Ambasáid na hÉireann
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HEIFER INTERNATIONAL KENYA

COMPREHENSIVE LEARNING REPORT

THE CATALYTIC IMPACT FOR DAIRY SECTOR GROWTH PROJECT IMPLEMENTED - LESSONS FROM

EMBU COUNTY| MERU COUNTY | NANDI COUNTY | UASIN GISHU COUNTY|ELGEYO MARAKWET COUNTY

Developed with technical support of:

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EXECUTIVE SUMMARY

Brief overview of the project

The Catalytic Impact for Dairy Sector Growth Project was a five-year initiative that was implemented between July 2019 and July 2024, It is a project implemented by Heifer International Kenya (HIK) in collaboration with Irish Aid, County Governments, and 10 Producer Organizations (POs). This project, valued at approximately €1.5 million, aimed to foster sustainable and inclusive growth in Kenya's dairy sector by supporting farmer-owned dairy agribusinesses. The project is part of the Ireland Kenya Agri-food Strategy (IKAFS), launched by the Embassy of Ireland in Kenya in late 2017, which focuses on dairy, fisheries, and potatoes. The initiative aligns with Ireland's Policy for International Development "A Better World," aiming to encourage private sector development, reduce humanitarian need, build resilience, respond to climate change, and promote gender equality. The project's overarching goal was to improve living incomes by creating job opportunities for 25,000 households through the growth of farmer cooperatives and youth agribusinesses. The project operated across five counties in Kenya's North Rift and Upper Eastern regions, engaging seven POs in the North Rift and three in the Upper Eastern region implemented in two phases between 2019 and 2022.

Specific Objectives:

- Strengthen the institutional capacities of cooperatives for sustainable management of catalytic impact investments.
- Enhance the competitiveness of 10 cooperatives through market and business development, financial, and technical capacity investments.
- Stimulate the growth of women and youth-owned enterprises for improved household livelihoods.
- Promote the adoption and use of Catalytic Impact Investment at organizational and county levels to foster sustainable private-public partnerships.

Bridge Phase:

- Insights from the first two phases highlighted the need to deepen the impact within the 10 POs. Consequently, a twelve-month bridge phase was initiated from January 2023 to July 2024. This phase aimed to enhance the catalytic investment's impact by boosting the institutional capacity of the POs for efficient investment utilization and repayment, while reducing operational inefficiencies.

Key findings and insights

1. Operational Efficiency Improvements: The project improved operational efficiency in cooperatives through capacity building, enhanced mechanization, and transport efficiency resulting in increased productivity and profitability.
2. Gender Inclusion and Youth Empowerment: Initiatives in cooperatives such as Katheri and Mburugu highlighted the roles of women and youth, addressing unpaid labor, long working hours for women and household job creation. Success stories, like Isabella's with a milk delivery truck in Katheri, showcased significant empowerment impacts.
3. Catalytic Impact Investments: In Lessos Cooperative, Catalytic Impact Investments facilitated better relationships between cooperatives, farmers, and financial institutions, leading to favorable terms and strengthening cooperative-farmer dynamics. This unlocked new opportunities such as machinery investment of silage making machine in Lessos..
4. Capacity Building: Training programs on hygiene, AI, disease diagnosis, and dairy management in the POs improved milk production quality and farmer incomes by equipping them with essential skills.
5. Youth engagement and professional management were integral to the project's success. The employment of youth interns, business officers, and extension officers in POs led to better management practices, financial stability, and transparency. The introduction of check-off systems and catalytic SMS communication further streamlined operations and improved accountability. These measures ensured that cooperatives were not only managed efficiently but also had the capacity to support and nurture young talent with most of the interns being retained thereafter.
6. Sustainability and Long-term Impact: Ongoing support and capacity building, as seen in Ainabkoi Cooperative, are crucial for maintaining progress. Strategies like forming farmer groups and unions have contributed to building resilient and sustainable business models.

Major achievements and impacts

1. Increased Membership and Milk Production: Ainabkoi Cooperative Society saw its membership grow from 700 in 2021 to 2000 in 2024, demonstrating the project's success in mobilizing farmers. Similarly, all participating cooperatives reported increased milk production and revenue.
2. Enhanced Skills and Capacity: Farmers received training in silage making, feed formulation, disease management, and dairy management practices. This led to improved animal health and increased milk quality with milk rejection falling from a high of 500 liters per day to 100 loiters per month for Katheri PO.
3. Financial Benefits: Farmers' income increased by approximately 20%, attributed to better milk prices and reduced production costs. The provision of check-off loans and other financial aids facilitated the purchase of dairy inputs and infrastructure improvements.

4. Infrastructure and Equipment: The project funded the purchase of milk transport lorries, silage machines, and water tanks, which addressed critical logistical challenges. Establishing satellite stations with cooling plants reduced milk spoilage.
5. Market Access and Linkages: Cooperatives like Kabiyet and Chepkorio established new market linkages, enabling them to sell products to supermarkets and other major buyers through unions and established milk ATMs enhancing stability and reliable markets for their milk.

Major lessons from the project

1. Improvement of transportation facilities encouraged women participation by reducing the time taken on the road to deliver milk especially in Upper Eastern (Katheri for instance) where this activity was a preserve of women. Furthermore, women now do not wake up very early as they used to, to milk and deliver the milk and thus frees their time to undertake other economic and family activities. Interestingly again, this intervention unintentionally increased men's participation over time as the dairy farming became more profitable leading to more empowerment to men.
2. Over and above the financial support required to improve on internal operations, POs require post investment support on business development services to deepen market participation and accessibility for sustainability of PO's ventures. This aspect was missed in the structure of financial support provided but should be considered in future catalytic investments.
3. Diversification from the core business of milk chilling proved to be a turbulent enedevour with those who tried facing market challenges. For instance, Mburugu's feed milling factory failed to command the targeted market share initially envisioned and ended up operating at a quarter capacity and failed to service the loan with this investment. It was learnt .such moves required better market feasibility, PO capacity building before, during and post investment to enhance market penetration and sustainability.
4. Holistic capacity strengthening involving board members, PO management and farmers turned out to be quite a success. The board members were capacity built on policy making, PO management were trained on governance, records management, professional HR and accountability was a key success factor. And similarly training farmers on-farm extension services on new technologies on feed, AI, records keeping among others to enhance farm operational efficiency was more impactful .
5. Demo plots like those set up in Chepkorio and Ainabkoi enhanced replicability of good agricultural practices proving to be more efficient than traditional off-farm training.

Policy recommendations for the dairy sector

1. Targeted Funding for Core Activities: Prioritize funding for essential activities like milk chilling and aggregation to maintain quality and consistency.
2. Climate-Smart Investments: Invest in solar energy systems to reduce operational costs and environmental impact.
3. Business Development Support: Allocate additional funds for business development to support investment installation, project implementation, and ongoing business support.
4. Dedicated Staff for Project Accountability: Employ full-time staff focused on project goals to ensure consistent management and effective implementation.
5. Comprehensive Training Programs: Implement structured training programs for both staff and farmers to improve management practices, milk quality, and overall productivity.
6. Policy to Support Growth and Sustainability: Adopt a Quality Based Milk System to reward high-quality milk production, enhancing market competitiveness.
7. Further Investment in Transport and Cold Chain Infrastructure: Improve transportation and storage infrastructure to reduce milk spoilage and accommodate increased production.
8. Gender Inclusion Policies: Ensure equitable resource distribution and empower women and youth through targeted training and capacity building.
9. Support for Value Chain Activities: Provide substantial financial and business development support for expanding value addition processes within the dairy sector.

TABLE OF CONTENTS

ACRONYMS

BDS	Business Development Support
BETA	Bottom-Up Economic Model
FGDs	Focused Group Discussions
FPOs	Farmer Producer Organizations
GDP	Gross Domestic Product
HIC	Heifer impact Capital
HIK	Heifer International Kenya
IDI	Indepth interviews
IKAFS	Ireland in Kenya launched the Ireland Kenya Agri-food Strategy
KDB	Kenya Dairy Board
KIIs	Key Informant Interviews
M&E	Monitoring and Evaluation
MEL	Monitoring, Evaluation, and Learning
NKCC	New Kenya Creameries Cooperative
PI	Principal Investigator
POs	Producer Organizations
KMAs	Knowledge Management Assistants
ToR	Terms of Reference

List of tables

List of figures

1.0 INTRODUCTION

1.1 The context of the dairy sector in Kenya

Kenya is a significant milk producer in Africa, contributing 30-40% of the continent's total milk production with over 4.5 million dairy cows, ranking third after Ethiopia and Sudan[i]. Annually, Kenya produces approximately 5.2 billion litres of milk, with a high per capita consumption of 120 litres, projected to nearly double to 220 litres by 2030. The dairy industry is economically vital, contributing about 4% to the national GDP, 14% to the agricultural GDP, and 44% to the livestock GDP, aligning with the Kenya Kwanza regime's Bottom Up Economic Transformation Agenda (BETA) model of economic transformation. The dairy sector is among the key value chains fronted by the Government to support the rural Livelihoods. The industry faces opportunities from rising demand for processed and packaged milk products driven by urbanization, changing consumer preferences, and retail industry developments. However, challenges such as stagnant milk production volumes, low productivity per cow, aging infrastructure, and insufficient investments in dairy farms persist. However, the sector suffers immense risks of rising cost of feeds and an apathetic youth involvement[ii]. Moreover, the sector is estimated to create about 365,000 job opportunities for farm labourers, feed manufacturers, veterinary suppliers, animal breeding service providers, government extension officers, among other direct input service suppliers. For Kenya's smallholder farmers, dairy production is a cash enterprise and a multi-purpose cattle system, which gives them milk and manure and serves as their capital asset.

The dairy industry faces numerous obstacles that hinder its development. Key issues include insufficient research, extension services, and weak institutional connections. The seasonality of milk production leads to fluctuating periods of surplus and shortage, destabilising the market. Additionally, the industry struggles with low-quality feeds, suboptimal feeding practices, poor cattle breeds, and the high cost and limited availability of animal healthcare and breeding services like artificial insemination. Furthermore, the sector's growth is stymied by a low level of milk processing and minimal product diversification. Producer organisations are often weak, lacking the capability to manage essential functions such as milk collection, cooling, bulking, and logistics efficiently. These organisations require modern technology and sustainable management structures. Rural areas suffer from poor infrastructure, including the absence of cold chain facilities and inefficient transportation systems, leading to compromised milk quality and significant losses from spoilage and wastage. Additionally, the local market is increasingly affected by the influx of inexpensive milk from neighbouring countries, further challenging the industry's growth.

The dairy industry faces numerous obstacles that hinder its development. Key issues include insufficient research and extension services, along with weak institutional connections. The seasonality of milk production leads to fluctuating periods of surplus and shortage, destabilising the market. Additionally, the industry struggles with low-quality feeds, suboptimal feeding practices, poor cattle breeds, and the high cost and limited availability of animal healthcare and breeding services like artificial insemination.

Furthermore, the sector's growth is stymied by a low level of milk processing and minimal product diversification. Producer organisations are often weak, lacking the capability to manage essential functions such as milk collection, cooling, bulking, and logistics efficiently. These organisations require modern technology and sustainable management structures. Rural areas suffer from poor infrastructure, including the absence of cold chain facilities and inefficient transportation systems, leading to compromised milk quality and significant losses from spoilage and wastage. Additionally, the local market is increasingly affected by the influx of inexpensive milk from neighbouring countries, further challenging the industry's growth.

Kenya's policy and regulatory environment has meta morphed over time since the colonial era[iii]. The regulatory interventions criminalizing the sale of raw milk for instance, date back to 1958 when the Dairy Industry Act was enacted. Just like the case with the current policy efforts, this Dairy Act aimed to address food safety and quality concerns. But the regulation largely supported the large-scale producers and th urban markets. Until 2004 when there was a policy change (Kenya Subsidiary Legislation, 2004)[iv] , informal dairy sector players were often harassed and operated without licenses despite their significant growth in numbers and market share). However, the revised policy of 2004 allowed the Kenya Dairy Board, following a training scheme, to train and license small-scale vendors as a pathway to formalisation. This engagement entailed strengthening the capacity of informal traders in milk handling, value addition and business development. Consequently, there has been an increased number of licensed vendors and a high welfare benefit for actors across the dairy value chain with a net worth of USD 230 million. Other key policy documents include the Sessional Paper No. 03 of 2020[v] on The Livestock Policy which outlines Kenya's approach to utilizing livestock resources for food security, improved livelihoods, and environmental sustainability. This addresses key issues around animal health and agribusiness and value addition, technology adoption and transfer within the dairy sector. Other key polices include:

The Dairy Industry Act (Cap 336)[vi]: it regulates the production, processing, and marketing of milk and dairy products in Kenya, establishing the Kenya Dairy Board (KDB) to oversee the industry. However, it has several gaps, including limited enforcement and compliance mechanisms, inadequate support for smallholder dairy farmers, and outdated provisions that fail to address modern dairy farming challenges.

The National Livestock Policy (2008)[vii]: was introduced to enhance livestock productivity and profitability while ensuring environmental sustainability, covering various livestock, including dairy cattle. However, it has notable gaps: insufficient focus on value addition and market access for dairy products, limited emphasis on research and development specific to dairy farming, and inadequate measures for climate change adaptation and resilience in the dairy sector.

Kenya Vision 2030: is a long-term development plan that includes strategies to boost the agricultural sector, including dairy farming, to achieve food security and economic growth. However, it faces implementation challenges at the grassroots level, insufficient linkage between national policies and local agricultural practices, and inadequate

funding and resource allocation for dairy sector initiatives.

The Agricultural Sector Transformation and Growth Strategy (ASTGS) 2019-2029[viii]: aims to transform agriculture into a competitive and sustainable sector, with a particular focus on supporting the dairy industry. However, there are notable gaps in the strategy, including limited integration of smallholder farmers into commercial dairy value chains, inadequate infrastructure for milk collection, storage, and transportation, and challenges in implementing technology and innovation in dairy farming.

The Dairy Master Plan (2010)[ix]: outlines a strategic framework for developing the dairy sector, emphasizing increased milk production and improved quality standards. However, progress has been slow in achieving the plan's targets, collaboration between public and private sectors remains insufficient, and there are significant gaps in extension services and farmer training programs.

Addressing these gaps through targeted interventions can significantly enhance the sustainability and growth of the dairy sector in Kenya as well as unlock the full potential of its dairy industry. Some of the interventions could include focusing on smallholder farmer support such as enhancing access to credit, subsidized inputs, and training. Developing infrastructure for milk collection, processing, and distribution, and promoting value addition through incentives are crucial. Investing in research for high-yield breeds, improved feeding, and disease management, and forming partnerships with academic institutions is needed. Implementing climate-smart practices and training farmers in resilient techniques are essential. Strengthening county governments' capacity to implement national policies and improving coordination among government agencies, the private sector, and farmer organizations are necessary. Investing in rural infrastructure, including roads, electricity, and cold storage, is vital to reduce post-harvest losses and improve milk quality.

1.2 Project Overview

1.2.1 The concept of the catalytic impact investment

Catalytic impact investment is a derivative of impact investment that accepts disproportionate risk and/or concessionary returns to generate positive impact and enable third party investment that would likely not be possible otherwise[x]. Say for example, Heifer International-Kenya (HIK) provides a concessionary funding to a farmer cooperative organization for expansionary investment such as to expand the capacity of pasteurizer which catalyses reactionary need for additional funding from a third-party financial institution to acquire a 10-ton truck in view of increased capacity to process milk. Catalytic funding by its nature has the potential to unlock and accelerate novel and effective solutions to social and environmental problems, giving entrepreneurs increased freedom to develop their business models and attracting co-investors with different risk and return appetites. The objective of catalytic capital is to generate positive impact and enable third party investment that would likely not be possible with higher return expectations, lower risk tolerance, or less flexible/patient investment terms.

1.2.2 Description of the Catalytic Impact for Dairy Sector Growth Project

The Catalytic Impact for Dairy Sector Growth Project was established by HIK in collaboration between Irish Aid, respective county governments, and 10 Producer Organizations (POs). This is a five-year project implemented between July 2019 and July 2024. Heifer International is a global non-profit working to end hunger and poverty and care for the Earth by using sustainable practices and engaging smallholder farmers in agricultural development.

The Embassy of Ireland in Kenya launched the Ireland Kenya Agri-food Strategy (IKAFS) in late-2017 which includes a focus on three value chains: namely dairy, fisheries and potatoes. The Strategy aims to drive Irish-Kenya trade partnerships through institutional partnerships and support to agribusiness, in a way that contributes to the realization of the Sustainable Development Goals. The Embassy, through Heifer Project International, made available funds to pilot catalytic funding that will support SMEs in the dairy sector, with the overall goal of contributing towards sustainable and inclusive growth of the farmer-owned dairy agribusiness in Kenya. The fund will help accomplish the objectives of Ireland's Policy for International Development "A Better World" and the "Ireland Kenya Agri-food Strategy (IKAFS)" which both focus on Ireland's ambitions to encourage private sector development to reduce the humanitarian need and build resilience, respond to climate change and promote gender equality while for Heifer, accelerate 15,000 households towards achieving a living income.

The overall goal of the project was to contribute to sustainable and inclusive growth of the farmer-owned dairy agribusiness through impact investment. The project was meant to accelerate a pathway to improvement of living income through creation of job opportunities amongst 25,000 households by catalyzing the growth of farmer cooperatives and youth agribusinesses. The project was implemented across five (5) counties within the North Rift and Upper Eastern regions of Kenya. The North Rift region comprised seven POs: Lessos Dairy, Lelchego Dairy, and Kabiyet Dairy in Nandi County;

New Progressive Farmers Cooperative Society, Lelbren Dairies, and Ainabkoi Farmers Cooperative Society in Uasin Gishu County; and Chepkorio in Elgeyo Marakwet County. The Upper Eastern region included three POs: Mburugu Farmers Cooperative Society in Embu, Katheri Dairy, and Magati Dairy in Meru County. The total project value stands about EURO 1,038,000.

1.2.3 Specific objectives of the project

The projects objectives were:

1. To strengthen the institutional capacities of cooperatives to sustainably manage catalytic impact investments.
2. To improve the competitiveness of 10 cooperatives through market and business development, financial and technical capacity investment for impact
3. To stimulate the growth of women and youth-owned enterprises for improved household livelihoods
4. To enhance the adoption and use of Catalytic Impact Investment at the organizational and county level to spur sustainable private-public partnerships.

1.3 Purpose of the Report

The intent of this report is to collate and organize the lessons and insights derived from the project after five years of successful implementation. The report highlights the intended and unintended outcomes that are organised into a knowledge product for purposes of knowledge sharing with a wide range of stakeholders, such as officials from the National and County Governments, policymakers, participants from the private sector, donors, development partners, financial institutions, and Farmer Producer Organizations (FPOs) within and outside the targeted groups.

2.0 Methodology

The assignment adopted a structured participatory approach to gather both primary and secondary data for the knowledge production process while paying attention to lived experiences and viewpoints of all the Catalytic Impact for Dairy Sector Growth project beneficiaries and stakeholders, including Farmer Producer Organizations (FPOs), financial institutions, development partners, policymakers, private sector, and county government.

The approach provided new insights and raised new questions and perspectives that aided in the development of a comprehensive picture of the learnings, information exchanges, and achievements around which the project was designed and implemented. The assessment involved a qualitative approach highlighting the case studies on positive impacts of the project on the dairy sector, and to the promotion of local communities' food systems and livelihood development. The case studies provide a summary of what worked well and what didn't work during project implementation while eliciting recommendations for future implementation of similar projects.

In summary, the knowledge generation exercise was organized into five core stages, as indicated in the figure 1;

Figure 1: Summary of knowledge generation key processes

2.1 Data Collection Methods

Qualitative methods of data collection were used to analyze the project's impact on the dairy sector and the local community's food systems. The data collection took two tracks with consideration to showcasing case studies of the project's success, challenges, lessons learned, policy gaps, and overall impact of the project. Primary data was gathered through key informant interviews (KIIs) and focus group discussions (FGDs) (Figure 2), while secondary data were sourced through a desk review of selected programme documents.

Figure 2: An FDG session in Ainabkoi Dairy Cooperative Society

2.1.1 Inception and Planning

The inception and planning stage involved consultation with HIK programme implementers. The inception phase aided in the identification of documents for review. Ultimately, these consultations culminated in the development of an inception report that specifies in substantive detail the methodology, assessment tools, sampling procedures, work plan and timelines, a data quality assurance checklist, and communication protocols. During this phase, a stakeholder mapping was undertaken where a list of key stakeholders to be involved in the KIIs and consultative meetings were developed. The list was developed by answering the key questions on why, who, when to engage while considerations for inclusion were also made (women and youth). The list includes POs (management and farmers), county governments (Department of Livestock and Cooperatives), project partners, beneficiaries, feed mills, financial service providers, HIK staff, and heifer impact capital representative.

During the planning phase, the consultants developed interview guides in consultation with HIK team to ensure that the tools are tailored to gather specific information on project impacts, challenges, successes, and lessons learned.

2.2 Data Collection approaches

Qualitative methods of data collection were used to analyze the project's impact on the dairy sector and the local community's food systems. The data collection took two tracks with consideration to showcasing case studies of the project's success, challenges, lessons learned, policy gaps, and overall impact of the project. Primary data was gathered through key informant interviews (KIIs) and focus group discussions (FGDs), while secondary data were sourced through a desk review of selected programme documents. These tracks have been explained below:

2.2.1 Desk review

Critical and comprehensive review of literature, through content and thematic analysis of the key documents with important information relevant to the project was done. Review of project documents helped to bring out the context including existing knowledge and information, specifically in the dairy sector and the choice of the different catalytic. The review of relevant documents included:

1. Baseline and end-line evaluation reports for the different phases of the project implementation.
2. Joint Field Monitoring reports
3. Project results and log frameworks
4. POs lessons learned reports
5. Theory of Change: Catalytic Impact for Dairy Sector Growth Project – Phase III
6. Catalytic impact for dairy sector growth I, II, III project proposal
7. County government CIDPs
8. Project agreement the scope of work
9. Monitoring and Evaluation reports
10. Kenya Government's Bottom Up Economic Agenda (BETA) policy document
11. Agricultural Sector Development Plan
12. Dairy Industry Regulations (registration, licensing, cess and levy) 2020
13. WCDI (2021). Rapid Assessment of the Dairy Sector in Kenya. Wageningen Centre for Development Innovation, Wageningen.

2.2.2 Data collection approaches

It involved conducting FGDs, and KIIs to establish the project impact on the local community's food systems and livelihood based on the developed survey questions. The approaches are as discussed:

1. Focus Group Discussions

Focus Group Discussions (FGDs) (Figure 3) comprising between 5 and 6 participants in selected FPOs were facilitated by an interviewer and a note taker (Table 1).

Figure 3: An FGD session in Lessos Dairy Cooperative Society

Table 1: Gender distribution of FGD participants

#	County	Organization	>35 years old		<35years old
			Male	Female	Male
1.	Embu	Mburugu Dairy Farmers Cooperative Society Ltd	1	3	1
2.	Meru	Katheri Dairy Farmers Cooperative Society Ltd	2	2	1
3.	Uasin Gishu	Ainabkoi Farmers' Co-operative Society Ltd	1	2	2
4.	Nandi	Lessos Dairy Farmers Cooperative Society Ltd	3	2	1

2. Key Informant Interviews

Farmer Producer Organizations were identified to discuss their experiences with the programme and enumerate the key learnings that they can draw from the implementation. Key questions to guide the sessions responded to what worked well and what didn't and their recommendations from their experiences. Participants here

will be targeted purposively across all the project sites to ensure representation. A total of 21 KIIs, with 12 male and 9 female respondents, were interviewed (Table 2).

Table 2: List of Key informants

County	Organization	Position	Gender
Meru	Magati Dairy Farmers Cooperative Society Ltd	FPO Manager	Female
	Katheri Dairy Farmers Cooperative Society Ltd	FPO Chairman	Male
	County Government	Ward extension officer	Male
Embu	County Government	Cooperative Officer	Male
	County Government	Cooperative Officer	Female
	County Government	Livestock Officer	Female
	Kenya Dairy Board	Branch Manager	Female
Nandi	Lelchego	FPO manager	Male
		FPO extension officer	Male
	Kabiyet	FPO manager	Female
		FPO chairman	Male
		FPO secretary	Female
	Lelbren	FPO manager	Male
	New KCC	NKCC manager	Male
Uasin Gishu	New Progressive	FPO manager	Female
		FPO chairman	Male
Elgeyo Marakwet	Chepkorio Dairy Cooperative	FPO Manager	Male
Other stakeholders interviewed			
HIC	Regional manager		Male
HIK	Project Manager		Female
HIK	Former project coordinator		Male
NKCC	Lessos Branch	Acting Manager	Male
Uasin Gishu	County Government	Agri-enterprise Lead	Female
Uasin Gishu	Kenya Dairy Board-Uasin Gishu County		Female

3. Case studies

Three case studies were identified to showcase the impact of the project. These studies explored the propped operational efficiency at POs in Ainabkoi, Katheri, and Mburugu, as a result of the green energy transition by use of solar panels and water heaters to reduce fossil fuel reliance, capacity building of various stakeholders of POs, including board members, PO management and PO farmer members on various relevant topics to improve their efficiency. The other aspects targeted for operational efficiency included the adoption of technology and enhanced mechanization through the purchase of machinery. The case studies also focused on examining gender inclusion and youth empowerment initiatives in Katheri, Mburugu, Ainabkoi, and Chepkorio, highlighting issues such as unpaid labor and long working hours, household job creation, and women's and youth's roles, including a specific focus on Isabella's experience with a milk delivery truck in Katheri. Finally, the third stream of case studies showcased the adoption of catalytic impact investments, particularly in Lessos, analyzing the dynamics between cooperatives, farmers, and banks regarding interest rates, coping mechanisms with HIC facility repayment, and the advantages of catalytic funding over conventional bank funding. These case studies involved debriefing

structure to narrate their project experiences and provide future programming recommendations. A total of 4 FPOs were interviewed for the case studies, as summarised (Table 3).

Table 3: FPOs involved in the case study

County	Organization	Position	Gender
Embu	Mburugu Dairy Farmers Cooperative Society Ltd	FPO Extension Officer	Male
Meru	Katheri Dairy Farmers Cooperative Society Ltd	FPO Manager	Male
Uasin Gishu	Ainabkoi Farmers' Co-operative Society Ltd	FPO CEO	Male
		FPO Human resource manager	Female
		FPO records officer	Female
Nandi	Lessos Farmers Dairy Cooperative Society Ltd	FPO extension officer	Female

4. Stakeholder consultative forum

A regional level stakeholder engagement forum, taking the form of a one-day workshop, to discuss effective approaches, challenges, achievements and lessons learned from the project implementation and fill in the gaps of the findings from KIIs and FGDs was undertaken. The workshops were held at regional level with North Rift and Upper Eastern having one workshop each. The forums consisted of HIK team, KEBs, KDB, FPOs, Feed mills, County staff and private sector actors.

2.3 Data Analysis

The findings were analysed through content analysis where the key themes, trends, successes, and challenges were identified and summarized. The findings from qualitative interviews were triangulated with those from the literature review into a comprehensive learning report.

The comprehensive learning report will be condensed into knowledge-based materials tailored to different target audiences. The knowledge products include; a learning brief with case studies, and a policy brief. Additionally, a dissemination plan outlining the strategies and channels for disseminating the knowledge materials generated.

2.4 National dissemination workshop

To share the knowledge materials generated from this assignment, a stakeholder workshop will be held. The knowledge materials to be shared during this workshop will include key findings, case studies, policy recommendations, and impact stories.

2.5 Limitations

During the data collection exercise, several challenges were experienced. Below is a breakdown of the challenges that were experienced during the process and the mitigation measures.

Time Constraints: The data collection period was limited, which limits the depth of information collected from the project participants. This was however taken care of by

the stakeholder consultative forum that brought together the different stakeholders from the specific regions for validation and to provide further insights. Additionally, Heifer provided key monitoring documents that were further triangulated with field findings to achieve results reliability.

Reliability of Self-Reported Data: Self-reported data from FPO members and other stakeholders may be subject to biases, such as social desirability bias, affecting the accuracy of the information collected. The findings were triangulated with desk review findings and a consultative forum that validated the preliminary findings.

3.0 Lesson from the project interventions and outcomes

3.1 Capacity Building

Capacity building plays a critical role in the success of any organization. For instance, **Lessos Farmers Cooperative Society**, through the Catalytic Impact for Dairy Sector Growth Project, received training for staff, board members, and farmers. The staff was trained in leadership roles, and the board on governance, while the farmers were trained in dairy management, feed formulation, especially silage making, and record keeping. Members received comprehensive training on feed production, animal health management, and improved breeding techniques, including diagnosing diseases like East Coast Fever and mastitis, and transitioning from local bulls to artificial insemination. As a result, the manager mentioned that there is an increased ownership of improved varieties because of the AI and an increase in extension thus better management practices.

"We received very good trainings from the project that have helped us improve our dairy farming. By learning about feed formulation, especially silage making, dairy management, and improved breeding techniques, we've seen a marked improvement in our operations. Early diagnosis of diseases like East Coast Fever and mastitis and shifting to AI have significantly increased our milk production, quality and incomes." - [Participant from FGD, Lessos Farmers Cooperative Society]

Heifer International also pays salaries for the sales and marketing staff, which has, over time, increased sales and found a market for the milk. The organisation also pays staff to ensure quality milk collection from various farmers by training them on quality checks, which has, over time, improved the quality of milk delivered to the society as a result of less milk rejection. The catalytic impact for the dairy sector growth (CIDSGP) also provided financial support to facilitate training as well as grants to purchase tractors and machinery for making silage. Support was also advanced to designing and delivering training manuals, brochures, and flyers to farmers. The cooperative employed veterinary officers, creating job opportunities for the youth, and distributed fodder seeds to farmers, promoting the adoption of improved feeds. Training on improved feeds transformed dairy farming from a traditional practice into a business-oriented venture. The training and provision of fodder seeds to support farmers with feed have really increased the production of fodder trees among members of the cooperatives, and this has also spilled over to other farmers' cooperatives who are also utilizing the fodder processing machinery.

"The adoption of feed and fodder conservation methods has really improved our milk production. Having feed and fodder supply across the year, has significantly reduced seasonal dips in milk production during dry months." - [Key Informant, Lessos Farmers Cooperative Society]

Similarly, **the management of the New Progressive** indicated that the employment of business officers to train farmers on treating dairy production as a business, improvements in cooperative management practices, the implementation of check-off systems to reduce cash constraints, and the introduction of SMS communication between farmers and the cooperative are also key components in improving the skills of farmers and the cooperative staff as this helped in real time communication especially regarding the amount of milk that has been dispatched to the cooperative thus improving farmers confidence.

Ainabkoi Farmers' Cooperative Society- The training and capacity building involved several activities. For instance, transporters received training on quality checks to ensure the integrity of the milk supply, which is particularly helpful when collecting to ensure minimal milk contamination from farmers and this has improved the quality of milk that farmers deliver. According to (Nyokabi et al., 2021), lack of training hinders a farmers' compliance with standards Governance also plays a critical role in the management of the cooperative. The Ainabkoi Farmers' Cooperative board underwent training focused on policy making and implementation, reviewing the board charter, developing election policies, and defining the duties of each staff member. This led to more structured and efficient governance within the cooperative. Farmers received extensive training on milk handling and safety, feed production and formulation, and feed conservation techniques. Loans were provided to upgrade the agrovet and store systems. Additionally, financial literacy training was offered to improve the financial management skills of members. Due to minimal extension staff in the cooperative (2), to support ongoing member education and development, 40 farmer field schools were established, each accommodating up to 50 members. Members were trained on farm record keeping on cow performance and milk production and sales, training on animal health to identify disease symptoms, feed preparation (figure 4), formulation through Total Mixed Ratio, making of silage, and planting of tree fodder and maize fodder. Demo plots were funded by Heifer to set napier and Brachiaria varieties for which farmers choose seeds that perform best in the area. Training of improved breeding using sexed semen for high-breed cows after four calving circles to achieve .pedigree (Butler, 2020). Members were also trained on milk quality, feed quality, and cow hygiene to reduce diseases and calf mortality rates. The use of sexed semen has allowed farmers to continuously improve their breed cows, and the emphasis on milk and feed quality has ensured that they maintain high standards in production and health of their cows.

Figure 4: FPO members preparing fodder

The Heifer Catalytic Impact project offers various skills to cooperative members through training. **Lelchego Marketing Dairy Cooperative**. Members were trained on business management skills such as proper record keeping through catalytic impact projects. The FPO also has interns who were impacted with skills in business management and ICT by the FPO staff. Besides, FPO members were trained by animal nutritionists on feed quality, milk quality, cow hygiene and best handling practices. This has prevented the occurrence of frequent diseases, and calf mortality rates have declined. Lelchego dairy cooperative, through the Heifer catalytic impact project, employed extension staff to train farmers on feeding and producing quality milk through better hygiene practices. Lelchego Dairy employs nutritional staff that train farmers to produce quality feeds and quality milk. FPO staff carry out follow-ups at the farm level to guide and ensure farmers practiced feed production as per the guidelines. In addition, demo plots and tree nursery were established to train farmers on quality feed production so they could develop their feeds and access seedling for planting of supplementary feeds at their farms. The training entails feed management, feed harvesting, and feed storage. This has improved the quality of feeds produced by farmers and increased the nutrition level of the cow during drought periods. Food shortage has reduced during droughts, increasing steady milk production. Farmers were trained and adopted modern quality feeds such as super napier through the impact catalytic project funding.

Many activities geared toward capacity building were conducted in the **Lelbren Farmers' Cooperative Society**. These activities targeted the board, the staff, and the farmers. Board members were trained in governance, policymaking, and implementation. They were also trained on the importance of stipulating roles and hence each member of the board and staff was assigned clear roles within the cooperative society. The staff members, being that they were the users of the policies made by the board, were trained on various aspects of leadership, record keeping, finance management, resource management, and milk quality checks. The clear definition of the roles and enhanced management skills have led to more effficient and transparent operations. Improved leadership management practices have increased the cooperative's capacity to deliver high-quality services to its members, contributing to the cooperative's long-term success and sustainability. Farmers on the other hand underwent rigorous training, which is still ongoing on various aspects of dairy management. These included training on animal feed production, feed formulation, and good dairy animal management practices including disease detection and vaccination scheduling, milk hygiene, quality, and safety. Apart from this training, several trade fairs and shows, farmer field schools, and exchange visits were organized, where the farmers went to see and learn what other farmers were doing. Lelbren has about 9000 registered members but with only about 1,400 active members. All of these have in one way, or another taken part in a few or all the trainings that were organized for the farmers. With the inception of the Heifer Catalytic Impact project, the Lelbren Farmers' Cooperative Society got to have extension officers who were trained on how to operate machinery that would be used for feed formulation as well as value addition. While this activity hasn't kicked off yet, a few of the farmers have also been trained on the same in readiness for when the building dedicated to feed formulation and conservation should be complete.

The Heifer Catalytic Impact Project provided training on women empowerment for female dairy farmers of **Kabiyet Dairies Cooperative Society**. This was to ensure that even the female members of the household earned from the project. Before the project, women were tasked with taking care of the cows in terms of feeding and milking but all the proceeds from the milk would go to the men. With the Catalytic Impact Project, both men and women were empowered in a way that even the women received part of the proceeds from the sake of milk. Farmers were provided with training on how to improve the quality and quantity of milk, feed formulation, the importance of using sexed semen, general dairy management, and the importance of planting Indigenous trees for the environment. Through these training, most farmers improved their skills and knowledge on matters of dairy management and environmental protection which improved milk production quantities and quality as well as improve our environment.

The project offered training and capacity building to the FPOs and farmers. The FPOs were trained on efficient governance and management models including designing a board charter and FPO's operational policies, while farmers were trained on profitable dairy production. The farmer trainings' utilized Peer Farmer Trainers (PFTs) model with each trainer in charge of five groups, and each group consisting of at least 20 farmers. The practical demonstrations were held at the farmers' homestead ("local host"). The training has transformed dairy farming in the FPO's catchment areas in terms of the average milk production per cow, milk handling and sanitation, and animal health and welfare. Katheri Chairman noted that *"...Our goal of reaching 10 kgs by 2026 is now more achievable than ever given that we have seen an increase from 7.2 kgs to 9 kgs now."*

3.1.1 Number of participants and topics covered

The training models were effective and at least two-thirds of the FPO farmers received the training. The trainings insisted on women and youth participation The training mainly involved demonstrations and included;

- Nutrition management. The training emphasized the contribution of quality feeding to animal health and milk production. During the training, farmers were supplied with high value fodder seeds such as Calliandra, panicum, oats, Brachiaria, Boma Rhodes, yellow maize, super napier etc, trained on how to produce the fodder and preserve it as silage.
- Dairy herd health. The farmers were training on general herd health including calf rearing (including colostrum feeding), housing, health management, animal diseases, vaccinations. The farmers were also linked with veterinary personell for disease management.
- Fertility and breeding. The farmers were trained on breed improvements using AI and AI services availed within their reach.
- Milk production. The farmers were trained in milk handling and sanitation.
- Economic aspects of dairy farming. The farmers were trained on record keeping and efficient practices to reduce cost of production and increase revenue from dairy farming.
- Farmers were receptive and integrated the skills and knowledge learnt into their dairy farming. As a result, the quality of fodder produced by the farmers improved, a steady supply of fodder to their cows was established, and they were able to maintain a steady supply of milk to the cooperative societies.

3.1.2 Improvements in skills and knowledge among FPO members

Farmers have gained practical experience and advanced their skills and expertise in dairy herd management. As a result of the trainings, farmers now have more healthy cows, prevalence of mastitis and foot rot has decreased to less than 10%, calf mortality rates have declined, milk hygiene has increased with almost negligible scenarios of milk rejection due to quality, farmers have updated records for their herds and milk production, farmers have quality fodder complementing the high-priced concentrates among others. The cooperatives have enhanced their governance and managerial operations, more staff have been recruited, membership increased, and volumes of milk collected increased.

3.2 Financial and Technical Support

Figure 5: Ainabkoi FPO motorcycles for milk transportation

The project offered training and capacity building to the FPOs and farmers. The FPOs were trained on efficient governance and management models including designing a board charter and FPO's operational policies, while farmers were trained on profitable dairy production. The farmer trainings' utilized Peer Farmer Trainers (PFTs) model with each trainer in charge of five groups, and each group consisting of at least 20 farmers. The practical demonstrations were held at the farmers' homestead ("local host"). The training has transformed dairy farming in the FPO's catchment areas in terms of the average milk production per cow, milk handling and sanitation, and animal health and welfare.

Ainabkoi Farmers Dairy cooperatives was Funded by Heifer catalytic project in transport sector to purchase 10 motorbikes (figure 5) for transporting milk to replace oxen and donkey carts. The project also supported the creation of demo farms, which were intended to educate farmers on fodder production for sustainable production, especially during drought periods. The project through its efforts for increased collaborations led to the installation of a satellite mast (figure 6) to enhance proper communication, which has brought transparency between the farmer and the cooperative. Similarly, with the collaborations the FPO got funding for the installation of solar heaters to reduce the cost of electricity for the cooperative.

Figure 6: Ainabkoi FPO telecommunication mast

Lelchego Dairy cooperatives farmers, through the Heifer Catalytic Impact project, received financial assistance through a checkoff system loan that enabled the farmers to acquire commercial feeds from the cooperative and also seek treatment for their animals but pay in bits for a long period without feeling the burden of the loan. Green Revolution funds were provided by the project to the cooperative members to

Figure 7: Automated transaction machines

acquire energy that is friendly to the environment, such as solar heaters, solar panels, and solar pumps. The heifer catalytic impact project offered Lelchego Dairy financial support in terms of purchasing a milk transport lorry worth 5 million, a milling machine, mortar, weighing machine, computers, automated transaction machine (figure 7), scaling machine, fodder harvester, mixer, and also funds for supporting farmers' field days. The initial motor purchased by Heifer was smaller but later replaced with a bigger capacity motor. Funds from Heifer were also used for constructing machinery buildings. A key informant from Lelchego Dairy Cooperative stated, *"The financial assistance and investments in machinery and sustainable energy have significantly improved our operations. The training programs have equipped us with the skills needed to enhance our productivity and efficiency, making dairy farming a more viable and profitable venture for our members."*

Figure 8: Tractor with a silage machine for operational efficiency

The main intervention for Lelbren Farmers' Cooperative Society was setting up a value chain that would provide animal feeds to the farmers. The entry point was the completion of construction of the building to house feed mills, the milk cooler, and stores for the animal feeds. The Heifer Catalytic Impact project came in when the building had stalled. The cooperative society had started building but due to cashflow issues, they stopped in 2016. When the Heifer project commenced in 2019, they agreed to support the completion of the building. This was, however, a co-shared initiative where the society was to contribute partially (30%) and the Catalytic Impact project would cover the difference. With Irish Aid augmenting what the society had started, the building is currently 90% complete with the remaining part being as a result of the PO failing to fund their share of costs due to cash flow challenges. The Heifer Catalytic Impact project also advanced finances that were used for the training of FPO members. The project also supported three extension officers to work with farmers affiliated with the Lelbren Farmers' Cooperative Society. These extension officers were in charge of all capacity-building activities within the society however after the three months were up, the society was not in a financial position to pay their salaries and they had to let two of them go and retained only one. From the year 2019, the society recorded an increase in volumes as well as increased profitability up to 2022. This was attributed to the fact that farmers had confidence with the society when the Catalytic Impact Project started, and they would bring in huge volumes of milk. *"Since project inception, there was a remarkable increase in the volumes of milk brought in by our farmers. Their renewed confidence due to the project's initiatives, had been a key driver of this growth."* – Manager Lelbren Farmers' Cooperative Society. However, in 2023, the society ran into losses due to milk marketing challenges and cash flow issues.

The farmers in **Lessos** appreciated the funding initiatives received from Heifer including the provision of fodder harvesting machinery (2 row and 1 row), water tanks to address water scarcity, funding for aluminum milk cans to extend milk shelf life, and the employment of gender and development interns to support women and youth employment. Through the catalytic impact project, the cooperative purchased a faster means of transport (motorbikes compared to the donkeys they initially were using) that reduced transport costs from 2 shillings per liter to zero which resulted in increased income. Similarly, the management at **New Progressive** mentioned that the financial support increased farmers' trust in the cooperative which led to stability of the FPO, increased milk delivery and milk prices for farmers from 15 shillings to 37 shillings per

liter. *"The fact that the cooperative was able to receive financial support has significantly increased farmers' trust in the cooperative, leading to greater stability of the FPO. This trust has translated into higher milk delivery volumes and increased milk prices for our farmers."* Manager, New Progressive Cooperative. The increase in milk prices further increased the milk supply to the cooperative and therefore increased their revenue. Additionally, the check-off system that came as a result of the project intervention has ensured smooth production among farmers therefore maintaining a constant milk supply to the cooperative.

Figure 9: Tractor with a silage machine for operational efficiency

Before the inception of the Catalytic Impact project, many trees had been cut around the water catchment area and this meant that during the dry season, it would dry up. The Catalytic Impact project facilitated Kabiyet Dairy Cooperative Society in tree planting, and this ensured the protection of the water catchment area. Previously, the society's activities were limited to the collection, chilling, and selling of raw milk. But with the project, machines that would be used for value addition through pasteurized milk, yoghourt, and sour milk were purchased. Electronic cup sealers were also purchased to replace the manual ones, and this meant an increase in the levels of yoghurt production and port sealers for pasteurized milk. The number of milk ATMs also ncreased from one to about ATMs, with one more being under construction. Profits were also ploughed back, and the society was able to purchase one refrigerated vehicle. With the provision of cup sealers and port sealers, the cooperative society was able to go into value addition and produce yoghourt (figure 10), pasteurized milk, and sour milk in bigger capacities. the cooperative society was able to enter new markets such as supermarkets, to sell their products. A fridge for yoghurt preservation was also purchased.

A representative from Kabiyet Dairy Cooperative Society remarked, "*The support from the project has been a game-changer for us. The ability to enter new markets such as supermarkets has significantly increased our sales and visibility. The investment in yoghurt preservation equipment has improved our product quality, and reduced milk spoilage which has boosted our revenues."*

Figure 10: Kabiyet Dairy yoghurt

Chepkorio Dairy Cooperative has made significant advancements with the support of the Catalytic Impact Project. The dairy organization has acquired a refrigerated truck and a pasteurizer, both crucial for improving their operations. They applied for KSh. 8 million from the impact investment to service a long-term loan from Cooperative Banks. *"We wanted to reduce reduce the pressure of servicing the bank loan at the interest rate which ranged from 14%-18% so that we can have enough working capital. The Heifer investment loan gave us a chance to do that with an interest rate of 10%,"* says Jeremiah Kiptum, Chepkorio Dairies Manager. This strategic financial support has enabled Chepkorio Dairy Cooperative to allocate more resources towards working capital, enhancing their operational efficiency and growth potential.

In summary, financial assistance received by various FPOs in Nandi and Uasin Gishu counties included execution of checkoff system, green revolution funds, machinery funds, capacity building funds for training, transport facility funds, building and construction funding, establishing of demo plots, solar and satellite installation, cooler plant embellishment and support for feed processing. Financial support was provided to improve productivity and efficiency in the dairy sector. Results were in agreement with the findings of Zinich et al. (2021)[xi] and Rozhkova and Olentsova (2022)[xii] concluded the need to improve technical equipment in the dairy sector through state support funds. The dairy industry requires equipment to be funded by investors for improved performance. The dairy sector needs to be financially supported at the regional level to acquire new technologies for improving milk productivity and production. Wairimu et al. (2022)[xiii] support that financial aid enhances the dairy sector to access support services such as improved breeds, feeds and extension services in Kenya.

3.3 Market Access and Business Development

3.3.1 Initiatives to improve market access for FPOs

The project aimed at improving market access and service delivery among the cooperatives. The cooperatives have established market linkages with their main buyers; Meru Dairy Union for Katheri and Magati Dairy cooperatives and Brookside ltd for Mburugu Dairy cooperative. Capacity building programs played a crucial role in sustaining the market linkages as farmers were able to maintain a steady milk supply and delivered quality milk that met the buyers' requirements. The FPO members were linked to SACCOs improving their access to affordable financial services. The manager Magati remarked *"Establishing market linkages with major buyers like Meru Dairy Union has provided us with a stable and reliable market for our milk. The capacity building programs have empowered our farmers to consistently deliver high-quality milk, meeting the quality requirements of our buyers. Additionally, linking our members to SACCOs has improved their access to affordable financial services, allowing them to invest in better farming practices. This has not only increased our productivity but also contributed to financial stability."*

3.3.2 Business development strategies implemented

The FPO's were supported in improving their business plans and operations strategic plans. For example, **Mburugu Dairy cooperative** was supported in developing a 5-year strategic plan that involved strategies for reviving their feed milling factory. **Magati Dairy Cooperative** was supported in developing human resource, procurement, ICT and operations policies that will inform their operations and management. *"With the new human resource, procurement, ICT, and operations policies, our cooperative is now better equipped to manage and streamline its operations. These policies have introduced a level of professionalism and efficiency that is crucial for our growth and long-term success,"* as remarked by the Manager Magati Dairy.Katheri Dairy cooperative was also supported in developing/realizing their strategic plan where they seek to improve average milk collection per farmer to 10 kgs by 2026. Katheri Chairman noted that *"The strategic plan support has set us on a path to significantly improve our average milk collection per farmer. Our goal of reaching 10 kgs by 2026 is now more achievable than ever given that we have seen an increase from 7.2 kgs to 9 kgs now."*

3.3.3 Increase in milk production and productivity

Katheri Dairy Farmers Cooperative Society now collects over 18000 litres of milk daily, a 260% increase from their previous average of 5000 litres daily before the project implementation. They currently maintain an average of 9 kgs per cow, which is an improvement from an average of 7.2 kgs per cow when the project began. **Magati Dairy Farmers Cooperative** have increased their production from an average of 3000 litres to over 5000 litres. The average milk collected per day is 5 kgs per cow. Mburugu Dairy Cooperative has increased their average production per cow from 4.5kg to current 7.5kg per cow. Other cooperatives have shown remarkable improvements as well:

- Kabiyet has increased their average production from 5 liters to 7-8 liters per cow.
- Lelbren has grown from 4 liters to 6-7 liters per cow.
- Lessos has improved from 3-4 liters to 6-7 liters per cow.
- New Progressive has enhanced their yield from 4-5 liters to 6-7 liters per cow.
- Chepkorio has risen from 3-4 liters to 6 liters per cow.

Overall, all the cooperatives have reported a rise in milk productivity, reflecting the success of the project initiaties

3.3.4 Employment generation, especially for women and youth

The project aimed at promoting social sustainability through increased women and youth active involved in dairy cooperatives. There is improved participation of women in the FPOs but with mixed results. The programmes manager noted that *"For Katheri, when the project was starting, milk handling and sale was a preserve of women since the venture wasn't quite lucrative, but with growth, men have joined in and are threatening to take over. While for Ainabkoi, which is in North Rift, Culturally, milk belong to men. So, morning milk which is usually more was being marketed by men and the afternoon session is left for women. However, through the project, investment in transport by 10 motorbikes, the women have started marketing the afternoon milk and now have an income."* The expansion and increased operations of the FPOs have created job opportunities for the youth, contributing to livelihood improvement. The 3 cooperatives have recruited additional staff at the collection centers, in transportation, and ICT office and they are mainly the youth. However, few youths are actively engaged in dairy production due to structural challenges such as limited land ownership, limited capital to establish zero grazing units and buy animal feeds/fodder, perceptions and attitude among others.

3.3.5 Membership in the Cooperative societies

The cooperatives have increased their active memberships with 2300 at Mburugu, 2500 at Katheri and 720 at Magati. Women, and youth (in Katheri Dairy cooperative), are actively enrolling as members. Lelchego Dairy Cooperative has made remarkable strides, expanding its membership from 7,000 to 12,000, with active members increasing significantly from 300 to 3,000. Similarly, Lessos FPO has grown from 4,000 members to 12,000 members. New Progressive Cooperative's membership has doubled from 205 to 400 members. Kabiyet Dairy Cooperative Society has experienced extraordinary growth, with its membership soaring from 400 to 17,000 members. Lelbren Farmers' Cooperative Society has seen its membership rise from 800 to 1,400 members.

3.3.6 Enhanced market access and business linkages

The cooperative societies have collaborated with the private sector (feed millers, banks, SACCOS) and county governments (livestock and cooperative department) to supply the farmers with quality animal feeds, agrovet services, extension services and financial services at their convenience.

Figure 11: Enhanced market access through motorcycles and employement creation

The Heifer catalytic impact project has enabled L**elchego Dairy Cooperative** to increase milk productivity of the members. Before the project, the holding capacity per day was 7000kg and has increased to 18,000kg in 2023. The minimum holding capacity was 3000kg before the project but has improved to 8000 kg per day. Through training provided by the Heifer project, member acquired processed quality feeds from the cooperative established agrovet which has impacted to before the project milk prices were Ksh. 20 per kg and currently has increased to Ksh.35 to 45 per kg. Increased milk productivity has also been contributed to by Heifer funding of Demo plots that has improved feed production using modern napier varieties and Bracharia e.g super napier, Jun cow, Giant King, kobra, kabila. Catalytic impact project has reflected on the growth of the cooperative; increased membership from registered cooperative members is currently 12,000 from 7000 members. The number of active members has also increased from 300 to 3000 after the project. Women participation in the FBO has increased by 42 percent and youths by 20 percent. Before the project farmers were incurring high feed costs but due to their own feed establishment on the project has reduced production and increased farmers' income. Revenue has increased by 20 percent per farmer after the project. Improved income has been reflected on enhanced livelihood for the farmer as they produce quality feeds results to more quality milk being produced I.e "Happy cow Happy Family slogan" Milk transport lorry purchased by Heifer catalytic funds has created employment for drivers and private motorbikes (figure 11) has created employment for youths. Number of staff employed by the FBO after the project has increased by 3 additional members. *"Since the project began, our revenue per farmer has increased by about 20 percent, significantly improving livelihoods. The Heifer-funded milk transport lorry and private motorbikes have created new employment opportunities for drivers and youth."* Manager, Lelchego Dairy Cooperative

In the case of Lessos FPO, milk production increased from a peak of 8000 kg per day to 18000 kg per day. Silage acreage has increased from 1 acres to 12 acres on average, cooperative membership has increased from 4000 to 12000 members, cooling plant capacity has increased from 5000 litres per day to 9000 litres through opening up of satellite stations, farmers have been able to adapt fodder shrubs from zero before to about 20 fodders shrubs trees per farmer, before the project, there were zero biogas plant but now there are more than 20 implying more environmental conservation. According to farmers in Lessos, the project has resulted in business growth as evident in the significant increase in milk production among farmers. For example, one farmer who

previously produced 5 litres of milk from 2 dairy cows now produces 45 litres from 3 dairy cows. This surge in milk production has led to improved livelihoods, with one respondent highlighting enhanced educational opportunities for his children due to increased income, with a profit of KES 20,000 per month from the initial KES 15,000 per month, and improved living standards for the entire household. Likewise, the need for growth has also led to the employment of five youth dairy farmers assistants (DFA) as extension officers, each DFA was allocated 5 farmer groups, the main aim was to check whether farmers follow the recommended measures in dairy production. In the case of New Progressive, the management acknowledged a tremendous increase in milk production from 1500 litres per day to 6000 litres per day. The cooperative also indicated that cooperative agrovet which previously ran short of supply for inputs currently serves its members fully. The New progressive cooperative has also seen an increase in its members from 205 members to currently 400 members. Furthermore, the increase in milk quality because of training on hygiene has increased access to the market. With Kabiyet Dairy Cooperative Society farmers understanding the importance of feed conservation and good practices when it comes to dairy management, the volumes collected increased from about 400 litres of milk per day to about 30,000 litres of milk per day, during the peak season. Society membership has also increased to about 17000 active members from 400 members registered before the project.

For Ainabkoi, milk supply to the cooperative has increased from 2000 kg per day to 16000kg per day. Revenue has increased from negative 7 million in 2020 to 3.4 million in 2023. Youth employment has increased directly and indirectly. For instance, the cooperative employs over 70% of the youth. Production capacity has also increased. Majority of the farmers have received training on dairy production: production of fodder crops, milk quality and safety. Most of the cooperative members have embraced technology after getting the mast. Transactions are done online, farmers are paid cashless, and milk records are done instantly.

Purchase of 10 motorbikes through provision of loans to the young transporters, this has improved transportation of milk to the market as there are reduced spoilage and delay on milk delivery. The cooperative society's management shielded farmers from transport losses, only confining it to the transporters which greatly reduced diversion of milk that initially paused significant losses to farmers. There was also reduction in milk rejection due to fast access of milk to the cooperative as transport shift to motorbikes from animal carts. Motorbikes loans has created employment to about 39 youth in the cooperative catchment areas. Initially using the oxen or donkey transport facilities farmers were only delivering morning milk to the market but with the motorbikes members could now deliver even evening milk to the cooperative. Introduction of SMS Alert system through Heifer catalytic project has reduced hazardous behavior of transporter as farmer get instant feedback on the kilogram delivered to the cooperative. Market information in terms of quantity of milk, prices, and sales could be easily communicated to cooperative members. Milk production has increased for members through trainings received on quality feeds, feed storage, and silage. For install a farmer testify an Increase from 8 to 25 litres when owning 6 and 2 cow, respectively after the project. In return milk price has increased from 15 to 40 shillings per kilogram increasing members' income. Cooperative

milk holding capacity has also increased from 5000kgs per to 15000kgs currently. New members have currently join the cooperative has they witness increase in milk production and income from the cooperative members. Check off system has enable farmers to acquire inputs on credit from the cooperative agrovet. Breed improvement the value of cow has increase from average price of 40000 to 150, 000 per cow. Calve prices has also improved from 15,000 to 30,000.

The Heifer Catalytic Impact project has provided training and relevant support that has enabled members of Lelbren Farmers' Cooperative Society to increase their milk production. Before the project, the society would collect up to 2000 litres of milk in a day while the society's holding capacity was much higher than that. This meant that the society was highly underutilized, and its running costs were higher than what they were making. The current volumes are at 12000 litres of milk in a day which is a major improvement. With an increase in volumes of milk comes an increase in the number of transporters needed to deliver the milk on time to society. So many employment opportunities were created through the Heifer Catalytic Impact Project, with consideration given to women and youth. About 80% of the employees in Lelbren Farmers Cooperative society are youth, with the two-third gender rule being adhered to. The society's active membership has risen from 800 in 2019 to 1400 as of July 2024. The slow rise in membership can be attributed to the marketing challenges and cashflow issues witnessed in the society that have necessitated other members to move to other societies. Most of the milk from the Lelbren Farmers' Cooperative Society is absorbed by the New Kenya Cooperative Creameries Limited (NKCC). However, in the past year, the society has had issues with NKCC because of delayed payments which has in turn brought about despondencies with farmers, necessitating some of them to abandon the society and move to other cooperative societies that expedite the payment process. At the time of the assessment, the board members were deliberating on the best markets to go into so that they could sustain their operations.

3.4 Innovations and Adaptations

The training models, Practical Farmer Trainings (PFTs), and demonstration farms proved highly effective in improving farmers' skills and expertise in dairy production. It facilitated the dissemination of local information, particularly among their peers, enhancing knowledge-sharing within the community. The model incentivized young people, especially in Katheri, into dairy farming, and this resulted in an average of 20% (about 500) of the active members being young people. Moreover, farmers have adopted green energy (biogas production), with the cooperatives offering demand-based trainings to its members. Katheri cooperative has about 20% (> 500) of its active farmers and Mburugu 43 farmers who have adopted biogas in their homesteads. In the bid to meet its feed milling factory operation capacity, Mburugu coop outsourced inputs to improve the feed quality but was not sustainable. On the other hand, Magati coop streamlined its procurement processes to avoid future procurement of undelivered machinery.

The Heifer Catalytic project funds **Lelchego Dairy Cooperatives** to train farmers to adopt fodder trees, reduce soil erosion, and own feed formulation ration. The use of biogas, solar heaters, solar radios, and solar water pumps reduce firewood use which was

introduced by the project and has positively impacted the environment. The number of biogas installed has increased from 6 to 30 after the implementation of the project. Land acreage before the project was about 0.1, 0.2 acres per farmer but has increased due to the 50:50 regime land portion for the cow and for the family crop production. Fodder production for OKOA COW during drought season has reduced cow mortality rates which were high before the project. Fodder preservation and production of supper Napier has reduced cow malnutrition which was common before the project during droughts.

Innovative approaches used by Lessos Farmers Cooperative Society include milk value addition to enhance longer shelf life and make yoghurt that fetches better prices, particularly during seasons of high milk production. Secondly, the cooperative acquired another bigger silage machine to increase silage production to meet farmers' demand. Incentivizing farmers through a favourable check-off system and prompt payment mitigates farmers' migration to other organizations such as KCC. Opening up satellite stations (5) with cooling plants to limit milk spoilage has helped minimize milk spoilage due to road network challenges, especially during rainy seasons. Linking accounts to milk deliveries not automatically to men to improve access to resources and enhance women and youth empowerment.

With the addition of a pasteurizer, Chepkorio Dairies has invested in adding value to its milk by producing yogurt, which is currently sold in Kabarnet town. This investment has not only led to the establishment of an outlet market in Kabarnet but also facilitated the purchase of a Probox vehicle to transport yogurt to other emerging markets. Furthermore, it has created job opportunities for drivers, marketing officers, sales officers, and workers involved in value addition.

In Lessos cooperatives, dairy farmers have embraced group membership which has been influential in knowledge sharing. The farmers also highlighted the adoption of paddocking and zero-grazing units to increase efficiency. The management in the New Progressive cooperative established a zero grazing unit and a demo plot to train farmers on fodder management practices and dairy production management such as the adoption of improved dairy breeds. The management also indicated that the cooperative has fully implemented the SMS system to enhance transparency in input and milk delivery. They have also established a petrol station to diversify and expand their income level. Further, The management enhanced professionalism in management by defining the roles of the management staff, including the accountants. The adoption of aluminium cans aimed at increasing the quality of milk which has improved.

In Ainabkoi Farmers Dairy Cooperatives Heifer catalytic impact project has led to the emergence of numerous innovations to the cooperative members. Some of the interventions are the introduction of SMS alerts and the use of satellite mass for communication between the cooperatives and members. This technological innovation has revolutionized communication among members and transparency through timely record keeping, access to credit and offering extension services. Adoption of AI services, sex semen to replace natural insemination by farmers for improving breeding. Animal

health hygiene, identification of cow disease, commercial feed processing by the cooperative, silage making, and setting feed demo plots. Introduction of plot division for 50 to 50 for cow feeds and plant production. These improved management practices has led to significant boost in productivity and animal well-being.

In summary, the key innovations to the project implementation include;

1. Loan consolidation: Heifer International Kenya (HIK) collaborated with cooperatives to assess their financial needs and, in some cases, purchased loans from other financial institutions that were offering high interest rates. This initiative aimed to alleviate the financial strain on cooperatives.
2. Blended Financing by Heifer Impact Capital: Heifer Impact Capital effectively utilized blended financing to bridge the gap between the grants provided to cooperatives and their actual financial needs. This adaptive approach ensured that cooperatives received the necessary funds to meet their project requirements, enhancing the likelihood of successful implementation. A key component of this innovative approach was the expectation of a matching grant from the cooperatives themselves. This requirement fostered a sense of ownership and commitment among cooperative members, ensuring that all actors were aligned toward achieving the project's goals.
3. Flexible Payment Terms: After reviewing the cooperatives' audited accounts, HIK and the cooperatives agreed on flexible payment schedules. Depending on their financial and cash flow projections, some cooperatives committed to monthly, bimonthly, or quarterly payments.
4. Provision of Digital Weighing Scales: The introduction of digital weighing scales increased farmers' confidence in the accuracy of reported milk deliveries. This transparency led to a rise in the volume of milk delivered by farmers.
5. Operational Cooperation among Cooperatives: To optimize the use of silage machinery, cooperatives adopted the principle of operational cooperation. This allowed multiple cooperatives to process their silage using shared machinery and pay for the services rendered, enhancing efficiency and resource utilization.
6. ICT Management and Cashless Payments: The implementation of ICT management and information systems linked different departments and operations within the cooperatives, resulting in increased efficiency. This integration also facilitated cashless payments through MPESA and bank transfers, streamlining financial transactions.

3.5 Case Studies

Janet Chemusion of Lessos Farmers' Cooperative Society attested that the cooperative has allowed her to set up an agro vet since the project started, which has helped her grow personally. She also got employed by the cooperative. My successes are attributed to the growth of the Lessos Farmers Cooperative Society, where there is increased membership, which has made the cooperative grow in milk production.

"The opportunity to establish an agro-vet and secure employment with the cooperative has been instrumental in my personal and professional growth. Our cooperative's expansion, marked by increased membership and enhanced milk production, is a testament to our collective success." Janet Chemusion an FGD participant

Unlike before, farmers have been able to venture into dairy production as an agribusiness venture. For instance, Leah Ngugi says "*Before the project, dairy production was not a focus for me as an agribusiness. Initially, I supplied only 19 kg of milk to the cooperative. Since engaging with the Catalytic project, I've been able to increase my monthly supply to 70 kg. This success is a direct result of the valuable knowledge and skills in dairy production that I've gained through the project.*"

The project's interventions have led to significant improvements in fodder production and milk yield among farmers in Lessos. For instance, Land production under silage fodder has dramatically increased, with one farmer expanding from 0.2 acres to 4 acres and others similarly boosting their production areas. "Due to the availability of feed, my wife currently owns dairy cows, and she is involved in the dairy production which has brought harmony in the household," Murgor David said. Anne Lang'at further supported this sentiment. The increase in fodder production has resulted in reduced feed costs due to minimal wastage and time-saving through the use of machinery. Consequently, milk production has surged, with one farmer's yield rising from 5 litres per day to 12 litres, and another's from 4 litres per day to 8 litres. "Overall, average household milk production in Lessos has increased from 2 litres to approximately 4.6 litres per day," said Sang Nelson. A youth farmer also indicated that the purchase of efficient transport means has reduced transport costs from 2 shillings per litre to zero which has significantly increased his income. The male youth farmer also highlighted that the project involved training farmers on the use of silage machines and feed preservation which was interesting to him.

3.5.1 A Case of propped operational efficiency

The project interventions significantly enhanced the operational efficiency of Katheri and Mburugu dairy cooperative societies. Katheri FPO manager, Paul, noted that since the project started, they have collaborated with Sistema to install biogas systems for farmers. He affirmed that the members had not embraced the technology before. However, since the catalytic project and collaboration with such stakeholders, 460 members (20%) of the farmers have adopted this technology. Through this initiative, farmers have been able to use animal waste to generate biogas used for cooking in the homesteads.

Before the implementation of the project, Katheri Dairy Farmers Cooperative Society faced challenges including delays in transportation, insufficient milk collection capacity, and inefficient backup generators. The project supported Katheri by adopting advanced ICT technologies for real-time data collection, increasing chilling capacity, acquiring a transportation truck to reduce milk spoilage, and building the capacity of the management team in leadership and governance. These improvements led to enhanced internal operations, including human resource and procurement processes, increased active memberships, improved milk collection capacity, better milk quality, higher market prices, and improved livelihoods for the cooperative members. Wilson, noted that milk is now collected between 5:30 and 6:00 a.m. unlike before the project where farmers would be up as early as 4:30 a.m. due to the purchase of a truck and the 5000-litre cooling tank.

Mburugu Dairy Farmers Cooperative Society was supported in acquiring land for a feed milling factory, purchasing milling machinery, procuring raw materials, and hiring a factory operator. With the establishment of the factory, farmers were able to access quality feeds from the mill at affordable prices and on credit, which in turn reduced their cost of production. These improvements helped increase milk production and herd health, enhancing overall efficiency. The project also provided ICT infrastructure and digital scales, further streamlining operations and improving data management. The manager remarked *"With the support provided, including acquiring land, purchasing milling machinery, and hiring a factory operator, our cooperative was able to establish a feed milling factory. This allowed us to access high-quality feeds at affordable prices and on credit, significantly reducing our farmers production costs. The improvements led to increased milk production and better herd health, boosting overall efficiency. Additionally, the ICT infrastructure and digital scales provided by the project have streamlined our operations and enhanced data management. Despite the challenges that led to the pause in operations, we are positive at reviving the mills operations"*

Dairy farming is one of the major contributors to greenhouse gas (GHG) emissions that have contributed significantly to climate change[xiv]. Dairy sector is a major source of livelihood for many households, hence this challenge can be mitigated through adopting some innovations in the dairy sector. The Catalytic Project, through the FPO, has made a deliberate plan to adopt the use of green energy in some activities along the dairy values chain. For instance, Lelchego Marketing Dairy Cooperative, through Heifer project funding, has enhanced environmentally friendly energy to be adopted by both members and the cooperative. Members received Green Revolution funds to purchase solar heaters, solar panels, solar pumps, and solar radios. The project has promoted the use of biogas by members. The number of members who have installed biogas has increased from 6 to 30 members who have installed the biogas digester for use as cooking energy. Adoption of this innovation mitigates GHG emissions. The manager remarked that *"Thanks to the project funding, our cooperative and its members have embraced environmentally friendly energy solutions like the solar heaters, panels, pumps, radios as well as the biogas technology with the number of members using it increasing from 6 to 30. These advancements contribute the large climate change initiatives."*

Ainabkoi Farmers Dairy Cooperative has embraced the purchase of solar through the Heifer catalytic project for use in the cooling plant. Solar power to cooling has cut the cost of electricity and reduced milk spoilage as a result of regular electricity outages. The catalytic impact project has enabled cooperative members to acquire solar heaters, solar radios, and solar panels to reduce the use of fossil energy in their homes. But there is a need for more solar power since they still depend on standby generators in cases of power outages which are actually quite persistent. The manager remarked that *"The project has greatly improved our operations by reducing electricity costs and milk spoilage through solar-powered cooling. Members have also benefited from solar heaters, radios, and panels. However, we still need more solar power to eliminate our reliance on standby generators due to frequent outages."*

Beatrice Mengich from Ainabkoi Farmers Cooperative Society said that in collaboration with HAPPY COW, through the Catalytic project, they have been able to procure solar panels, reducing the operation cost. The society has been able to reduce or save on the energy cost of operation from Kes 300,000 per month to 50,000-80,000 per month on electricity. Initially, they also depended on firewood for their boilers, which could cost about 20,000 per month, but now, with solar energy, they do not spend any money on firewood. This has not only saved on cost but also on environmental conservation.

Janet Chemusoin also intimated that since the project started, they have collaborated with several stakeholders, such as Sistema, which installs biogas systems for farmers. She attested that the member farmers had zero biogas plants before the project. However, since the catalytic project and collaboration with such stakeholders, more than 20 biogas plants have been installed for farmers. Through this initiative, farmers have been able to use animal waste to generate biogas (clean energy) used for cooking in the homesteads. In addition, the biogas plant has helped them to reduce the demand for firewood, thus conserving the environment.She further indicated the Lessos Farmers Cooperative Society also worked with VI Agroforestry, which has enabled some of the farmer members to get different species of agroforestry fodder seeds that they have used on their farms. This agroforestry fodder species conserves the environment and serves as animal feed for their livestock.

3.5.2 A case of catalysed youth and women inclusion in the dairy sector value chains

The project promoted social sustainability by increasing the active involvement of women and youth in dairy cooperatives. The active memberships in the cooperatives include a significant percentage of women and youth, with Katheri Dairy Cooperative having 60% (about 1380 members) female members and 16% (360 members) youth members. The project also created job opportunities for the youth in various roles such as collection center staff, transportation, and ICT office positions. The chairman Katheri remarks *"With 60% female of our total membership and 16% of the members being youthful, we exemplify inclusivity, empowering women and youth. Through the project we were able to employ two intern youths."* Despite, structural challenges like limited land ownership and capital hindered more youth from actively engaging in dairy production. Additionally, training models like Practical Farmer Training (PFTs) and demonstration farms proved effective in enhancing the skills and expertise of young people in dairy farming.

In Mburugu Dairy Cooperative, more than 920 (40%) farmers of 2300 members are female. The youth are only 207 (9%), as most of them have not embraced dairy farming. Most of the youth prefer quick money, which has driven them into bodaboda business.

“The smallholder farmers reported tremendous increment in milk production as a result of the project interventions especially the capacity building component. The farmers were clustered in groups through which the peer farmer trainer would disseminate training ranging from setting up of demonstration plots on fodder trees production, silage production. The competitive milk prices of ksh 50 offered by the FPO has resulted

in an increase in the farmers income and their general livelihood. Efficiency in transportation of the milk has reduced the transportation burden and farmers do not need to wake up very early in the morning. The success of the FPO members incentivized the young people to adopt dairy milk production."

Lelchego dairy cooperative members, especially women are disadvantaged as result of cultural and social norms. Women mostly attend training facilitated by the Heifer catalytic project as compared to men. Women's implementation of dairy training skills received from the project has been constrained due to cultural diversity limiting them to make major decisions and they do not own farm production resources such as land. Wife and husband disagree on how to use funds from milk proceeds as they compete on which needs to use the money. FBO has introduced crops such as avocado, coffee, and poultry to empower women. Divert training which is gender based on dairy by the FBO currently focuses on youths and women. This initiative boosts their economic opportunities, enhances their agricultural skills, and promotes greater community participation and self-sufficiency

In Ainabkoi Farmers Cooperate, a gender dynamic used to exist where only men owned cows and had rights to milk income as compared to women. Youths and women may own dairy cows but they have no say on the sales of milk. Management of Ainabkoi after the introduction of the Heifer project the management cheap in to support youths and women to own dairy cows and promote their rights to receive income from milk sales. A case of Edwin Sirma says his father could not allow him to sell milk from his own cow as the milk belongs to the family. Edwin had to go to the CEO to have mediation with his father to allow him the right to sell his milk separately and to be apportioned land to grow feeds. Another case Joan Cheboi used to graze cows before the Heifer project but has no say about sales income from milk. After the husband received training through the project they live a happy family with each of them receiving milk income independently and making decisions on income use jointly.

3.5.3 Adoption of catalytic Impact investment

The Catalytic Impact Investment Project played a crucial role in transforming the operations of Katheri and Mburugu Dairy Cooperative Societies. Katheri Dairy Cooperative benefited from investments in cooling tanks, transportation trucks, digital scales, and ICT infrastructure, which collectively improved their operational efficiency and milk collection capacity. The chairman noted that before Heifer intervened through the Catalytic impact investment, they were doing 7000 litres a day and now they are at over 18000 litres a day. Similarly, Mburugu Dairy Cooperative received support for acquiring land, constructing a feed milling factory, procuring machinery and raw materials, and hiring a factory operator. These investments resulted in increased milk production, improved herd health, and enhanced overall efficiency. Despite challenges during the COVID-19 pandemic, these initiatives highlighted the scalability and sustainability potential of such investments.

Lelchego dairy farmers have limited access to credit. Banks offer credit at a higher interest rate of about 15 percent per year which makes it difficult for their members to acquire loans for purchasing farm inputs. The farmers cooperative has emerged SACCOs to increase saving to advance credit to farmers at a low interest rate of about 6 to 10 percent through Heifer revolving funds. Heifer funds to be delivered to small banks such as family banks that could offer farmers with low interest rate loans. Use of check of system in the agrovets to enable FBO members to acquire feeds on credit and pay at a later date.

Ainabkoi Dairy Farmers members revealed that banks interest rates were high, limiting credit access. The Heifer project has promoted the checkoff system in the cooperative to another, to acquire feeds from the cooperative on credit, receive animal vet services and pay at a later date at zero interest rate. Corporate SACCO has promoted access to credit to members which has improved their living standard as they can use the funds to support their families.

3.5.4 Sustainability and Scalability

The FPOs have developed strategic plans that detail how they will streamline their operations to ensure the sustainability of the outcomes achieved and the lessons learned from the projects. The successful implementation of the project at Katheri FPO, along with the realization of its outcomes and the resulting multiplier effect on the FPO members, demonstrates the potential for replicating and adapting innovative products aimed at enhancing institutional capacity and improving rural livelihoods. The project significantly enhanced the sustainability of FPOs through strong market linkages with major buyers such as Meru Dairy Union and Brookside Ltd., ensuring a stable and reliable market for their milk. Capacity-building programs empowered farmers to deliver high-quality milk consistently, which is crucial for maintaining these market relationships. Additionally, linking FPO members to SACCOs provided access to affordable financial services, enabling farmers to invest in better farming practices and thus increasing productivity sustainably. Strategic support, like Mburugu Dairy's 5-year plan for reviving their feed milling factory and Magati Dairy's new policies in human resource, procurement, ICT, and operations, introduced professionalism and efficiency, laying a solid foundation for long-term growth. The project led to substantial increases in milk production and productivity, demonstrating its scalability. For instance, Katheri Dairy's daily milk collection surged from 5,000 to over 18,000 liters, and Magati Dairy's production increased from 3,000 to 5,000 liters daily. Employment generation for women and youth was a key outcome, with many cooperatives recruiting additional staff in collection centers, transportation, and ICT, primarily engaging young people. The remarkable growth in cooperative memberships, such as Kabiyet Dairy Cooperative Society's expansion from 400 to 17,000 members, reflects the project's ability to scale. Enhanced market access and business linkages with private sector entities and county governments improved feed quality, milk prices, and overall productivity. These outcomes collectively contribute to the project's sustainability and scalability, fostering long-term improvements in the dairy sector. Collaboration among various stakeholders to establish robust operational structures is essential for scaling and replicating these interventions in a manner that aligns with the local context.

Farmers in Lessos recommended several measures to ensure the project's sustainability after it ends. These include forming farmer groups to pool resources and enhance collective bargaining power. Improving the relationship between the cooperative and the farmers is also crucial to foster trust and collaboration. Additionally, the employment of a quality assurance extension officer to train farmers on feed formulation will ensure continuous education and adherence to best practices in feed production. These measures aim to create a self-sustaining framework that maintains the benefits of the project long-term. On the other hand, the management in New progressive have diversified their income including establishment of an agrovet and a petrol station to curb the cash-constraints faced before.

Ainabkoi Dairy cooperatives members ascertain that to ensure project sustainability there is need for continuous training and visits followed up by cooperative extension staff to ensure farmers practically apply skilled acquired through training. There is a need to organize farmers into groups for the continuity of the project. The cooperatively uphold yearly awards, dividends and bonus for the best performing member in terms of milk quantity and quality. Cooperative to introduce 50 cent milk cut per kg to support more extension training to the farmers. Cooperative to liaise with seed companies to deliver quality fodder seeds varieties, napier and blacharia to deliver to their members. Cooperatives introduce milk value addition for increasing milk price hence more income thus more youths will be attracted to the dairy enterprise.

Ainabkoi Cooperative Society aims to increase milk volume and holding capacity as a strategy to boost revenues and profits to enhance its sustainability. In addition, the cooperative has encouraged members to diversify into other enterprises, such as potato and poultry production, to create new revenue streams and as a price hedging mechanism during periods of poor returns from milk. They have also introduced a share system to encourage farmers to invest in the cooperative, with share prices ranging from Ksh. 200 to Ksh. 20,000. To support this growth in dairy farming, the cooperative has enhanced capacity building by integrating all member farmers into field schools, ensuring they receive the necessary training and support to improve their farming practices.

In Kabiyet plans are underway to expand its market for yogurt as a result of an increase in milk production. They are also planning to establish a new milk ATM in Eldoret.

4.0 Challenges and Solutions

4.1 Operational Challenges

The **Lelchego dairy cooperative** is currently experiencing a high cost of electricity in cooling plants as the power is expensive when using 3 phases, and that cost has increased to 500,000 per month. At times there is an occurrence of electricity outages. Purchase back-up generators and even solar to cut on the cost of electricity. Poor roads during the rainy season where youths using motorbikes to collect milk usually fall as roads are very slippery during the rainy season. There is a need to purchase pick-up to collect milk at the collection centers established. Cooperative experienced a shortage of feed harvester machinery but used proceeds from sales of commercial feeds made in 2020 to purchase additional feed harvesters. Purchase of forage baler. Proper storage of feeds. Another challenge is inadequate transport facilities for transporting processed feeds to various agrovets in the catchment areas where FPO members are allocated. Purchase pick-ups and trailers through sourcing funds or reinvesting part of the profit.

Some challenges encountered in LFCS include machine shortages for silage production due to the increased number of farmers producing silage, leading to unmet demand, poor infrastructure, such as roads, which limits milk transportation, especially during high rainfall seasons, and inadequate transport systems affecting milk and milk safety and few equipment or machines for testing milk quality. These challenges were solved through additional machines for making silage and opening up satellite stations (5) with cooling plants to limit milk spoilage that is easily accessible to farmers.

"Despite the challenges of high electricity costs and poor infrastructure, we've managed to overcome some of these issues by reinvesting profits to purchase additional feed harvesters and forage balers. Another challenge is inadequate transport facilities for transporting processed feeds to various agrovets in the catchment areas" remarked by the manager, Lelchego Dairy Cooperative

Since the project started, **Ainabkoi Cooperative Society** has experienced exponential growth in members (from 700 members in 2021 to 900 in 2022 to 1300 members in 2023 and about 2000 members in 2024), which has constrained extension training since the extension staff is only two against the 2000 members. The cooperative has formed farm field schools, which has enhanced reaching out to these farmers. Farmers have been classified as 1, 2, and 3. Class three comprises the most experienced farmers, class two comprises the less experienced, and class one comprises the least experienced farmers. A class comprises about 50 farmers. This has made it easy to offer extension services.

According to Ainabkoi Farmers cooperative members, the main challenges hindering the performance of the dairy sector were lack of transport facilities, inadequate storage facilities for feed, lack of proper transportation, use of donkeys which delayed milk delivery, and high milk spoilage rates project introduce loans for acquiring motorbikes for transporting milk to the cooperative. During the rainy season, most of the roads in the cooperative milk catchment areas are inaccessible even after the introduction of

motorbike roads are impassable, and transporters usually fall, risking milk loss and contamination. Water-limiting production input for cooperative members as it plays a key role in increasing milk production. Farmers, before the introduction of the checkoff system, could not acquire inputs such as animal feeds and drugs. Members experience high production costs by receiving training in silage and own feed formulation the production cost has reduced.

"Despite the trainings and the other support , our cooperative still faces considerable challenges. Inadequate transport and storage facilities, impassable roads during the rainy season, and water scarcity continue to hinder our farming. However, the introduction of loans for motorbikes and the check-off system for acquiring essential inputs have started to mitigate these issues." FGD participant Ainabkoi Farmers Cooperative

Farmers in **Lessos cooperative society** mentioned that training and financial support have played a pivotal role in addressing numerous challenges faced by the Lessos cooperative farmers. Initially, poor quality silage production and high production costs due to manual labor were significant issues, but with the introduction of silage machinery, these challenges have been mitigated, reducing labor requirements and improving silage quality. Training initiatives have enhanced farmers' skills in silage making, hygiene practices to prevent mastitis, and proper dairy management, including record-keeping and animal health management, such as deworming and feed formulation. Additionally, the formation of farmer groups has promoted economies of scale, allowing for pooled resources and diversified fodder cultivation, such as adopting improved varieties like super napper and lucerne.

"Training and financial support have transformed our operations. The introduction of silage machinery has significantly reduced labor and improved silage quality, while training in dairy management and hygiene practices has enhanced our skills and productivity. Forming farmer groups has allowed us to pool resources and adopt improved fodder varieties, addressing many of our previous challenges." Manager, Lessos Farmers Cooperative

The biggest challenge for the **Kabiyet Dairy Cooperative Society** was mobilizing farmers to take on and be part of the project. However, educating the members on the importance of joining and the benefits that they would accrue by being part of the project helped us onboard a few members. Another challenge was that when organizing training, many of the community members expected some allowance as well as food which would sometimes be a problem as we didn't have a budget for the same. We, however, ensured that meals were provided during training, and this encouraged a few members to attend. The manager remarked *"Mobilizing farmers and ensuring participation was challenging initially. However, educating them on the project's benefits helped us onboard members. Providing meals during training also encouraged attendance, even though managing expectations regarding allowances was difficult."*

The **New Progressive Dairy Cooperative** faced several challenges before the intervention, which were effectively addressed through targeted initiatives. Initially, there

were issues with milk spoilage due to poor hygiene practices, but training programs were implemented to educate farmers on proper hygiene measures, reducing incidences of milk losses. Another challenge was the low adoption of AI, impacting breeding practices, but training sessions focused on the importance of AI led to increased uptake among farmers. Additionally, training in disease diagnosis significantly lowered animal mortality rates. Farmers also lacked skills in feed production, hindering nutritional availability, but were trained to improve feed quality and quantity. Water scarcity was addressed by providing water tanks, while the purchase of aluminum cans extended milk shelf life, reducing spoilage. Employment of gender and development interns supported women and youth employment, and business officers trained farmers to treat dairy production as a business, improving overall management professionalism. The introduction of SMS enhanced communication, reducing discrepancies in milk reporting. These interventions collectively transformed the cooperative, enhancing productivity, profitability, and sustainability in dairy farming.

The Mburugu Farmers Cooperative Society has encountered several significant challenges that have hindered its ability to achieve its objectives. One of the primary issues is the lack of utilization of its feed milling facility, which has impacted its operational efficiency – this points to inadequacy in business development support. Specifically, the cooperative has faced difficulties in accessing raw materials necessary for feed production, resulting in a reliance on high-cost feed sourced from Thika, compounded by transportation expenses. Staffing issues have further exacerbated the situation, with a lack of qualified personnel in the feed mill leading to responsibilities being shifted to the extension department, negatively affecting overall efficiency. Inadequate capital has also been a significant barrier, restricting the cooperative's ability to procure both raw materials and essential forages for feed production.

Katheri Dairy Cooperative has struggled with insufficient milk cooling capacity, as the two available 5000-liter cooling tanks cannot accommodate the entire milk collection in one batch. This limitation necessitates two collections per day, causing inefficiencies. Furthermore, some of the fodder seeds provided to farmers, specifically Brachiaria seeds, did not perform as expected. This underperformance led to disappointment among farmers, discouraging them from continuing to grow the promoted fodder.

Magati Dairy Cooperative has faced several challenges, including instances of milk rejection due to quality issues, highlighting the need for improved milk quality testing and training on milk handling and sanitation. Transportation challenges have also been prevalent, with poor road conditions causing delays in milk collection from last-mile farmers. Additionally, the cooperative experienced procurement challenges when a generator they procured was not delivered.

A significant challenge in achieving project success was the inadequate requisite knowledge and skills among some cooperatives to implement their proposed business cases successfully. Investments in various stages of the value chain, whether upstream or downstream, demand specialized skills and dedicated departments, which were often absent in the technical capacities of the FPOs management. Additionally, the

the governance and sustainability of the FPOs were in question. Many were not prepared to professionally handle growth patterns and business development. This lack of readiness was evident in their difficulties with sourcing materials, decision-making, and implementation, impeding their ability to undertake serious business development initiatives effectively.

A key challenge to the delivery of the project was the lack of dedicated staff from Heifer who were fully accountable for the project's success. During phase I, the project relied on cross-working staff without a dedicated focus, as it was a layering project. In phase II, a consultant was brought in, but their focus was limited to the project side. Finally, in the last phase, a full-time staff member was hired, but their involvement was only for a few months, leading to insufficient continuity and oversight throughout the project's duration.

Strategies to Overcome Challenges

To address its challenges, Mburugu Farmers Cooperative Society is planning to secure external funding through a strategic partnership with an established feed miller. This collaboration aims to leverage the feed miller's technical expertise and financial resources to enhance the successful operation of its feed mill factory.

Katheri Cooperative Society is currently implementing a project to establish five satellite stations, each equipped with cooling tanks to mitigate milk spoilage. Furthermore, the project has introduced other fodder trees, including Panicum species and Desmodium, to improve forage quality and sustain livestock nutrition.

Magati Cooperative has reformed its procurement procedures to enhance transparency and prevent fraudulent activities. Additionally, targeted training programs have led to significant advancements in milk quality, reducing milk rejection rates. Streamlining procurement processes has further helped the cooperative avoid fraud, and the training initiatives have facilitated improved milk quality among its farmers.

4.2 Financial Challenges

Lelchego Dairy Cooperative experiences financial constraints as the cooperative members could not afford to acquire credits. Banks offer credit at higher interest rates. SACCOs to increase saving to advance credit to farmers. Heifer funds are to be delivered to small banks such as family banks that could offer farmers with low interest rate loans. Use of check of system in the agrovets to enable FBO members to acquire feeds on credit and pay at a later date. Introduce revolving funds, youth funds to cooperative members through liaise with the county and national government. Lelchego Dairy cooperatives were challenged by fluctuation of milk prices. Union umbrella for farmers cooperatives to negotiate with processors on a stable set milk price on behalf of farmers through selling milk under contractual sale to processors at contracted prices to ensure stable milk prices.

LFCS financial constraints included milk price fluctuations, especially when there is high production and member migration to more competitive milk societies such as the Kenya Cooperative Society. This challenge has been overcome by the cooperative starting milk value addition to enhance longer shelf life and make yoghurt that fetches better prices. Ainabkoi Cooperative Society experienced a challenge for lack of access to clean water that could be used for dairy production. To overcome this challenge, society has asked members to embrace the construction of boreholes and the installation of tanks to trap rainwater. They have also encouraged farmers to increase tree populations for environmental sustainability and attraction of more rain.

Being that the intervention given to Lelbren Farmers' Cooperative Society was a co-shared initiative where the society was to contribute partially and Irish Aid to cover the difference, the society ran into problems with processors delaying remittance of monies and therefore unable to fulfill their part of the bargain which was about 30% contribution. Another challenge was that part of the support given was to support three extension staff and this was for three months. The society was not able to sustain the three staff after the period ended, and they, therefore had to let them go and retain only one. Due to these challenges, the board of Lelbren Cooperative Society is currently conducting discussions on which other markets they can go into to sustain their operations. The manager remarked that *"Due to processors delaying remittance, we struggled to meet our 30% contribution for the co-shared initiative. Additionally, after the initial three-month support for three extension staff, we couldn't sustain all of them financially and had to let two go."*

Ainabokoi dairy farmers' cooperatives members denoted several challenges that constrained their dairy production. Most farmers before the project lacked proper transportation use of donkeys or oxen, which delayed milk delivery, reduced the quantity of milk delivered to cooperatives, and high rates of milk rejection by the cooperatives as farmers mixed evening milk with the morning milk, resulting in spoilage. Credit was lacking for the majority of the farmers as banks offered credit at a higher interest rate, but through the project, checkoff loans enabled the farmers to acquire dairy inputs. Before, the catalytic project milk transporter used to tamper with milk quantity and even

steal from the farmers through the sms alert, all transport losses have been reduced, fully being catered for by the transporter. Cooperative members faced the challenge of lack of clean water. No access to clean water for use by the animals. Before the project, we used to travel long distances to get water for our animals, but currently, we have a pump that we use to pump water from the river to our homesteads.

"Before the project, the high-interest rates on loans from banks made it difficult for us to acquire dairy inputs. However, the introduction of checkoff loans has significantly eased this burden, enabling us to improve our dairy production." FGD participant Ainabkoi Dairy Farmers' Cooperative.

Farmers in Lessos mentioned being cash-constrained when acquiring inputs such as dairy meal and silage-making services. This challenge was alleviated through a check-off system, where costs are deducted from farmers' revenues throughout the year. Likewise, the management of the New Progressive implemented a check-off system to ease cash constraints in the acquisition of farm inputs, including deworming drugs and dairy meal. Overall, there existed a mismatch in the loan maturity and project maturity cycles: Some cooperatives that were funded by HIC facility had not achieved full maturity by the time the loans were due. This misalignment between the loan maturity schedule and the project development timeline led to financial strain on the cooperatives, often forcing them to use their internal resources to repay these loans.

4.3 Social and Cultural Challenges

Lelchego Cooperative encounters gender dynamic challenges where the wife and husband disagree on how to use funds from milk proceeds as they compete on which needs to use the money. FPO has introduced crops such as avocado, coffee, and poultry to empower women. Divert training, which is gender based on dairy by the FPO, currently focuses on youths and women. Community Engagement challenges the Dairy sector giving misleading information from the government, resulting in suspicions by farmers, making it difficult for them to join cooperatives. Train and sensitize farmers on their feed formulation, reduce production costs, milk pasteurization, and then sell to supermarkets. Low turn-ups during training- women and youths turn up yet they have no control over the decision on the use of production resources making implementation of training received from the project difficult. Involve both genders on field days. Use WhatsApp, sms, and online platforms to train farmers.

Social-cultural challenges in Lessos Farmers Cooperative Society include farmers mixing milk at different times (morning and lunch milking) and delivering it as fresh milk. The issue of gender dynamics, where men dominate in access and control of resources, with male dominance in the dairy sector by owning key production resources, was observed both in the Lessos Farmers Cooperative Society as well as in the Ainabkoi Cooperative Society. To manage this problem, the Lessos Farmers Cooperative Society has opened up satellite stations (5) with cooling plants to limit milk spoilage that is easily accessible to farmers. With respect to gender dynamics, the cooperative societies have increased training and sensitization on gender inclusivity, more women and youth capacity building, and linking accounts to milk deliveries, not automatically to men.

"Milk delivery at different times of day and gender roles have been significant challenges. By establishing satellite stations with cooling plants and emphasizing gender inclusivity and capacity building for women and youth, we've taken steps to mitigate milk spoilage and promote equal access to resources." FGD participant, Lessos Farmers Cooperative Society

Ainabkoi cooperative Dairy members were constrained by cultural and customs that did not allow youth and women to own cows. Youth and women receive training, but they cannot implement it as they lack a say in the decision on farm productive resource use. A youth who owns a cow while still living with the parent has no say in the milk produced as it belongs to the parent. Cooperative members before the Heifer project kept cows as a cultural practice but not as a business due to a lack of training on business skills.

There were delays in disbursement of funds and procurement of the interventions which delayed implementations at the cooperative level.

Working capital is a challenge because little is left for the Cooperative operations once the farmers have been paid and at times stifles their progress (For example; out of 53 shillings from the union, farmers get 50 shillings whereas 3 shillings goes to the cooperative).

5.0 Policy and Evidence based Recommendations

5.1 Policy Gaps and Opportunities

Identification of gaps and opportunities for improvement

1. **Dairy Industry Regulations (2021): Enhancing Policy Enforcement and Compliance**

The regulations permit raw milk be sold only by producers direct to neighboring consumers in rural areas and only pasteurized milk should be sold in urban areas, seeks to address the issue of milk safety and boosting production capacity.

- **The effective enforcement of the Dairy Industry Regulations (2021) has yet to be fully realized.** To achieve comprehensive policy implementation and ensure that all stakeholders, including producers, are actively involved in the marketing of quality milk, several key measures need to be addressed:

- **Strengthening Enforcement Mechanisms:** Enhance enforcement strategies are critical to ensuring that all dairy industry actors, including producers, adhere to regulations and standards for quality milk production and marketing.

- **Expanding Training and Awareness Programs:** Increasing the scope and frequency of training programs is essential for educating stakeholders on best practices for milk safety and quality. These programs should also focus on raising awareness about compliance with existing regulations and standards.

- **Reviewing and Increasing KDB Budget:** The Kenya Dairy Board (KDB) requires a comprehensive review of its budget, which is currently insufficient to meet its regulatory and enforcement responsibilities. Adequate funding is necessary to enable KDB to oversee and enforce dairy industry regulations effectively.

- **Increasing Spot Checks and Inspections:** There is a pressing need for more frequent spot checks and inspections to ensure ongoing compliance with dairy regulations. These checks should be designed to provide timely feedback and corrective measures to producers.

- **Establishing Clear Protocols for KDB Inspections:** During KDB visits, there should be clear protocols and reasonable timelines for addressing compliance issues before enforcement actions are taken. This approach will allow producers to address potential violations and align with regulatory requirements.

- **Developing a Mobile Laboratory for On-Site Testing:** To enhance the efficiency of milk quality testing, KDB should consider establishing a mobile laboratory that can perform on-site milk tests. This initiative will facilitate immediate testing and ensure that quality standards are maintained throughout the dairy supply chain.

2. Cooperative Bill 2024: Opportunities for Improvement

The cooperatives bill 2024 that seeks to provide a legal object of the framework that promotes sustainable and competitive cooperatives sector for socio-economic development in a devolved system of governance.

- **De-gazettement of Inactive Cooperatives.** To address the issue of inactive cooperatives whose names remain on the registry, a systematic process for the de-gazettement of such entities should be implemented. This process could involve the automatic removal of cooperatives from the registry after a specified period of inactivity, typically a few years. Ensuring that only active and operational cooperatives are listed will streamline the registration process for new cooperatives and reduce administrative burdens.

- **Legal Framework for Board Succession and Transition.** The Cooperative Bill should include provisions for the succession and transition of board members. A formalized process should be established to ensure that board transitions uphold the cooperative's primary mandate of benefiting its members. This framework should include verification of governance qualifications for incoming board members to ensure that transitions are conducted transparently and effectively.

- **Assessing NGO Engagement and Mandate Adherence.** When cooperatives seek to engage with non-governmental organizations (NGOs), there should be a rigorous assessment of the NGO's capacity and alignment with the cooperative's core mandate. This will ensure that cooperative operations remain focused on their primary objectives and prevent deviations from their established mission**.**

- **Standardizing Cooperative Policies.** Cooperative policies should be standardized and independent of donor or impact investment provider requirements. The County Government should address and align cooperative policies to regulate the business of impact ventures and donor funding effectively. A comprehensive needs assessment and feasibility studies should precede any new policies or changes to ensure that they are well-founded and relevant.

Strengthening the CASCOM Secretariat. The Cooperative Administrative Services and Cooperative Management (CASCOM) Secretariat plays a critical role in coordinating efforts among various stakeholders. Strengthening the CASCOM Secretariat will help consolidate resources, reduce funding duplication, and enhance the effectiveness of cooperative support efforts.

Some of the policy gaps that can be drawn include;

- There is a policy gap in price stabilization strategies or mechanisms, which is evident from low prices during high milk production other than the existing and underutilized milk value addition. Price regulation can be achieved through setting price ceilings below which no actor can sell their milk; this can be announced and gazetted quarterly.
- Access to machinery that farmers experience indicates that there is a policy gap in machine sharing and leasing arrangements or programs.

- Policy gaps in rural development and agricultural support, especially on the road infrastructure
- Lack of formal policies to ensure equitable resource sharing and opportunities among men, women and youth.

Opportunities include

- Implement an insurance policy to protect farmers from extreme price fluctuations
- Establish a policy for machine sharing or ownership
- Introduce innovative member retention programs such as loyalty rewards to minimize the migration of members
- Implement a formal gender equality policy to give women more opportunities and participation at all levels, such as leadership, roles and equal access to resource

5.2 Evidence-Based Recommendations

Table 4: Policy recommendations

Target area	Policy recommendation
Targeted Funding for Core Activities.	Funding should prioritize the core activities of dairy cooperatives, specifically the chilling and aggregation of milk from farmers. These core activities are essential for maintaining the quality and consistency of milk, which is vital for the cooperatives' business operations. Dairy cooperatives often struggle to develop strong business cases and practical implementation strategies in areas outside their core activities within the dairy value chain. This includes aspects such as processing, marketing, and distribution. Therefore, focusing investments on the core activities will help strengthen the cooperatives' overall business performance. Additional investments are necessary to support the reduction of costs associated with the cooperatives' primary functions. Lowering the expenses related to chilling and aggregating milk will improve the financial viability of the cooperatives, enabling them to offer better prices to farmers and maintain higher quality standards.
Climate-Smart Investments	Investments should prioritize climate-smart solutions that reduce the environmental impact of dairy cooperatives. Specifically, funding should be directed towards installing solar energy systems. Solar energy is a renewable and sustainable alternative to traditional power sources, providing an eco-friendly way to meet the cooperatives' energy needs. By transitioning to solar energy, cooperatives can significantly lower their carbon footprint and operational costs.
Business Development Support	Setting up additional funds for business development support is crucial for the successful execution of dairy cooperative projects. This funding should cover key areas such as investment installation, project implementation, and ongoing business support. Business development funds help cooperatives address challenges promptly and efficiently, ensuring smoother project execution and quicker achievement of goals.
Dedicated staff for project accountability	During the initial phase, ensure that the project has a committed team rather than relying on cross-working staff. For subsequent phases, maintain continuous oversight by employing full-time staff with a clear focus on project goals from start to finish. This approach will ensure consistent management and effective implementation throughout the project.

Implement a comprehensive Training Program, including staff and farmer training.	Training was seen to improve cooperative management. Evidence also mentions a shortage of extension staff (for instance; 2 for 2000 members in Ainabkoi Cooperative Society). Structured peer-to-peer training programs be formed leveraging existing models such as farmer field schools and farmer classification systems that will increase adoption of best practices, increased milk production, and improved livelihoods among dairy farmers. There is further need for training farmers on achieving quality milk indicators, including appropriate fat content, cleanliness and proper handling using aluminium cans and warm towels, sufficient protein content, absence of antibiotics and other contaminants, and low somatic cell counts, which reflect the health of dairy animals with low levels of mastitis. These indicators are important to dairy cooperatives and consumers as they ensure the milk is safe, nutritious, high-quality, and has a longer shelf life, thereby protecting public health and maintaining consumer trust and satisfaction.
Policy to support growth and sustainability	FPOs should adopt Quality Based Milk System to reward farmers based on the quality of milk supplied. This will ensure the growth and sustainability of the cooperatives by incentivizing farmers to produce higher-quality milk, thereby enhancing product standards, increasing market competitiveness, and fostering consumer trust and loyalty.
Further investment in transport and cold chain infrastructure	Enhance transportation infrastructure, such as roads and storage infrastructure, like cooling plants, to accommodate increased milk production: All cooperatives serve vast areas with decentralized cooling facilities, such as Lessos Farmers Cooperative Society's five satellite cooling facilities. Improved cold chains and good road infrastructure can reduce milk spoilage.
Institute and enhance gender inclusion policies	The KIIs and FDGs conducted show that male dominance in resource control exists despite women and youth doing much of the work. Implementing policies that ensure equitable distribution of income and resources will increase productivity in the sector as more women and youth will be more empowered and motivated.
Ensuring due diligence and provision of support to cooperatives operating in other value chain activities	To improve the efficiency and effectiveness of FPOs in the dairy sector, there is a need for substantial financial and business development support. Investments directed towards expanding value addition processes, such as establishing processing facilities for dairy products and value addition (downstream), and developing advanced feed formulation mills (upstream) should be coupled with significant support including mentorship from actors active in the said value chain activity.

6.0 Conclusion

Key findings indicate that farmers and FPO management in North Rift faced significant challenges, including poor hygiene practices leading to milk spoilage, low adoption of AI, high animal mortality rates, inadequate feed production skills, water scarcity, low milk production and prices, and inefficient management practices. These challenges are consistent with those reported in many studies across Sub-Saharan Africa, where water scarcity, seasonality in feeds, limited feed conservation, low milk prices, and poor breeding practices are prevalent issues.

The project effectively addressed these challenges by implementing comprehensive training programs on hygiene, AI, disease diagnosis, feed production, animal health management, and capacity building. Additionally, the purchase of silage machines ensured a constant feed supply, while providing water tanks and funding for aluminum cans mitigated water scarcity and milk spoilage. The interventions, which included knowledge diffusion, provision of quality semen, improved breeds of dairy heifers, veterinary supplies, and equipment, proved successful in enhancing the commercialization of dairy production among farmers.

Employing youth interns, business officers, extension officers, and introducing check-off systems and SMS communication improved professional management, financial stability, and transparency. These collective interventions enhanced productivity, increased incomes, and ensured the sustainability of the cooperatives.
Management from Lelbren Farmers Cooperative Society noted the need for extended support in the extension sector, suggesting that longer-term assistance would have had a more significant impact. They emphasized the necessity of ongoing capacity building for farmers, staff, and the board, along with continuous monitoring and follow-up by funders to ensure the project's long-term success.

To implement projects successfully, a comprehensive approach that includes farmers in the planning and execution phases is crucial. Continuous monitoring and evaluation (M&E), accountability measures, regular follow-ups, focusing on value addition, and partnering with other cooperatives are essential strategies. Forming farmer groups, maintaining transparency, and prioritizing profitable ventures ensure long-term success, financial stability, and sustainability of the project.

7.0 End Notes

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