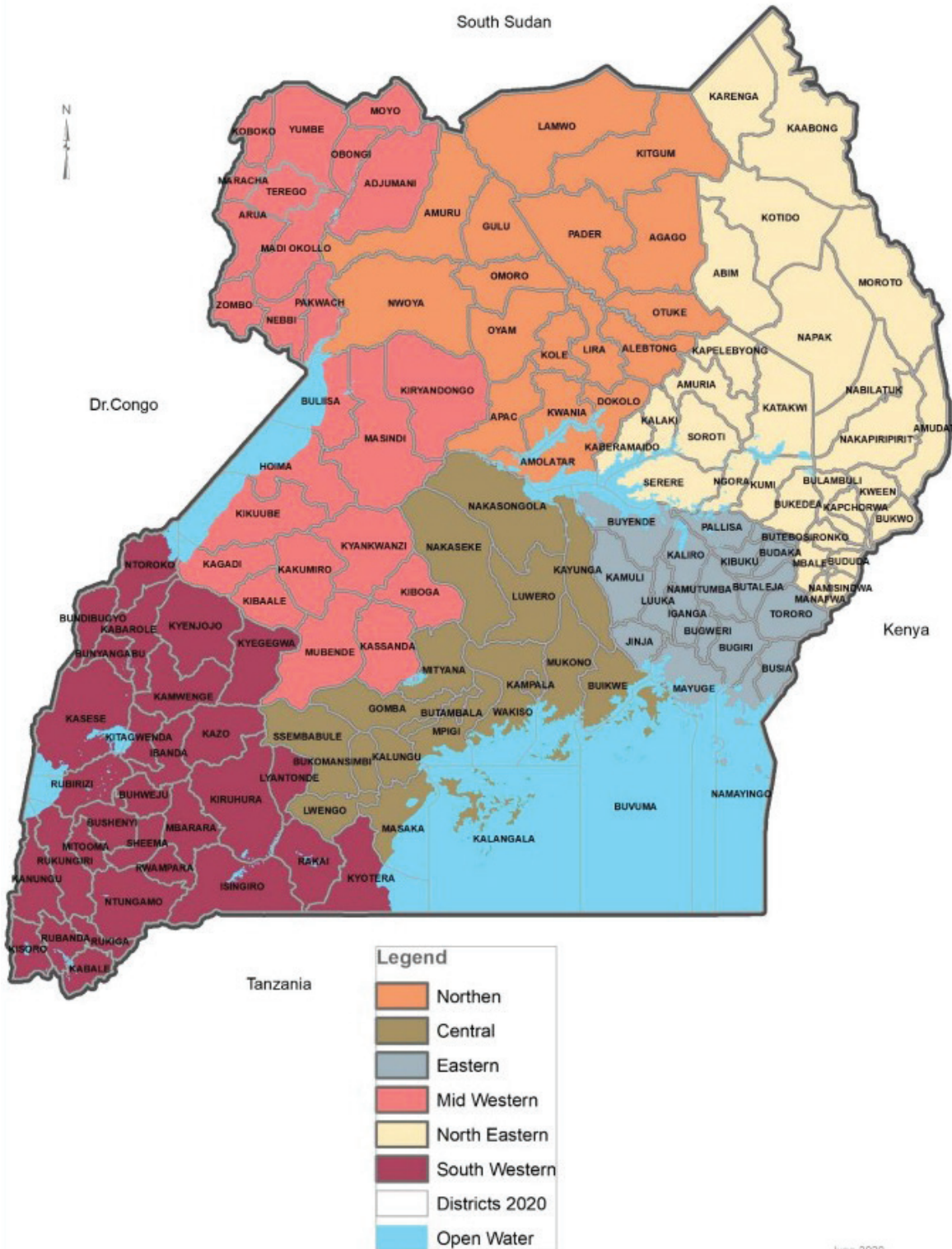
- aBi 2017. aBi Annual Report 2017. Agricultural Business Initiative (aBi), Kampala, Uganda
aBi 2015.
- aBi Annual Report 2017. Agricultural Business Initiative (aBi), Kampala, Uganda
- Balikowa 2011. Dairy Development in Uganda: A review of Uganda's Dairy Industry. Food and Agricultural Organisation (FAO) of the UN, Rome. <http://www.fao.org/3/a-aq292e.pdf> .
- DDA 2021. Annual Report FY 2020/2021, Dairy Development Authority (DDA), Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Plot 1 Kafu Road, Nakasero, Kampala.
- DDA Strategic Plan 2021. Dairy Development Authority Strategic Plan III, Financial Year 2020/21 – 2024/25, Dairy Development Authority (DDA), Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Plot 1 Kafu Road, Nakasero, Kampala.
- FAO (<http://www.fao.org/3/t3080t/t3080T04.htm>), accessed November 2021
- MAAIF 2021. Personal Communication (KII), Commissioner Animal Production, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Entebbe, Uganda
- MoFPED 2021. Background to the Budget Fiscal Year 2021/22, Ministry of Finance, Planning and Economic Development (MoFPED), Kampala, Uganda.
- NPA 2020. Third National Development Plan (NDP III) 2020/21 – 2024/25, National Planning Authority, Kampala, Uganda.
- UBOS, 2020. 2020 Statistical Abstract. Uganda Bureau of Statistics, Kampala.

7. ANNEXES

Annex 1: Map of Uganda showing the semi-arid cattle corridor



Annex 2: Map of Uganda showing the six dairy regions (milk sheds)



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