USAID FROM THE AMERICAN PEOPLE	**REBUILDING LIVELIHOODS AND RESILIENCY IN ZIMBABWE**	LAND O'LAKES, INC. INTERNATIONAL DEVELOPMENT Innovative Solutions for Global Prosperity

FINAL PROGRAM REPORT

January 18, 2010 – November 30, 2013

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Submitted to

Snodia Chikanza,
Agreement Officer Representative
USAID/Zimbabwe
P.O. Box 6988, Harare, Zimbabwe

Submitted by

Land O'Lakes, Inc.
P.O. Box 64281
St. Paul, MN 55164-0281
U.S.A.

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REBUILDING LIVELIHOODS AND RESILIENCY IN ZIMBABWE

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Contact Information

Contact in the U.S.:

LuAnn Werner
Land O'Lakes/USA
Phone: +1 (651) 375-5116
Fax: +1 (651) 375-5144
E-mail: LMWerner@landolakes.com

Contact in Zimbabwe:

Spencer Ngoma
Chief of Party
Land O'Lakes/Zimbabwe
Phone: +263-4-251-858
E-mail: spencer.ngoma@idd.landolakes.com

Regional Contact:

David Harvey
Regional Program Director, Southern Africa
Land O'Lakes/Zimbabwe
Phone: +263-4-304756
E-mail: david.harvey@idd.landolakes.com

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Acronyms

ABS	Accounting Bureau System
AGM	Annual General Meeting
AI	Artificial Insemination
ARDA DDP	Agricultural Rural Development Authority Dairy Development Programme
BCC	Bacterial Cell Count
CBF	Cattle Bank Facility
CIMMYT	International Maize and Wheat Improvement Centre
CLW	Community Livestock Worker
CMT	California Mastitis Test
COP	Cost of Production
DZL	Dairiboard Zimbabwe Limited
ESADA	Eastern and Southern Africa Dairy Association
FEAST tool	Feed Assessment tool
FTF	Feed the Future
GAP	Good agricultural practice
IPM	Integrated Pest Management
IRD	International Relief Development
MCC	Milk Collection Center
MPA	Milk Producer Association
PD	Pregnancy Diagnosis
SCC	Somatic Cell Count
SNV	Netherlands development organization
TBC	Total Bacterial Count
ZADF	Zimbabwe Association of Dairy Farmers

Executive Summary

Through a $5.797 million, three-year investment made possible by the American people through the United States Agency for International Development (USAID), 1,258 farming households are enjoying markedly improved food security and a 743% increase in annual dairy incomes by producing an estimated 3.6 million liters of milk worth $1,520,595 million.

Implemented by Land O'Lakes International Development, in partnership with the Zimbabwe Association of Dairy Farmers (ZADF), Tiller's International, International Relief & Development (IRD) and Micro King, the Building Livelihoods and Food Security in Zimbabwe through Interventions in Dairy and Livestock Value Chains (ZDL) program linked smallholder dairy farmers to functioning milk markets; improved access to animal health and on-farm fodder production; and developed donkey traction in support of dairy production and market access.

Zimbabwe historically had a relatively robust dairy industry, filled with commercial farmers, and heavily subsidized smallholder farmers. However, land reforms, economic woes and natural disaster devastated the country's dairy sector and its productive industry. Huge portions of the value chain were broken – which could only be repaired by changing mindsets of stakeholders and promoting the intrinsic value of competitiveness.

Conceptualized and implemented as an economic growth program for vulnerable yet viable farmers, ZDL was first launched as a pilot program in January 2010, and then extended into a full program through November 2013. Through the program, ZDL farmers have become more creditworthy, having repaid US $290,719.81 to the revolving Cattle Bank facility; 65% of the outstanding amount had been paid by November 2013. Meanwhile, USAID-supported Milk Collection Centers (MCCs) have increased production 417%, from an average of 21,000 liters per month in 2009 to more than 108,641 liters in June 2013.

This report discusses the multitude of qualitative and quantitative results from the ZDL Program through the description of achievements and lessons learned. Facts and figures were collected through the ZDL Final Evaluation, supplemented with information from Quarterly Reports over the life of the project. Project highlights include:

- Household-level annual **incomes from milk sales increased 743%, from $312 to $2,943**.
- **3,041,191 liters of milk was tested, bulked and chilled at ZDL-supported MCCs**, valued at $1,520,595.
- Average household production **volumes increased 1,124%, from 50 to 562 liters a month**.
- The **gross margin gain for a cow in lactation increased 4,390%** from the baseline of $26.70 to $1,199.
- The project disbursed **US $659,735.22 in cattle bank loans** as initial investment, and **US $290,719.81 has been paid back** by the farmers in the cattle bank facility for the purchase of additional cattle. 65% of farmers were on track with scheduled loan repayments. Additionally the Dairy Fin product loaned out $56,160 and repayment to date has been 100%.
- An additional **$31,287 was loaned to farmers to purchase hygienic cans and buckets,** as well as for donkey milk transport equipment, of which $24,756 has already been paid back; ZADF has purchased another container with cans and buckets to continue this facility.

- The volume of milk sold by project farmers increased 417%, **from 21K liters per month in 2009 to 108K liters in 2013, amounting to 2% of national production**.
- **Milk consumption increased 66.7%** in all project sites.
- **681 farmers in 21 MCCs are delivering milk to 5 processors (compared to 1 MCC in 2009), and 90% is Grade A Milk;** average monthly farmer payouts from MCCs have increased 75%.
- At least **932 new full-time jobs were created**, with 74% of farmers hiring at least one on-farm employee.
- **Rehabilitated and strengthened 21 MCCs nationwide**, of which 15 were operating at or above break-even point by November 2013.
- Of the 247 households that received relevant training, **155 are using donkeys for land clearing, plowing and/or transportation**.
- Female Empowerment led to more balanced decision-making; **65.7% of couples decide together about reinvestments** using money from milk sales.

Introduction

Rebuilding Livelihoods and Resiliency in Zimbabwe (ZDL) was a Cooperative Agreement between USAID/Zimbabwe and Land O'Lakes that began on January 18, 2010, and ended November 30, 2013. The project's geographical reach included Manicaland, Mashonaland East, Masvingo, Midlands and Matabeleland South Provinces. This report summarizes activities and reports highlights over the implementation period.

Areas of Intervention

Component One: Dairy production, collection, and processing
Component Two: Increased capacity in preventative animal health and rangeland/fodder flow management
Component Three: Donkey traction and transport study

Project Support for USAID's Operational Plans

Rebuilding Livelihoods and Resiliency in Zimbabwe supports USAID - Zimbabwe's Assistance Objectives 3 and 4:

Assistance Objective 3: Livelihoods Restored and Maintained/Economy Stabilized and Growing

- IR 3.2: Basic Economic Activity and Livelihoods, Income Generation, and Employment
    - Sub-IR 3.2.1: Improved Livelihoods, Income Generation, and Employment

Assistance Objective 4: Increased Income and Employment Generated by the Agricultural Sector

- IR 4.1: Increased Agricultural Production
    - Sub-IR 4.1.1: Contract Farming and Out Grower Schemes Strengthened

Dairy Industry Assessment

Overview

Zimbabwe once had a thriving dairy and livestock industry, led predominantly by large commercial farmers and, to a lesser extent, small-scale farmers incentivized into dairying through a government-led poverty alleviation effort. At the sector's height, in 1990, Zimbabwe was producing up to 260 million liters of milk annually, and was exporting it across Southern Africa. However, a confluence of complex political, economic and environmental factors caused a precipitous decline starting in the late 1990s, with the dairy sector reaching its nadir from 2008-2009.

At that time, the dairy sector and its productive infrastructure were devastated by massive hyperinflation. For small-scale farmers, the impact of the economic crisis was compounded by cyclical droughts and erratic rainfall; the death of their livestock from an inability to access feed, veterinary care and breeding services; and the collapse of the Milk Collection Centers (MCCs) and processing plants that had once provided them with a guaranteed market for their milk at fixed prices.

Annual milk volumes plummeted to less than 35 million liters by 2009, with the industry as a whole operating at below 8.4 percent of installed capacity. Today, in late 2013, Zimbabwe imports more than 60 million liters of milk annually.

Many of the nation's smallholder farmers first started dairying at the invitation of the Zimbabwean government, which saw the sector as a means of reducing poverty, raising farm incomes, and improving nutrition and employment in rural areas. Farmers were linked to MCCs, and inputs, services and transport were often subsidized and administered by the government. While many farmers initially saw far more profits from dairying year-round than they had ever experienced farming seasonal staple crops such as maize, the schemes were not financially viable without external support.

As a result of hyperinflation, all of the government's 35 established MCCs stopped functioning, as the subsidies could no longer be paid while financial markets were imploding. In 2009, seven MCCs reopened and many farmers received improved breed cows through the EU Stabex fund, administered by ZADF. However, this program was heavily focused on milk production, rather than linking with consumer markets and strengthening the financial management of MCCs; consequently, the program did not have resources to rebuild the entire value chain. But with support from the American People through the US Agency for International Development (USAID), Land O'Lakes International Development was able to create the enabling business environment throughout the dairy sector, and market linkages needed to transition families from being donor-dependent subsistence farmers to business partners, who were determined to engage in dairy farming as a business.

Dairy Milk Production in Zimbabwe

In 2013, Zimbabwe was targeting to produce 60 million liters of raw milk by year end as the revival of the industry continues[1]. Although it is a marked increase in production, the figure still falls far short of the national demand of 120 million liters per annum. In 2012, the country produced 55.9 million liters. Speaking at the 9th African Dairy Conference and Exhibition in Harare, Zimbabwe Dairy Industry Trust chairperson Thompson Mabika said although the dairy industry had virtually collapsed in 2008, it has been on a growth trajectory since 2009. However, the decline in local production has opened a door to imports from regional countries.

The stakeholders in the dairy sector acknowledge the need to increase the dairy herd if milk production is to increase. Artificial insemination as a way of building the dairy herd over time was also mentioned as a major factor to increase the dairy herd.

The country needs research for the secondary level product development[2] to ensure that the country remains on the cutting edge of technology and innovation to enhance competitiveness. However, processing capacities remained largely under-utilized in the region, mainly due to inadequate volumes of raw milk, high utility costs, high processing cost that negatively affects prices of milk, and competition from imports, among many others.

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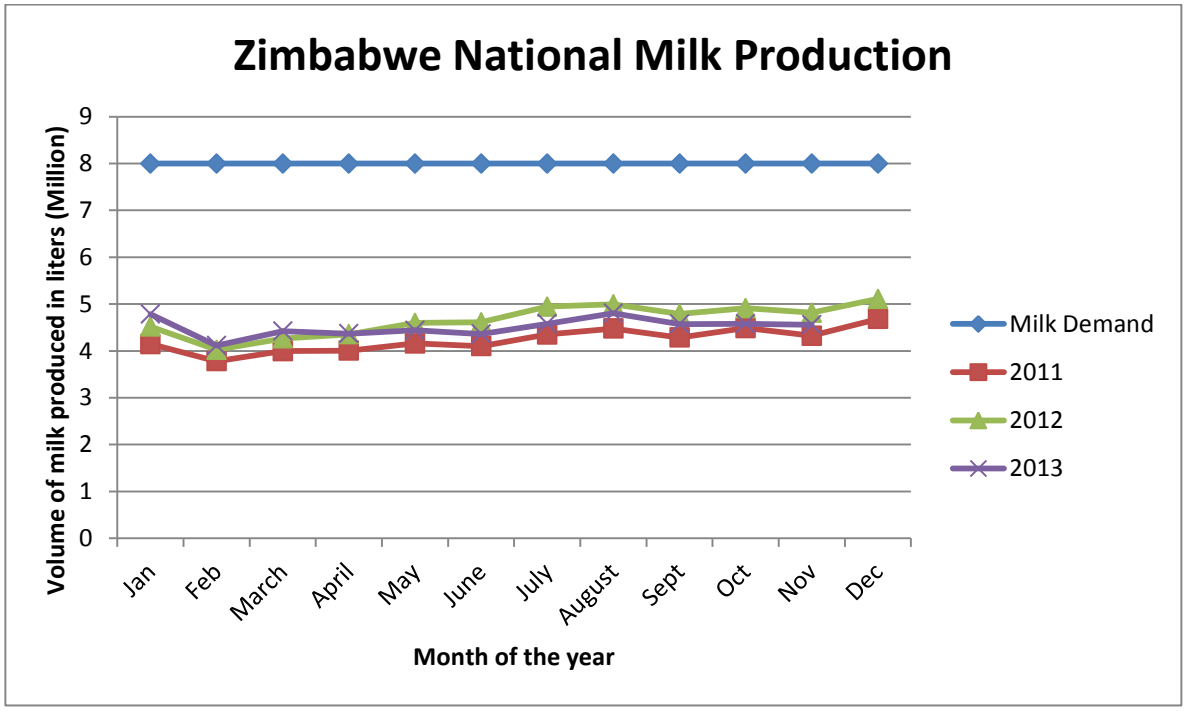
[1] Thompson Mabika ESADA - Harare

[2] Agriculture, Mechanization and Irrigation minister – Joseph Made at ESADA

Graph 1: National Milk Production Figures



Milk Production Trends in Zimbabwe

The above graph shows the trends in national milk production figures against the milk demand. The change in milk production has been about 10% from 2011 to 2012. Year 2013 is showing a decrease in national milk production especially during the dry season by 4% for the period May-August. However, projections show an increase in milk production for the rest of the year as the dairy herd is set to increase. The changes in the milk production, whether positive or negative, are important for the milk processors to plan their operations. As the gap between the demand and supply widens or contracts, the implications on the dairy industry are huge. Currently, the gap is met by milk imports in the form of milk powders, milk products or packaged milk. This fact will be a challenge for milk processors as they have to adjust milk processing capacities in two directions depending on whether they are growing or declining. For farm input suppliers, especially feed companies, this will also be the case.

The Dairy Industry and Globalization

The fast pace of technological progress, economic liberalization, privatization, scale enlargement, internationalization and globalization are exercising a growing influence on the dairy industry. The dairy sector is a unique component within the agriculture sector and must be treated as such. Small holder dairy in Zimbabwe is now in the mainstream formal sector selling milk in the formal market through the milk collection centres and commercial milk processors. As a way of improving this sector to compete in the formal market first and then the larger international market, there are factors that the project has considered and tried to impart to the smallholder farmers. If the following factors continue into the next phase of smallholder dairy projects, then the foundation built by ZDL will be sustainable.

1) Strict and comprehensive quality regulations to ensure that the milk produced meets the processor quality standards and fetches a higher price.

2) Distinguishing the dairy industry within agriculture as a whole is the socio-economic position of dairy farmers. The small-scale producers have a weak and vulnerable position on the market; the nature of the business (involving a high percentage of fixed costs) means that they are only able to adjust to market changes in a limited and gradual way. Furthermore, milk is produced every day and is a regular source of income to the numerous small producers. At the same time, milk production is a highly labor-intensive process and therefore provides many employment opportunities, not only in the dairy farming business itself but also in the transport and processing of milk and in the agricultural supplies sector. For that reason, the dairy industry is highly important for rural livelihoods.

3) Dairy milk associations are important for the milk producers as they build a voice to improve their position in the market. As long ago as the 19th century, dairy farmers wanted direct influence on the processing industry, on which their livelihood was, and still is, so crucially dependent. In Zimbabwe, the small scale dairies pushed for processing milk at the centres; however, there have been mixed results, with some centres being able to compete and others incurring massive debt from losses. Dairy is peculiar in that unlike grain, farmers cannot hold on to the commodity until prices improve. The disadvantage of poor milk prices is illustrated below:

   Poor milk price ⇒ Low farmer income ⇒ Less money allocated to feed ⇒ Poor cow nutrition ⇒ Low milk production ⇒ Low milk volumes delivered to the processor/MCC ⇒ Low farmer income

Therefore, the cycle persists if the milk price issues are not addressed. The approach of milk producer associations should continue as a way of cushioning the small holder farmers from the milk market uncertainties.

Global Outlook for Dairy

Even though the Zimbabwean dairy sector is not much affected by the price changes in the global market, it is interesting to note that the challenges faced locally are also faced internationally. Major problems with drought in Australia and New Zealand have been compounded by falling yields in the UK, cows being culled in the US and dreadful weather in Latin America. This has resulted in 'significant changes in world milk price'. By 2014 there could be a sense of direction as to the supply and demand stability in the market. Farmers internationally face cash flow challenges and they have been under immense pressure; work load has increased because of larger herd sizes and a lot of farmers struggle to make ends meet. In the colder climates, it has become very costly to produce milk during the cold season as the milk/feed/price ratio goes up. Globally, dairy farmers request higher milk prices to cushion themselves from the high production costs and capital investments so that they remain viable. The local dairy farmers also face the same challenges of

high cost of milk production and low milk prices. It is anticipated that global milk prices will remain strong into 2014 because of high demand and low supply of milk.[3]

Project Objective Level Results

The Rebuilding Livelihoods and Resiliency in Zimbabwe reports progress against feed the Future (FTF) indicators (numbered) and custom Monitoring indicators (lettered). These indicators are used to measure progress of the stated goal above.

ZDL A: Increase in income of vulnerable households ($)

At the end of the project, dairy income per household was US$2,943.6 per year, 15% below the target of US$3,455 per year. This was largely due to the seasonality in milk production and because the project distributed fewer cows in the 2013 year as compared to the previous years. The other contributing factor causing the project to come in below target may have been the long calving periods, which were reported at between 14-18 months, which was longer than the recommended average of 12 months, due to farmers being unable to detect heat. This indicator is an average across the project beneficiaries calculated from a representative sample in a survey. Income varied greatly across project areas, from US$1,600 - US$8,000.

ZDL B: Number of rural households reporting increased incomes from program intervention

The number of farmers reporting an increase in income was 969, or 19% below the target of 1,200 farmers. Even though the targeted number of farmers attended trainings, not all of them delivered milk to the MCCs; 681 farmers delivered milk to the MCC over the life of the project. The farmers who benefitted from the project through trainings did not all deliver milk to the MCCs due to various reasons. 40-60% of the milk was sold at farm gate depending on the season, with higher milk volumes sold during the dry season and low milk volumes sold at farm gate during the wet season. Incomes earned from the farm gate sales were reported as dairy incomes and this contributed to the 969 farmers reporting increased incomes above the 681 delivering milk to the MCCs. The target for increase in incomes was set in line with the target of 1,200 farmers delivering milk to MCCs.

4.5.2(13): Number of rural households benefiting directly from USG interventions

1,258 farmer households benefitted from USG interventions against a target of 1,200. The assistance given was in the form of technical trainings in dairy husbandry, business management, fodder production, and donkey management and households that benefitted from livestock loan facilities, AI facility and milk hygiene equipment.

4.5.2(5): Number of farmers and others who have applied new technologies or management practices as a result of USG assistance

1,245 farmers against a target of 1,200 farmers adopted new technologies over the life of the project. Some of the new technologies adopted include:

- Good record keeping

[3] Farmers Guardian web discussion (May 31, 2013).

- Better animal nutrition
- Good animal health with less than 10% mortality
- Calf rearing (Milk replacer trials in Marirangwe and Hauna were the new management practice introduced in the latter part of 2013).
- Milk handling and hygiene – high grade milk is delivered to the commercial milk processors.
- Feed establishment – more than 90% of the farmers adopted fodder production and conservation, even though some of the areas placed under fodder did not produce enough fodder to last the dry season.
- Farm infrastructure – more than 90% of surveyed farmers had constructed kraals, milk parlors and had feed and water troughs in place.

The number of people applying improved technologies was 99% of the number of people trained and 4% over the target. One survey however, yielded the following challenges that should be addressed by follow on activities: 1) Dairy is capital intensive and farmers lack the finance to implement some of the good management practices; and 2) Some farmers have not yet accepted dairy enterprise as a complementary enterprise to their farming systems and are lagging behind in treating dairy farming as a business.

4.5.2(29): Value of Agricultural and Rural Loans

The project disbursed US $659,735.22 in cattle bank loans as initial investment, and US $290,719.81 has been paid back by the farmers in the cattle bank facility for the purchase of additional cattle. 65% of farmers were on track with scheduled loan repayments by the end of the project period. Additionally, the Dairy Fin product loaned out $56,160 and repayment to date has been 100%.

Additional agricultural loans were also disbursed as follows:

- US$31,287.00 loaned for the cans and buckets facility, of which US$24,756.00 has been repaid, indicating 79% repayment.
- US$13,300.00 loaned for the donkey milk transportation and $533 paid, indicating 4% repayment. The primary reason behind this low repayment was the poor performance of the donkey entrepreneurship pilot program, which is described in further detail under Component 3.
- US$3,450.00 loaned for bicycle transport and $2,475 repaid, indicating 72% repayment.

The total amount loaned out over the life of the project was US$1,023,698.03.

Feed the Future (FTF) Results

4.5(2): Number of jobs attributed to FTF implementation

The project created 932 jobs against a target of 557 jobs. The number of jobs created by FTF implementation surpassed the target by 67%. Initially, the project expected that most of the farmers would use their own and family labor, but as their incomes increased, the farmers resorted to hiring employees to assist with dairy farming, resulting in the target being surpassed by a significant margin. Farmers hired labor for dairy management, as they required more time allocation to feeding, milking, transportation to the MCCs and production of fodder, resulting in more labor hours allocated to dairy than initially anticipated. Additionally, the increase in herd

sizes, gross margins and cumulative milk volumes contributed to MCCs hiring additional employees to assist with handling and/or processing milk, record keeping and managing the centres.

4.5.2(11): Number of food security private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) receiving USG assistance

By the end of the project, a total of 21 Milk Producer Associations (MPAs) received USG assistance against a target of 20. Of these, 18 are main sites while three (Paidamoyo, Goshen and Upper land in Chipinge) are satellites for Rusitu United and Rusitu Association, respectively.

The assistance given to members of these producer associations included technical trainings in dairy husbandry, business management, fodder production, and donkey management. Distribution of improved dairy breeds had a positive impact on dairy herds for the smallholder farmers, with 565 dairy cows purchased through the Cattle Bank Facility revolving fund initiated by the ZDL project.

4.5.2(43): Number of firms (excluding farms) or CSOs engaged in agricultural and food security-related manufacturing and services now operating more profitably (at or above cost) because of USG assistance

Out of the 21 MCCs, 15 centres were breaking even against a target of 15 by the end of the project. This is up from zero centres operating profitably at baseline. Centres that were breaking even were: Gokwe, Sangano, Marirangwe, Chikwaka, Mayfield, Upper land, Goshen, Mafumise, Paidamoyo, Nharira, Claring, Hauna, Hama Ruwomba, Murehwa 44, and Tsonzo

Six centres were not profitable at the close of the project: Wedza, Sadza, Umzingwane, Guruve, Mutoko, and Dohwa. The primary reason for centres not breaking even was that milk deliveries to the MCCs were not receiving high enough volumes to cover the centre running costs. The future of these centers remains uncertain, and the ability to turn a profit will depend on farmers solving the governance issues that exist, reorganizing to deliver high milk volumes to the MCCs, and limiting farm gate milk marketing.

4.5.2(38): Value of new private sector investment in the agriculture sector or food chain leveraged by FTF implementation

The project leveraged a total of US$59,480.00 from the private sector through purchasing of generators, motorbikes for ZADF field staff, and the Microking Cattle bank loans. This indicator did not have a target as it was not originally part of the program design; however, it was reported on after the project managed to leverage some private sector funds.

4.5.2(28): Number of private enterprises (for profit), producers organizations, water users associations, women's groups, trade and business associations, and community-based organizations (CBOs) that applied new technologies or management practices as a result of USG assistance

21 private enterprises against a target of 20 applied new technologies and management practices as a result of USG assistance. The improved technologies that the project trained included but were not limited to:

- Introduction of milk testing at the MCCs and sending of milk samples to the laboratories

- Record keeping of all the financial transactions at the MCCs and the Accounting Bureau System at ZADF
- The cost of production model
- Strategic planning
- Budgeting

The adoption of the cost of production model by 15 centres this year has resulted in the 15 centres breaking even.

USAID ZIM 2: Number of project beneficiaries in relevant leadership positions
199 project participants against a target of 126 were in relevant leadership positions by the end of the project. Of these, 31% were female and the 69% were males. Two of the MPA leaders were in the provincial executive of ZADF, representing smallholder dairy at provincial level.

This indicator was added during project implementation and was first reported in the third quarter of 2013.

Activities and Activity Level Results

Component One: Dairy Production, Collection, and Processing – Activities

Component One, Dairy Production, Collection, and Processing, was the backbone of the ZDL project and where the majority of activities resided. The following section outlines specific Component One activities in relation to the project's workplan.

Activity 1.1: Strengthening Business Financial Management and Improving Financial Transparency of the Milk Bulking Groups

Financial Management Systems
The ZDL project implemented the 12 step workflow in order to improve record keeping at MCCs, thus creating a transparent financial management system at the centres. For a good and fair payment system, and proper recording of the milk deliveries, the milk collection centres need a good system of administration. The work flow consists of consolidation of raw financial data from the standardized source documents, which takes place monthly and is submitted to the Accounting Bureau System (ABS). The MCCs submit a monthly report from a template showing information on membership, production, stock control, product sales, income from other sources, invoices and receipts, summary and expense payment. The ABS generates a profit and loss report and feeds back to the MPA the financial performance of the MCC. By the end of the project, 16 MCCs were sending in ABS reports on a monthly basis. The MPA executive and some farmer members have a full understanding of the monthly statement, however all members have a basic understanding of the financial statements. Farmers benefit from this knowledge as once trained, they are then able to verify the monthly financial statement presented in the monthly meetings using ABS returns. Efforts were made to ensure that financial management at the centres would continue to take place after project exit. Refresher training and placement of all the centre financial source documents was carried out to ensure a smooth transition.

Cost of Production Model
Product costing, in terms of the ZDL project, is the process of tracking and studying all the various expenses that are accrued in the production and sale of milk and milk products, from raw milk purchases to expenses associated with transporting milk to processors or retail outlets. It is widely

regarded as an extremely important component in evaluating and planning overall MCC business strategies.

The management committees and the general members were trained on the Cost of Production (COP) model and the majority of the members were aware and fully able to articulate the model. However, farmers in 6 centres have not fully adopted the COP model. The shortcoming has been that, whilst the members were aware of the COP model, the model was not being used to come up with the farmer payout at the MCC, with farmers preferring to have a fixed payout of 50c per litre of milk. The reasons for members to prefer the fixed payout was that due to the milk deficit in the locality of the MCCs, farmers have an option to sell their milk at $1 per litre. Therefore, a farmer pay out price below US$0.50 further increases the opportunity cost of farmers marketing their milk to the MCC.

The COP model in itself is not a panacea to all the association challenges; also, there is need for farmers to be committed to supplying clean and good quality milk to the MCC and the need to keep milk losses and sales returns at the MCC at zero, in order to realize full benefits from the model. Increased milk production and supply to the MCC and lowering of centre running costs will result in farmers realizing more revenue from their milk. As a result, it will be of greater advantage for the farmers to use the COP model.

In most instances, the result of not adopting the COP model is cross subsidization of the farmer payout by the CBF. This is addressed through centralizing the CBF payments. However, for sustainability of the MCC operations, the project continues to emphasize the benefits realized from using the COP model. Farmers will receive lower farmer payouts in the short term but in the long term when milk production levels increase and there is a milk surplus in the locality, selling through the MCC will be the only viable option.

Interpretation of ABS financial statements (Center administrators, farmer members and board members)

The ABS office enters the data into QuickBooks and produces standard financial statements for all the MCCs submitting reports. Often, these standardized financial statements were not fully understood or utilized to improve performance at the centre level. To help centres to fully utilize ABS data, the ABS returns were taken to the centres, and ZADF and Land O'Lakes staff conducted trainings on how to read them with all committee members.

The MPA executive and some farmer members now have a full understanding of the monthly statement, however all members have a basic understanding of the financial statements. Farmers benefit from this knowledge as once trained, they are then able to verify the monthly financial statement presented in the monthly meetings using ABS returns. Every farmer member receives a copy of the income statement in the monthly general meeting. This high level of transparency tends to encourage farmers to participate in the monthly producer meetings, and farmers have a sense of ownership to their business.

Capacity Measurement

The Land O'Lakes performance management tool assisted in identifying gaps in the MCC operations at the beginning of the project. These were addressed during the course of the project through trainings in:

1. Leadership (the extent, to which the leaders inspire, prioritize, make decisions, provide direction and innovate): Generally, all the centres had an established committee. Training in corporate governance and structure has provided guidance to the committees and administrators of the MCCs. Corporate governance has also assisted in:

a) Instilling a common set of basic beliefs and values that exist and are widely shared by almost all staff and board members and by more than half of the general members;
b) Providing a sense of connection to organization and a clear direction for behavior;
c) Making sure beliefs and values clearly support organizational purpose, are in line with constituents' norms, and are consistently harnessed to produce impact.

2. Adaptive Capacity (the ability of the cooperative to monitor, assess and respond to internal and external changes): Generally, there was very limited measurement and tracking of performance and progress. After the trainings, all the associations were encouraged to come up with monthly targets that would be assessed in all monthly producer meetings.

3. Management: The management teams that have been hired by all associations before the project were weak in the area of financial management. A new record keeping system was introduced to all centres that complement existing structures. Records introduced include on-farm reception books, farmer pass books, on-farm business record books, milk supplies payment vouchers, milk reconciliation forms, issues forms, sales reconciliations, petty cash and internal requisitions, and salary schedules. An Accounting Bureau System (a centralized financial system housed at ZADF) supplies all MCCs with monthly financial statements that will influence decision-making and facilitate performance reviews.

4. Operations (the capacity of the cooperative to implement key organizational and programmatic functions): All 21 MCCs were fully operational by the end of the project. The ZDL project assisted in the refurbishment of the MCCs and installation of the bulk tanks.

5. Supply, processing and marketing (the extent to which the cooperative effectively carries out its business functions): At the baseline stage, the farmers′ marketing skills and levels of training were very low. 37% of the farmers reported to have received training in market linkages and 32% were applying these skills. However, after receiving training, 99% of the surveyed farmers reported applying the skills trained. This is also evident in the fact that the milk collection centres have varying ways of marketing their milk. By the end of the project, 10 MCCs were linked to processors.

6. Productivity and financial performance: In the initial assessment, all the associations recorded low capacity utilization, between 0-30 percent. Initially, the levels of milk rejections were very low. However, with the introduction of milk testing equipment, all MCCs now conduct platform tests. After realizing the cost of delivering poor quality milk on the final milk price, emphasis was made on platform tests so that the milk producers could benefit from the milk bonuses offered by processors on good quality milk. This also resulted in lower returns of milk from the processor back to the centre, which had seen farmers incurring heavy losses. Improved financial management has resulted in 15 out of 21 MCCs now operating above break-even point. This has been a huge improvement because when the project started none of the MCCs were making a profit.

Activity 1.2: Improving Financial and Business Management at Milk Collection Centres

Good financial management of a centre is dependent upon good record keeping of source documents. Land O'Lakes and ZADF developed a master set of source documents to assist MPAs in developing transparent recording systems for all transactions. Land O'Lakes and ZADF distributed samples of these record books to each MPA, and the Land O'Lakes business unit carried out one-on-one training with the MPA staff, management and board.

Trainings

Setting up an office and record keeping

The orientation of new office bearers on setting up an office and record keeping is important in maintaining good quality and timely submission of records to ABS. During the course of the project, refresher courses were conducted for the 40 centre staff and 119 executive committee members. These trainings have resulted in improved accountability of centre funds. Transparent decision making allows members to see where their money is spent and builds trust so that farmers continue to deliver milk to the MPA. These trainings have resulted in improved accountability of centre funds.

Budgeting

The centre budgeting process has managed to improve the MCC management, as centre staff and committees are now aware of the cost centres, the budget variable to target, and effective raw milk and product reconciliation through the use of corresponding forms. These budgeting processes not only help centres to operate more smoothly, but they also help to minimize or altogether avoid milk pilferage.

Advantages of Budgeting: Budgeting controls assist the MCCs in the following activities:

- Planning and orientation: The process of creating a budget takes MPA management away from its short-term, day-to-day management of the MCC and forces it to think longer-term.
- Annual budgets were drawn up at the beginning of the year to enable the centres to think about longer term planning. This is the chief goal of budgeting, even if the MPA management does not succeed in meeting its goals as outlined in the budget, at least it is thinking about the organization's financial position and how to improve it in the longer term.
- Profitability review: A properly structured budget illustrates what aspects of the business produce money and which ones use it, forcing the MPA management to consider whether it should drop certain parts of the business or expand in others. As the case of Sangano illustrated in the interpretation of the financial statements, the cost centres were presented to the centre and the MPA management realized that some of the costs, such as marketing, were too high to justify.

Break Even Point Analysis

Centres break even when sales revenue equals total expenses. Break even analysis demonstrates what level of output is required before the business will make a profit. Every month, MCCs reviewed their budgets and planned for the next month with ZDL staff, MPA staff and the executive committee to ensure that centres adhered to the plans and targets that the MPA executive would have set. Using the break-even point analysis, the centres were able to see areas of improvement in order to operate without losing money. The main issue of concern had been the centre

operational costs, which the MCCs were failing to manage in the face of decreasing milk volumes; hence, the costs remained high while the milk volumes decreased (this is especially prevalent during the dry season). The servicing of debts of the service providers, such as Zimbabwe Electrical Supply Authority (ZESA) and Zimbabwe National Water Authority (ZINWA), has been another challenge, as centres could not run without water and electricity. Farmer pay-outs were affected if the debts to the service providers are not paid in time, as accrued debt means higher than normal monthly payouts to these service utilities. This would result in farmers withholding their milk because of late payments or receiving low pay-outs. During the course of the project, project staff worked with MPA executives to gain a better understanding of the need to pay for services on time to avoid accumulation of debts; executives are now in a better position to manage these debts, knowing the importance of avoiding accumulation of debts that can become insurmountable.

Governance Training

Each MPA has different governance issues; over time, some governance issues have led to the malfunction of particular MCCs and the dissatisfaction of members. Some MPA members had opted to leave dairy prior to the USAID intervention, not because of decreased milk production, but rather because of the lack of transparency demonstrated in the running of the centres. Previously, the role of committee members was not well understood by the rest of the MPA members, and thus the committees were not accountable to their members. Now, governance training sessions continue to be carried out by the MPAs to minimize this malfunction. The governance trainings defined governance as the activities undertaken by the executive committee or other committees on behalf of the general members, as well as the relationship between the general members, the executive committee and the business of the association. The introduction of sub committees in the running of MPA activities raises governance issues, which needed to be addressed so that the MPA members understand the existence of these committees and the committees also understand their roles. The executive committee members and sub-committee (such as cattle bank and marketing committee) members were taken through the governance and leadership training. 199 farmer representatives and committee members were trained to raise awareness about governance issues in preparation for MPA elections.

MPA members received training that covered topics such as *what makes leaders more effective in managing businesses* in order to better select elected officials. After governance trainings, MPA members were elected to new committees based on leadership qualities rather than popularity. With the aid of the financial management trainings, product costing and budgeting, and ABS reports analysis, committees are now able to report back to membership on MCC financial management. This has served to promote accountability of the committee to membership and increase transparency in the running of the centre.

The governance trainings were carried out in two phases. The first phase looked at the current status of governance and leadership within the association and how the committee members viewed the status quo. The second phase looked at best practices in governance and leadership within the associations from the views of the committee members, whilst the Land O'Lakes officer provided clarification, correct position and technical backstopping skills on the subject.

Through the use of the constitution, members have been able to deduce the hierarchal structure of governance of the cooperative. The farmers are the supreme decision making board. The executive committee is the next level of command, after the general members, who are elected and

mandated by these general members. The executive committee has an oversight role over the Milk Collection Centre business and all the business activities of the association. Also under the executive committee are the marketing sub-committee, cattle bank sub-committee and the finance sub-committee, in which case some members of these subcommittees are executive committee members, who facilitate reporting and enhance feedback and synergy between these subcommittees and the executive committee.

All the 18 MPAs that were under the project had functional executive committees.

Strategic Planning Process

Strategic planning sessions were comprised of a participatory and highly interactive process, which required some level of simplification. Farmers were taken through the nature, purpose, and process of strategic planning. The outcome was a strategic planning document for the respective associations. Due to the holistic approach of the strategic planning exercise, the process offered opportunities to address immediate challenges being faced by the associations as well as opportunities that should be taken advantage of.

As part of the strategic planning process, MCCs were taken through a visioning process to enable them to picture where they would like to be five years in the future. Their organizational mission statement outlines the reason for being in businesses, and it provides some understanding of how the business will be operated. This visioning was then broken down to develop annual goals as well as detailed implementation, production, marketing, human resource, and financial plans.

Strategic planning introduced MCC staff to a systematic way of planning. Documentation of the strategic plans occurred at the MCC level, while the action plans were developed at both farm and MCC level.

Common focus areas for the year included a farm level increase in milk production through improved management techniques and an MCC level increase in milk deliveries through increased membership base, improved financial management, and improved governance.

Strategic Planning Results and Next Steps

Using the information generated from discussion with farmers, a strategic planning document for each MCC was finalized with the collaboration of Land O'Lakes and MCC staff. Reviews and feedback on each plan take place on a quarterly basis. The plan is not shelved; rather, it is constantly reviewed and adjusted to best meet the current needs of the particular MCC.

Activity 1.3: Provide Training and Technical Assistance in Dairy Production to Small-holder Dairy Farmer Members of MPAs

Dairy production and management training helped the farmers to improve their husbandry management techniques. The farmers who had not been involved in dairy for some time as well as the new entrants into dairy received introductory basic management trainings. To best ensure that the farmers stayed interested in the dairy training modules, training gaps were identified using the on-farm checklist and the farm diagnostic tool in order to address the relevant challenges faced by the farmers. These on-farm assessments also assessed the progress of management technique adoption for those farmers that had received training. Land O'Lakes and ZADF staff concentrated on participatory training approaches and on-farm training sessions. It was noted that farmers learned better when they experienced the application of techniques that they were trained on.

1,258 farmers were trained over the course of the project in the following topics:

Animal Health

Dairy feed is one of the major drivers of milk production. Smallholder dairy farmers continued to face challenges in the dry season with animal nutrition. The project promoted home grown feed, on farm feed formulation and per capita budgeting.

Improved dairy herd health is exhibited by lower mortality rates and better preventative health techniques. Adoption of good animal health practices resulted in cow mortalities below 20% per annum. Animals suffering from tick infestation were below 5% of the dairy herd, signifying that the farmers dipped their cows regularly. Mastitis continued to be a concern over the course of the project, especially in the rainy season with 50% of the households reporting that the disease affected their herds. However, milk tests in seven centres that deliver milk to processors indicated that the milk had gotten to "A" grade and the Somatic cell count was very low. This signifies a healthy dairy herd and strict measures at the MCC level in only accepting good quality milk.

Dairy Nutrition

The nutrition of the dairy cow has been singled out as one of the husbandry aspects for which farmers lacked knowledge. Training ensured that farmers adopted proper feeding and nutrition skills. Topics of the training included:

- Nutrients that a dairy cow needs: water, protein, vitamins and minerals
- Feed components and the nutrients they provide: hay roughage and energy, silage energy and roughage, legumes and bought protein concentrates
- Dry matter component of the feed (DM%): the part which contains the necessary energy, protein, vitamins and minerals
- The ruminant anatomy: the cows have one stomach with four chambers: the rumen, reticulum, omasum and the abomasum; the function of each were highlighted
- Dry matter intake should be 2-3% of body mass
- Standard management of a milking cow
- Feeding systems: conventional, budget feeding, totally mixed ration (TMR), in parlor feeding
- The four stages in lactation, their relation to feed intake, production and bodyweight gain.

This training addressed the link between milk production, feed and genetics. It was important that farmers understood that the feeding of the exotic breeds and traditional breeds differs because the genetic potential for the exotic breed is higher in milk production than the traditional breeds. Since eligibility to the cattle bank facility required that farmers conserve 300 bales of hay per one cow, farmers were eager to adopt this management practice. In areas like Hauna, farmers were encouraged to put in zero grazing units because of the high population density, which has left little or no grazing area in some places.

Breeding

The future of dairy in the small scale sector is hinged upon good breeding practices. In order to maintain and improve on the dairy genetics, the project emphasized reproduction through dairy bulls or AI. The cooperation of farmers in heat spotting is pertinent to a successful breeding program. Since the CBF distributed cross breeds, farmers had to be very careful to avoid breeding with indigenous cows as this would negatively affect the genetic composition of the offspring.

Training of successful breeding techniques was approached as part of good animal husbandry practices. Poor nutrition and health in dairy animals negatively affects the cycling of the animal, as if the cow fails to go into heat, then no reproduction can occur and hence there is no milk production if the cow is empty. This affects the farmers' cash flows in the long term because there is no income coming from the cow, yet maintenance is costly.

Replacement Rearing

Raising healthy replacement heifers takes time, commitment, skill and knowledge. The dairy economy has put a great deal of pressure on the cost of raising heifers. Since replacement heifers produce no daily income until they hit the milking age, viewing heifers purely as cost instead of an investment can set up the dairy enterprise for failure. The future productivity of the dairy herd depends on a supply of healthy and genetically superior replacements. The period from birth to weaning is a very important phase because the calf is more susceptible to many diseases, more sensitive to environmental stresses, and more responsive to management changes. Therefore, it was important to make sure that a calf management program was implemented by all farmers. The success of the cattle bank facility needed strong replacement rearing techniques. Most first time dairy farmers needed assistance in setting up calf structures and calf management training. The main areas of concern on calf rearing were: calves scouring, diarrhea, wet bedding, communal sharing of housing by calves, and no calf rearing facilities. To address these issues, the project carried out trainings and farm visits to train different methods of calf rearing, cleanliness, calf housing, immunization, the importance of feeding good quality hay, calf weighing, and routine management practices like dosing and dehorning.

Milk replacer trial demonstration

The ZDL project carried out trials to introduce milk replacers to small holder dairy farmers. Milk replacers are made from by-products of the milk manufacturing industry. Whey, the major protein source for milk replacers, is a by-product of cheese manufacturing and is usually much cheaper than other milk protein sources such as casein and skim milk. The use of high quality, lower cost ingredients makes milk replacer a more economic choice than whole milk. Biosecurity and disease prevention issues contribute greatly to the popularity and use of milk replacers. The results of the milk replacers in Hauna are illustrated below:

Land O'Lakes advised farmers to use milk replacers to feed calves instead of real milk. Amos Chitungo of Hauna Dairy was the first person in Honde Valley to take the initiative of using milk replacers. He fed three calves with the milk replacer and kept the calves in good condition. Each calf took 250g of milk replacer per day, which is the equivalent of 4 liters of actual milk for the first 1.5 months, and then 125g of milk replacer for another 1.5 months. The 250g of replacer costs $0.80. If the farmer was to give 4 liters of actual milk per day, it would cost him $2 ($0.50 per litre) per day.

Table 1: Saving through use of milk replacers

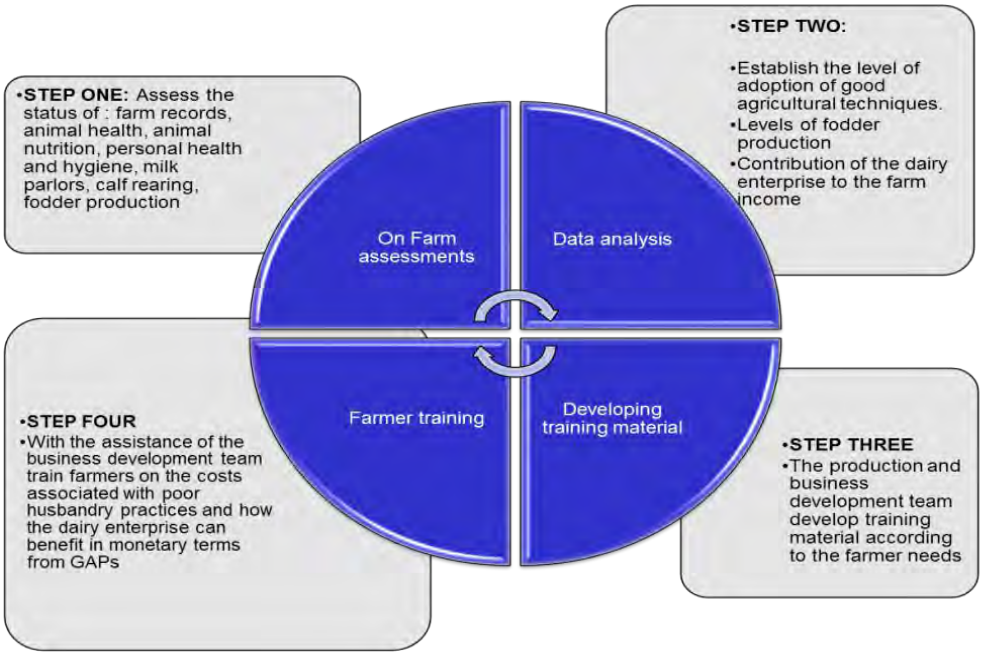
Cost of milk for the first 1.5 months US$/day	*Cost of milk replacer for the first 1.5 months US$/day @250 grams per day*	*Saving US$/day*	*Cost of milk for the last 1.5 months US$/day*	*Cost of milk replacer for the last 1.5 months US$/day@ 125 grams per day*	*Saving US$/day*
2	0.80	1.20	1	0.40	0.60

Using the calculations in the table above, this translates to a saving of US$81 per calf and $243 for his 3 calves for the 4 months that the calves feed on milk.

On-farm assessment of procedures, practices and infrastructure, as well as training & advisory using the diagnostic tool approach

Use of the On Farm Checklist and FEAST tool by the ZDL project

The ZDL production staff assessed on farm business processes, husbandry and feed availability, use the on farm checklist, diagnostic and feast tools. The tools enabled the project to go through a diagnostic stage where potential constraints and opportunities were identified. The technical team then worked to identify the best techniques and technologies to solve the issues coming out.



The graph above shows the steps taken in assessment procedures and implementing practices to address the results from the assessment. On farm assessments were followed by data analysis, training material and farmer training. After the farmers were trained, the next cycle was to determine adoption and other training needs.

Activity 1.4: Farm Business Management Training for Current and Potential Small-Holder Dairy Farmers

Over the life of the project, much emphasis was placed on budgeting and management of the dairy enterprise. In the last quarters of the project, farmers went through a process of assessing all the farm enterprises that were common in their areas. Several gross margins were calculated to show farmers how they could complement dairy activities with other farm enterprises. The comparisons of gross margins were also a way to show how dairy faired against other farm enterprises. This information served as an eye opener to the farmers to realize the enterprise mix that is suitable for their areas and also how far they could go in allocating resources towards dairy and other alternatives. 1,258 farmers were trained in whole farm enterprise budgeting over the life of the project.

Farmers increasingly realized the importance of record keeping as the dairy herds grew and they better understood the need for close monitoring, not just for the financials, but also for nutrition, health and breeding. On-farm record keeping was described as the capturing of all on farm data on dairy production, including but not limited to milk sales, milk production, feeding, animal health and breeding data. Wherever possible, the records attached monetary values to these activities, in order to ascertain the benefit vis-à-vis the cost of the dairy business otherwise. The output from this data included the gross margins; enterprise budget; and profit and loss and/or income statement for the business. Such information was important to inform farmers of the management of the farm - the planning and executing tasks in order to maximize profitability at the farm. 1,258 farmers were trained in on farm record keeping.

Activity 1.5: Rebuilding the National Herd - Dairy Restocking

ZDL sought to restock the Zimbabwean dairy herd with quality dairy animals. The dairy restocking exercise augments the efforts currently underway to increase the dairy herd through the breeding programs of AI and dairy bulls. It is faster to restock the small holder dairy with dairy cross breeds, which are easier for the farmers to manage, and work towards purifying the breeds through AI. Access to the dairy breeds locally has not been easy because the national dairy herd is already depleted; however, efforts to source good dairy breeds was a priority of the project. 1,258 farmers were trained on breeding practices and AI.

Cattle Bank Facility

Cattle Bank Committees are now involved in the follow up of CBF payments to ensure that the fund benefits all the farmers that are interested. The administrator and cattle bank committees monitored and tracked repayments on a monthly basis. There is still need to enforce the existing contract, as some farmers who benefited from the facility are no longer delivering milk to the MCC; to increase repayment rates, farmers should be regularly reminded of their commitments.

Land O'Lakes proposed the centralization of the CBF so that the centres no longer had to run the facility. Funds of the CBF are now pulled into one account and reputable service providers are linked to the farmers; this way, farmers have an expert to assess the cows before a purchase is made. Buying of cows with no records exposes farmers to the risk of buying poor performers. The CBF is the quickest way to increase the dairy herd among farmers, as most small holder farmers don't have access to loans from financial institutions.

Activity 1.5b – Cattle Bank Training & Awareness

Land O'Lakes provided training and awareness to the new and existing MPA members about the cattle bank purpose, requirements and functions. A CBF agreement form was developed between Land O'Lakes, ZADF, MPAs and the beneficiaries. This form was read to the farmers and advice was given to adhere to the agreement; arbitration is sought if farmers fail to fulfill the requirements.

Verification of farmers to benefit from the cattle bank facility was done prior to the delivery of CBF cattle. All beneficiaries were trained on how to care for their new animals, with an emphasis on dipping and feeding, as well as other measures to decrease the mortality rate. The farmers selected to receive cows had adequate feed and good handling facilities for the cows.

Micro King

To complement the existing cattle bank fund, Land O'Lakes engaged the services of IRD to work out a dairy financial product with a private Microfinance Institution (MFI). Micro King (Pvt) Limited was identified in the market as a suitable partner to work with to roll out this product. The Micro king facility was meant to benefit those farmers that had been groomed under the CBF and graduated to higher loans.

The product known in the market as "DairyFin" was launched with thirty six (36) in calf heifers worth USD56,160.00 being the initial investment of this fund. Land O'Lakes contributed half the investment and the other half came from MicroKing (Pvt) Ltd. Under the product, dairy farmers can get up to three animals and the loan is repayable over 24 months with an interest rate of 13% per annum.

Activity 1.6: Rebuilding Markets: Strengthening Service Providers and Input Suppliers along the Dairy Value Chain

The small holder dairy associations are linked to various input service providers in the dairy value chain. Below is a table illustrating the types of inputs and quantities purchased by the MPA. 1,279 MSMEs received business development services from the project.

MPA Name	Feed companies	Veterinary companies	Type of Drugs Purchased (Jan- March quarter)
Gokwe	National Foods, Agrifoods	Vet Distributors	Acaricides, Antibiotics, Anti-helminths,
Hamaruomba	National Foods, Agrifoods,	Vet Distributors, VETCO	Acaricides, Antibiotics, Anti-helminthes, Wound Oil
Claremont	National Foods, Agrifoods.	Vet Distributors, National Vet and Farm Supplies, National Tested Seeds, Centraline.	Acaricides, Antibiotics, Anti-helminthes.
Chikwaka	National Foods	Vet. Distributors	CMT and Teat Dip
Marirangwe	Ice Feeds	Fivet and Vet Distributors	CMT and Teat dip, antibiotics, anti-helminthic, vaccines

As the economy grows again, the service industry that supported the milk centres is beginning to function. However, the service industry has little idea of the size and scale of the smallholder

market. Land O'Lakes facilitated the engagement of several firms (Dairy Services, Semex, World Wide Sires, Agrifoods, and Ice Feeds) to look into receiving inputs from the smallholder sector. Land O'Lakes conducted a short course in marketing to facilitate promotion of a quality product, focusing on the marketing plan with emphasis on the placement, methods of promoting the product, packaging and pricing.

Considerable efforts were taken to build ZADF's capacity. The ZADF extension and member services wing reopened and was further developed to better target small holder members of the MPAs. A team of five professionals with various dairy production and business skills was assembled to better target MPA members and improve their profitability. ZADF was trained and mentored to plan, design, and send extension messages to this sector with considerable success.

The ZADF committee and management level efforts were made to improve the strategic planning process and also to improve communications and outreach to all sectors, especially areas where there can be considerable growth. After 12 months of effort, Land O'Lakes managed to facilitate the purchase of a generator for Rusitu United, an MCC in Chipinge, by the Dairiboard Zimbabwe Limited (DZL), an especially exciting accomplishment as DZL had previously been skeptical of small scale dairy projects. Three MCCs in Rusitu became DZL Chipinge's four largest producers, allowing the Sterimilk factory to remain open. The generator set improves milk quality and reduce losses due to erratic power supply. When this was done the milk farmer payout increased $0.25, to $0.43 per litre.

The Rusitu United MCC had previously viewed the MPA as a way of accessing donor funds. Through huge efforts of the ZDL field team, DZL, and Rusitu United, confidence was raised on all sides. DZL purchased the generator set, while Rusitu United raised 30% deposit of the cost and repaid the remaining 70% over 10 months. USAID and Land O'Lakes assisted with the logistics, wiring, and training in the use of the generator.

Activity 1.7: Develop a Workable Fee-Based System for Genetic Improvement to Small Holder Producers

The project placed emphasis on bull castration, identification of heat periods, and repair of the AI facilities, to better ensure success of the AI program. Previously when AI synchronization was implemented, farmers missed heat periods and this derailed the AI process. Heat spotting was identified as a gap in the breeding systems training, and this was addressed through refresher training modules. The implementation of zero grazing units also assisted in close monitoring of the cows and preventing the traditional bulls from servicing the cows. 1,258 farmers were trained on good breeding practices.

Activity 1.8: Strengthening Linkages through Improved Quality Standards between Smallholder Farmers and MCCs

Through increased training on the cost implications of poor quality milk, dairy farmers realized that good quality milk is not the responsibility of the MCC staff. Milk quality starts at the farms. The project emphasized construction of milk parlors, use of stainless steel cans and buckets and better hygiene for the milkers. The results of the trainings as reported by the milk processors' milk quality results were impressive. At the end of the project, 7 MCCs were delivering grade milk consistently at each delivery.

The project assisted the MCCs to lease bulk tanks from National Dairy Cooperative (NDC) and purchased 3,500 litre bulk tanks to assist MCCs in bulking and chilling the milk at the MCC sites. The bulk tanks were disposed to ZADF, who will continue to work with MCCs and NDC to ensure that they are being used and maintained by the farmers. Installation of back-up power at the MCCs in the form of generators was another major highlight of the project. Because of the power outages in the country, without back-up generators and bulk tanks, milk can easily go bad. Smallholders do not produce large enough volumes that can be delivered to processors on a daily basis, and hence, there is a need to bulk the milk for two days and then deliver to a processor. The existence of the back-up generators and bulk tanks means that it has become easier for the MCCs not only to maintain the cold chain but to send milk to the commercial processors.

To ensure that MCCs have a market for their milk, Land O'Lakes linked these MCCs to processors with higher capacity to purchase, pasteurize, package, and sell their production, as well as work with them in developing value added products. Land O'Lakes assisted milk producer groups and processors to negotiate supply and sales contracts and set up efficient delivery and collection schedules. In order for the farmers to deliver milk to these formal markets, milk quality had to be improved. Thus, the project focused on training hygienic milk handling, both on-farm and at the MCC. Milk samples were sent to laboratories for microbiological and chemical testing to ensure that the milk produced conforms to the pre-set standards.

Activity 1.8a: Demonstrations on clean milk production and platform tests

Clean milk production is one of the biggest barriers to entry into formal milk marketing. Clean milk production and platform training tests were emphasized because of the heavy losses that occur when farmers do not follow procedures and have to discard some of their milk supply.

At the MCCs, training targeted MCC staff who handled milk received from milk producers. They were taken through a practical training session, illustrating the process of sanitization and disinfecting. These procedures are critical; centres such as Hama Ruwomba lost up to 400 liters of milk in a month due to milk spoilage because of high bacteria counts. Considerable efforts were made to improve milk quality. The results of the trainings were evident in the laboratory test results for the milk. This is important for both the MPAs that were selling to the processors (10 of the 21), and those that were processing and selling to the public.

Milk quality is a major driver for competitiveness, allowing the milk to have a longer shelf life and quality in the eyes of the consumer. In addition, poor quality products that are not well preserved in the unreliable cold chain present public health risks.

At the farm level, mastitis presented the greatest challenge. It is difficult to completely get rid of mastitis because it can occur in a mild form, which is not easily detected. This subclinical mastitis is important to control so that it does not get to the clinical mastitis stage. Mastitis causes direct economic losses to farmers in several ways: Milk yields are reduced, milk that is abnormal or contaminated with antibiotics is unsellable, there are veterinary and antibiotic costs, there are higher culling rates, and there are occasional fatalities. If a centre or processor processes mastitic milk, heavy losses are incurred because of problems that result from antibiotics in the milk from the treated cow, and the reduced chemical and bacterial quality of mastitic milk.

Farmers that kept their livestock free from clinical mastitis reported that sound management of dairy cows kept infections away. Good general hygiene at milking, dipping or spraying teats of all cows in disinfectant after each milking, renewing cow bedding materials frequently (preferably

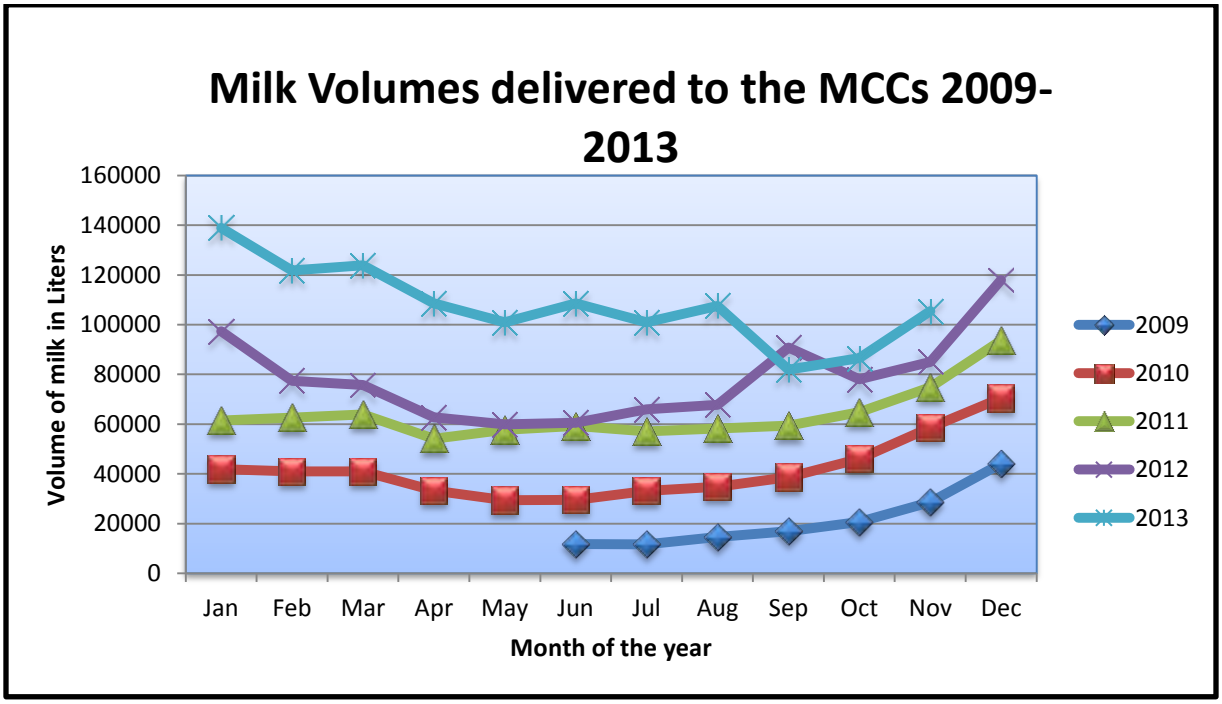
daily), not keeping cows in dirty paddocks, and good dry cow therapy lower the risk of mastitis infection. However, when clinical mastitis was detected at the farm, treatment with antibiotic under veterinary supervision was essential.

Farmers who used lower than the required doses of antibiotic treatment experienced recurring infections of mastitis and greater losses of milk income. Farmers were therefore encouraged to use the correct antibiotic doses when treating mastitis. Farmers realized that the California mastitis test paddle and the reagents for testing mastitis should not only be at the MCC, but also at the farm level.

By the end of the project, the training for milk quality was no longer just attended by farmers; milkers also were encouraged to attend the trainings, as they were the people most heavily involved in milk handling. Further, capacity was built within ZADF as to how to effectively treat mastitis and how to calculate the costs and benefits of the disease and its treatments; this not only quantifies the price of wasted milk, but it also illustrates the total reduction of milk yields.

Component One: Dairy Production, Collection, and Processing - Results

As discussed in the previous section, Component One focused on linking smallholder dairy farmers to markets. The following section outlines specific results achieved in relation to the project's Performance Monitoring Plan (PMP). Over the life of the project, farmers increased production, were linked to Milk Collection Centres and improved gross margins. MCCs increased the volume and value of milk collected from farmers, as well as the number of farmers delivering milk to the centres.



The graph above is an illustration of the milk volumes delivered to the MCCs since 2009. There is an upward trend similar to the national milk production trend in graph 1. Increased volumes delivered to the MCCs are not only a result of the improved herd genetics and dairy husbandry, but also an increase in the number of farmers delivering milk to the MCCs. However, in 2013 there was

a drastic decline in September because the farmers had not prepared enough fodder to last through the dry season. Over the life of the project, 681 farmers delivered milk to 21 MCCs. Even though the figure is below the targeted 1,200 farmers, it has been a great improvement from the 92 farmers that were delivering milk to 7 MCCs at baseline in 2010.

ZDL1: Total volume and value of milk produced per household per month (Liters/$)

The volume and value of milk produced per household per month measured 562.15 liters per month, more than the target of 300 liters by 87% because of the improved breeds of dairy cows distributed by the project and investments in artificial insemination (AI), which increased milk quantities. Adoption of improved dairy husbandry practices also assisted in improved milk production. The milk production per cross breed with improved management was high, ranging from 10 liters to up to 25 liters per cow per day in the best zero grazing systems.

The volumes of milk produced per household were higher than the volume of milk delivered to the milk collection centre, as some of the farmers do not deliver afternoon milk, and on Sunday some of the MCCs do not receive milk. The proportion of milk that does not reach the MCCs is estimated at about 40-60%, depending on the season. During the dry season, because of the milk deficit in the locality, more farm gate sales occur as farmers receive a higher price per liter.

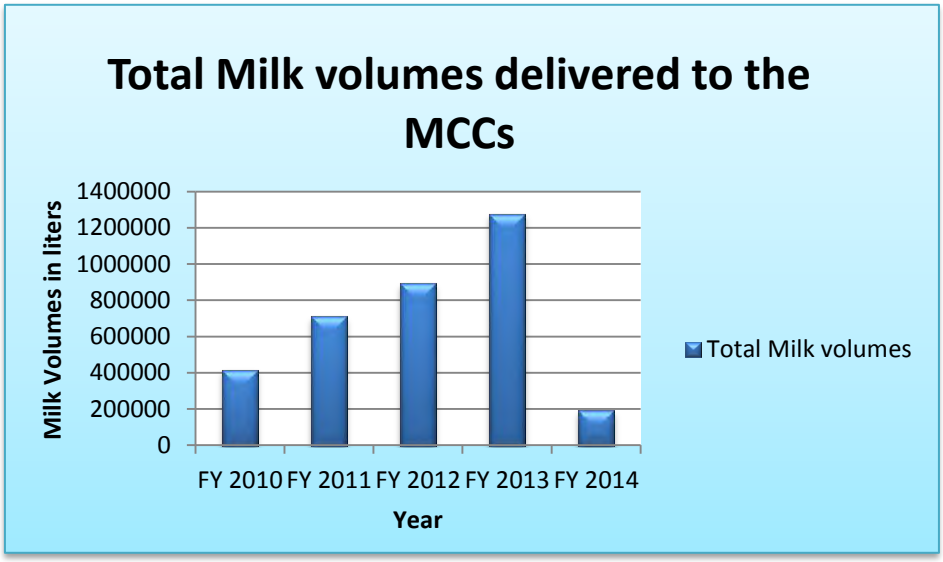
ZDL2: Number of households producing milk for collection by MCCs

681 households produced milk for collection by the MCCs. The number of farmers delivering milk to the MCC was 43% below target of 1,200, mainly due to several factors. The number of farmers delivering milk to MCCs is largely a factor of milk deficit in an area, MCC administration and transport. During the dry season, local farm gate sales are higher, with more than 60% of the milk not reaching the MCC because of local demand. Additionally, two MCCs failed to provide good centre administration and farmers stopped delivering milk, and this also negatively affected this indicator. Distance from the MCC was abated by donkeys and bicycles; however some farmers still failed to deliver milk. Even though the number of farmers delivering milk to the MCC was below the target it is was significantly higher than the 92 households delivering milk at baseline.

ZDL3: Volume and value of milk collected by MCCs (Liters/$)

The graph below shows the total milk volumes produced and collected by the MCCs. There is an upward trend in the total milk volumes.

Graph 2: Total milk volumes delivered to the MCCs



In FY'13 October 2012- September 2013, 1,276,059 liters valued at US$638,029.6 were delivered to the MCCs, which was a 43% increase over the 891,458.7 liters delivered during FY12. MCCs collected more milk by 60.7% over the target of 793,500 liters, mainly because of the increase of farmers delivering and the better milk productivity of the cross bred cows. More MCCs were also receiving milk, resulting in the high milk volumes passing through the MCCs.

ZDL4: Number of MCCs collecting milk from producers (#)
At the end of the project, 21 MCCs were collecting milk from producers against a target of 20.

ZDL5: Number of individuals receiving short term agricultural sector productivity training in rangeland management, fodder production and/or preventative animal health practices
1,258 farmers were trained in fodder flow planning, fodder production and conservation over the life of the project.

4.5(4): Gross margin per unit of land, kilogram, or animal of selected product (crops/animals selected vary by country)

<u>Dairy cow in Lactation</u>
The annual gross margin for a cow in lactation reached US$1,199 against a target of US$1,152, compared to a baseline of a baseline of US$26.70. The gross margin was higher than the target because the average milk production over the year was higher than the targeted milk volume. Although the farm costs were higher than the targeted costs, the gross margin was still higher. This signifies that in dairy, in order to produce more from a cow, higher costs have to be incurred.

4.5.2(7): Number of individuals who have received USG supported short-term agricultural sector productivity or food security training

1,258 farmer MPA members were trained in dairy husbandry, dairy business and fodder production. Additionally, 40 MCC centre staff was trained in financial management of the MCCs.

4.5.2(23): Value of incremental sales (collected at farm-level) attributed to FTF implementation

The value of incremental sales was as follows:

FY' 11-$513,429

FY'12 -$464,713 against a target of $326,571

FY'13 - US$1,552,452 in incremental sales against a target of US$1,473,429. Increased milk production at farm level resulted in high incremental sales.

4.5.2(37): Number of MSMEs, including farmers, receiving business development services from USG assisted sources

All the 21 MCCs/MPAs received business development services from the project as planned, including to 1,258 farmers who are members of the MCCs/MPAs. The target for this indicator was 1,220.

In total, 1,279 MSMEs received business development services in the form of farm business management and MCC financial management. The farm business management covered the dairy gross margins; whole farm enterprise budgeting; and per capita budgets for fodder production.

MCC financial management covered financial management, strategic planning and corporate governance training. The project also facilitated financial auditing of the MCC records by ZADF staff or through liaising with staff from the Agricultural Rural Development Authority (ARDA) Dairy Development Project.

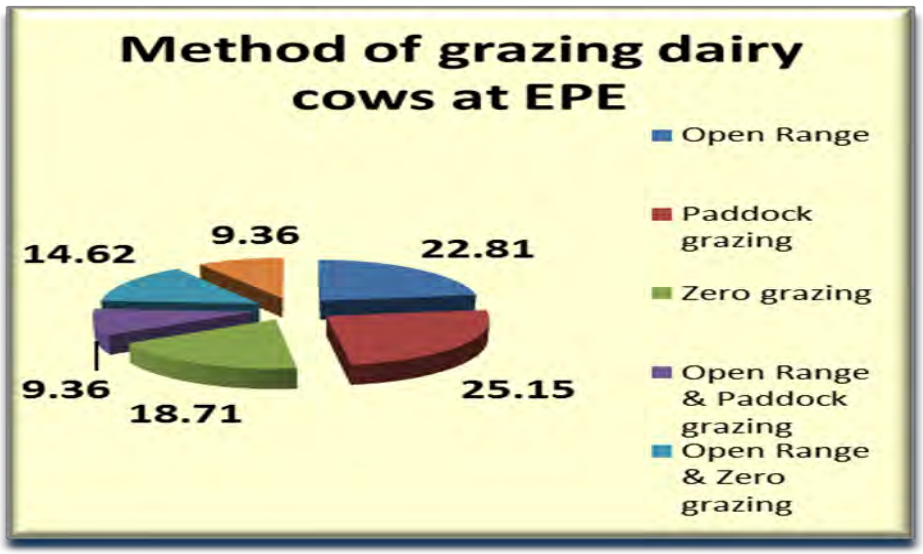
Component Two: Increased Capacity in Preventative Animal Health and Rangeland/Fodder Flow Management - Activities

ZLD focused on improving sustainable rangeland management practices through farmer training and extension service provision. Land O'Lakes encouraged farmers to grow their own fodder. This was expected to reduce the subsequent cost of producing milk. The following section presents an overview of Component Two activities in relation to the project's workplan.

Activity 2.1: Farmer Training

On-farm Fodder

The small scale dairy farmers have come a long way in terms of planning the dairy feed requirements throughout the year. In the communal areas, the landholding continues to limit the area under fodder production. The dry season has always posed a great challenge in terms of feed as the farmers fail to provide enough home-grown feed to last the season. A few areas, such as in Marirangwe, can access cheap silage and hay from the nearby Bara-Bara farm. The end of project evaluation (EPE) revealed the illustrated methods of grazing below:



The main crops grown for fodder were maize, velvet bean, sweet sorghum, and sun-hemp and Napier grass. The general set-up of the communal setting gave a limit to the area under improved technology. The average land holding in these areas was 4 hectares of land where the farmer grew food crops and was expected to grow fodder for livestock as well. The competition between food security and fodder production was a constraint to production of enough fodder per livestock unit. Fodder flow planning sessions focused on ensuring that the past feed deficiencies were corrected. Farm level plans were made, and emphasis was put on the establishment of fodder banks in the form of hay and silage. Farmers were advised to have at least 300 hay bales per cow, of which the cow will consume one bale per day. Most farmers also appreciated the bailing system of using a hay box or bailing pit, as it is cheaper and avoids wastage. The availability of a fodder bank at the farm likely translates to less fluctuation in milk volumes, meaning more income for the farmer.

In addition to hay, farmers were trained on the importance of silage making so as to have enough fodder throughout the year for constant milk volumes. Practical silage making processes were carried out on all the demo plots, and farmers were able to implement on their farms. Emphasis was also placed on making good silage, through proper harvesting and proper ensiling processes, in order to avoid spoilage by aerobic bacterial actions.

The importance of commercial feed was also highlighted, especially for the dairy breeds. Farmers were informed of research findings asserting that fodder can elevate milk levels to average volumes of around 5 liters. Further significant increment increases can be achieved through the use of commercial feeds such as the Dairy Meal (18% Crude Protein). Controlling input costs, especially feed costs, is the key to success on any dairy farm, and hence, the training on fodder flow was essential.

Demonstration Plots and Dairy Field Days

Field days played an important role in disseminating information on fodder conservation, especially silage making. The field day was an opportunity for farmers to learn by seeing the performance of recommended practices adopted by other local successful farmers. Farmers discussed the pros and cons of fodder production during the field day informally with their fellow farmers, extension workers and fodder production specialists, in addition to the Land O'Lakes field officers. This helped to convince even the most skeptical type of farmers on the pros and cons of fodder production and

conservation. The silage making field days allowed the farmers to witness and try for themselves the new innovative ways of silage making in their own farm setting, which is closer to the conditions that they experience on a day to day basis. NGOs, local governments and agriculture input companies were also invited to educate and train local farmers on a variety of farming best practices focused around silage making. In addition to fodder production and conservation, farmers were also trained on business, animal health and nutrition. On-farm events like these were the most effective way to reach farmers, and especially to reach women who are otherwise disadvantaged on access to information. Over the life of the project, 27 demonstration plots were supported by the project- 12 in the season 2011/2012 and 15 in the season 2012/2013.

Activity 2.2: Extension Service Provision

Over the life of the project, ZLD trained 60 Community Livestock Workers, against the target of 60. The work of the CLW became increasingly important over the implementation period, as the CLWs continued to be the first port of call for farmers facing challenges with their dairy herds. As the CLWs were trained in AI, breeding activities became part of their duties in addition to the preventative health activities. As a way of improving CLW activities, officers carried out refresher courses at the community level so that the CLWs could gain confidence and procedural experience to carry out different preventative health and AI activities.

The community livestock workers had an extensive course covering basic dairy cattle management and health. The training focused on:

- Common dairy breeds and their characteristics – methods of breeding and performance targets
- Dairy infrastructure- Housing, handling facilities
- Dairy nutrition and the role of good nutrition
- Record keeping
- Role of the dairy services in registering MCCs, issues of licenses for milk processing at MCCs, and inspections at MCCs and processing plants
- Livestock health

Component Two: Increased Capacity in Preventative Animal Health and Rangeland/Fodder Flow Management – Results

The following section outlines results under Component Two in line with the project's PMP.

4.5.2(2): Number of hectares under improved technologies or management practices as a result of USG assistance

1,663 hectares were placed under improved technologies and practices against a target of 1,700. The project focused heavily on encouraging farmers to grow fodder for the dairy cows to improve animal health and gross margins. On average, farmers planted between 0.7 and 2ha of fodder in the 2012/2013 agricultural season. In areas such as Rusitu and Hauna, farmers planted Napier and star grass and maintained contour ridges and terraces to curb soil erosion. Findings from the final evaluation in October 2013 indicate that farmers across different sites grew average of 0.9 ha of fodder. Highest average hectares of fodder plot figures per farmer were recorded in Gokwe (1.07 ha), Marirangwe (1.06 ha), Rusitu (1.21 ha) and Hamaruomba (1.33ha).

ZDL6: Number of community based volunteers receiving short-term agricultural sector productivity training as Community Livestock Auxiliaries (#)

60 CLWs (against a target of 60) were trained by the project to improve preventative health activities and AI. The presence of the CLWs for preventative health services will ensure that extension services for the farmers will remain in place even after the end of the project.

Component Three: Donkey Traction and Transport Study - Activities

As a third component of ZLD, Land O'Lakes piloted a donkey traction and transport study, to assess the viability of donkey introduction for milk delivery, on-farm traction and entrepreneurs, to provide smallholder farmers with a low-cost method of transportation, and to open the opportunity for smallholder transport businesses. The adoption varied greatly according to sites and farmer needs. Rusitu - [Goshen, Upper land, Mayfield, Mafumise and Paidamoyo], Gokwe, Chikwaka, Hama Ruwomba, Hauna and Sangano MCCs successfully use the donkey transportation model and the farmers realized that donkey transport was a cheap and reliable milk transportation means. Over the life of the project, gross margins for donkey milk transport measured $334 annually, compared to the baseline measurement of 0 and against the target of $833.

Activity 3.1: Development and Dissemination of Donkey Power Handbook

The Zimbabwe Donkey Traction and Transport Field Guide was developed by Zimbabwe's foremost expert on these animals. With over 30 years' experience within the region, the consultant came up with a field guide on these most undervalued of animals. The guide included sections on traction, transport and also business concepts and various business models. Many of the lessons learned were also captured, in particular the movement of milk in the mountainous eastern highlands.

Activity 3.2: Training and Technical Assistance for Donkey Owners

Farmers wishing to use donkeys faced many challenges, but a better understanding of the issues surrounding working donkeys helped farmers to meet these challenges. Good donkey husbandry– health, nutrition, breeding are essential components of donkey management. Training for the donkey handlers aimed to impart appropriate skills for training, handling and use of donkeys to provide draught power as well as realize economic benefits through the business approach to this project. Twenty farmers went for a two-week donkey traction and transport training in Mozambique, led by Tillers International. Ten additional farmers went for another week to do Artisan Training so that the group was able to make simple farm implements, harnesses, and start small to medium business enterprises. Tillers, with assistance from Land O'Lakes staff, conducted formal follow-up trainings on-farm to reinforce the Mozambique trainings so as to cater for specific individual farmer circumstances. As a way of ensuring that the farmers had a key resource for information on donkeys, the local Agricultural Extension Officer was also trained by Tillers in Mozambique.

In Manzununu, emphasis of donkey traction training emphasized furrow training, ploughing demonstrations and explanations of farm tools according to their parts and functions. The farmer's greatest interest in this discussion was the use of weeders and how to use and adapt a plough to be used of a weeder. Another way of follow up training carried out by the project was the donkey fairs aimed at dispelling the myths associated with donkeys by most dairy farmers. Donkey milk transport, donkey-driven tillage on timeliness of cultivation and use of donkeys in household chores were some of the uses explored at the donkey fairs.

By the end of the project 247 farmers had been trained on donkey management. 155 farmers were contracted for donkey traction and transport services.

Activity 3.3: Donkey Stocking

57 donkeys were purchased and distributed to 24 entrepreneurs in 9 MCCs (outlined below) under donkey transport. This is in addition to the 18 donkeys distributed in the first year to Manzununu Association for traction and commodity transport. When the project began, transport was identified as a major limitation to milk delivery to the MCCs. A cheaper way to transport milk was piloted in Rusitu, which is mountanous and difficult to navigate in motorised transport. This resulted in the pilot donkey study. However, the project areas did not have donkeys readily avaivalable and hence the need for donkey stocking.

Activity 3.4: Identifying and Supporting Key Service Providers

Donkey transportation model in Goshen-Rusitu, Hama Ruwomba, Gokwe, Chikwaka, Hauna
Five MCCs managed to use donkey milk transportation as compared to other centres. In the other Rusitu MCCs, the donkeys purchased were used for traction and household chores as shown in the table below.

Donkey transport by center

MPA	Number of Donkeys	Number Farmers Served by Donkeys	Volumes Transported
Goshen- Rusitu	11	22	20 liters per donkey per day
Mayfield- Rusitu	4	32	Donkeys used for household work and traction
Mafumise-Rusitu	7	24	
Upper lands- Rusitu	5	13	
Hama Ruwomba-Masvingo	2	10	45 liters per day
Gokwe	10	10	14 liters per donkey per day
Chikwaka	2	8	25 liters per donkey/day
Hauna	6	11	20 liters per donkey per day
Sangano	4	25	100 liters per day
Total	**47**	**155**	

The donkey model took a long time to succeed. The target of 200 farmers contracted to use donkey traction and transport was not met, and only 155 were using the donkeys for milk transport by the end of the project.

Component Three: Donkey Traction and Transport Study – Results

4.5(4): Gross margin per unit of land, kilogram, or animal of selected product (crops/animals selected vary by country)

Donkey in Milk transportation

The donkey gross margin was US$334, 60% below the target of US$833 due to the poor adoption of pilot donkey transportation model. Various trainings on donkey management and advantages of donkey use were carried out, but adoption of the practice was slow. There are several factors that affected the volumes of milk transported and the income that could be realized from donkey transportation.

1) A single donkey can only transport 40 liters of milk per day in 2 cans, provided the farmers in the locality can produce those volumes and deliver to the MCC. Milk volumes transported especially during the dry season were very low, as the average daily production is 16.6 liters.
2) There was also a high milk deficit, resulting in farmers selling milk locally at a higher price than they would receive at the MCC, and this negatively impacted the donkey gross margin. At US$0.05 per litre charged for transportation, farmers sometimes felt that this was too high and that it was more cost effective to deliver the milk on their own, especially if they were delivering low volumes of milk.

Entrepreneurs experienced varying success in their donkey enterprises. In Sangano the donkey entrepreneur was earning US$150 per month from milk transport, however, for some entrepreneurs transporting low volumes the gross margin was as low as US$40 per month.

ZDL7: Number of individuals receiving short term agricultural sector productivity training in donkey management and animal traction (#)

247 farmers received training in donkey management over the target of 200. Donkey fairs and local donkey management trainings were carried out to increase awareness of farmers to donkey management and transport.

ZDL8: Number of households contracted with trained service providers for land clearing, plowing and/or transportation (#)

155 farmers transported milk using donkeys against a target of 200. Farmers contracted for donkey transport were 22% below target largely due to the poor adoption of the donkey transport model. Donkey milk transport was popular in Rusitu, where the terrain is mountainous; however, in the flat lands where donkeys would travel in excess of 20km, the donkey model did not work, as they took longer than two hours to transport milk. The donkey model as a pilot project tested different methodologies and hence tried implementation in different areas and generated learning which was used in other areas. For example, in Wedza the donkey model was stopped in favor of bicycle transport and the donkey cart transport was implemented in three other centres.

Component 4: Goat Production Component - (2010-2011)

This component focused on linking vulnerable households to markets and providing technical assistance to improve their business skills to improve their livelihoods through planned marketing and production. These activities took place in Region IV, a very harsh agro ecological zone where the livelihoods are subject to periodic shocks from drought. The sites for this component were all in Manicaland, covering two sites in Makoni, two in Buhera and three in Mutare Districts. Component Four was not continued into the project extension phase, after 2011.

Background of the Goat Groups

Before the Land O'Lakes Project, the goat farmers were not organized in groups. The few groups that were in existence were in Mutare district, but these were informal groups that used to coordinate informal savings and lending. These farmers had received little/no business skill training and tended to be more production focused. The small ruminants had traditionally been viewed as a no/low input resource and a store of wealth to be sold only in case of emergency, not as a productive asset that may have a resultant value. There was no planned goat marketing and hence the price of goats was very low between $15 and $20 per animal. As a result, goat management

was very poor. Goat health was poor because there was no dipping of the goats, and drug purchases for goats were nonexistent. The farmers only used traditional medicines to control diseases, and some of the medicines were not effective. Goats were kept in the same housing as calves, and the shelter was prone to attack by predators such as hyenas.

The Land O'Lakes project initially set up farmer groups to work with in the goat project. These groups were according to the villages in the community. Initially, 66 groups were formed covering 1,939 households.

As the project progressed, farmers in Manzununu and Marange Ward 12 managed to form one group in each centre. The small village based groups were merged to form one apex committee in each of the two areas. Training was focused on all aspects of goat management so that farmers could better manage their goats and the goats that they received from the project. Goat business was an important aspect of the technical assistance from Land O'Lakes as the farmers had limited knowledge in this area.

Goat Production

Goat Health

Goat health trainings focused on preventative health care of the animals, especially strategic dipping, de-worming and how housing can assist in reducing mortality.

The farmer groups set up drug revolving funds for their livestock; this was not only limited to goat drugs but to all the other livestock. They gained an understanding that heart water, which was the main cause of goat death, was preventable and curable.

Goat Nutrition

Since the goats were seen as a low input resource, very limited effort was put into identifying and conserving supplementary feed for the goats. However, goats cannot solely rely on the rangeland for nutrition. During the dry season from July to October, the rangelands are depleted and alternative sources of feeding have to be sourced in order to maintain a good body condition of the livestock.

Most farmers let the goats scavenge for fodder in the fields and communal grazing lands. Trainings on animal nutrition imparted knowledge on processing and storing the crop residue and in the process adding value to the feed especially for the dry season. Farmers began providing supplementary feeding to natural pastures for the goats, which improved goat weight and ultimately price of the goat. 53% (48 farmers) of the households surveyed reported to have stored feed for the goats from a base line of none.

Farmers need to have a sense of responsibility for land utilization, especially in communal grazing lands. Rangeland management training was included in goat nutrition trainings so that the farmers could restrict grazing in the poor grazing lands and manage grazing areas to improve nutritive value of the grasses. This component was continued into Land O'Lakes' implemented ZRR project, which took over the goat component in 2012.

Goat Breeding

Good goat management requires that a farmer plans on the breed of goats that he wants to produce. This project supported meat goat rearing for the majority of the farmers, as well as a few

farmers raising dairy goats. Training on goat breeding focused on reproduction cycle of goats and how to take care of a pregnant doe from the time of conception to parturition and after birth of a kid.

Goat Housing

Although goats are very adaptive animals and do not require fancy or expensive housing, they need protection from the basic elements. When it rains, they seek shelter, and in the dry season, they need shady areas with adequate air circulation. Farmers were trained to use the material that is available in their locality to construct the goat housing structures at a lower cost. The 400 farmers that were targeted to receive goats from the project in the first line pass-on scheme had goat houses already constructed. In the survey carried out in March 2011, 86% (77 farmers) of the households reported to have constructed goat housing.

Goat Business

The goat business model sought to enhance and facilitate the building of strong Marketing/ Business Associations at an apex level representing the different clusters in the target areas. This association aimed to coordinate the marketing activities (Pricing, Promotion, Grading/Quality) ensuring that the farmers will get more value for their product.

Governance trainings focused on membership rights and responsibilities and committees' duties and responsibilities.

The business trainings assisted the farmers in realizing their potential in farm business. Trainings in record keeping led the farmers to update their on farm records and to track on farm performance

There was a changed perception of goat business. Goats were valued as a profitable asset and not randomly sold when there was an emergency need. Group formation not only improved relationships amongst the villagers but it has increased group bargaining power in the event that goat markets are identified. By the end of year 1 project implementation, 1,939 farmers had been trained in goat production and business, and 886 had adopted better management practices compared to zero at baseline.

Cross-cutting Themes

Environmental Mitigation

Environmental management and compliance mainstreaming was an important cross-cutting theme of the ZLD project. Land O'Lakes embedded environmental management in the technical training of the field officers as they trained the good dairy husbandry components. The ZDL project encouraged project beneficiaries to work toward sustainable management practices that reduce soil erosion, soil and water pollution as well as the proper storage, use and disposal of pesticides. Fodder production, animal health, AI and milk handling at MCCs were major activities that required environmental compliance. Farmer training emphasized the use of green manures in rotation to increase the humus and fertility and decrease the need for chemical fertilizers.

Agro forestry in the dairy enterprise was encouraged to slow down the shortage of trees and fire wood. In planning for fodder production, intercropping of grains and legumes for better ground cover and higher total production was emphasized.

During the dry season, fire outbreaks are very common and farmers were encouraged to clear land as fire guards not only to protect their property from fire but also to protect the grazing lands and paddocks.

Maintenance of contour ridges and terraces in Rusitu Valley and Honde Valley was encouraged to avoid soil erosion. Napier and star grass planted in furrows also assisted in curbing soil erosion, especially in the mountainous regions.

Lastly, the project also focused on enhancing practices to protect humans from adverse effects of chemicals. Farmers were reminded to adhere to the milk withdrawal periods when animals are under treatment, urged not to eat meat from animals which die from diseases and which will be under treatment and to properly store/protect AI drugs that are harmful to pregnant women. Farmers were also advised to use drugs according to their prescription and avoid using expired drugs.

Gender and Youth

Gender mainstreaming continued to take top priority over the life of ZLD. The proportion of women making a decision on the dairy income improved from 50.2% at mid-term to 60.3% by the end of the project. This signifies that the perception of the woman as an equal partner in the dairy business is improving. However, leadership in the MPA committees is still dominated by males who make up 69% of the leadership positions, and women take up the remaining 31%.

GNDR 2: Proportion of female participants in USG-assisted programs designed to increase access to productive economic resources

415 out of 1,258 participants in the project, or 33%, were female. This is against the target of 30% participation by women.

GNDR 4: Proportion of target population reporting increased agreement with the concept that males and females should have equal access to social, economic, and political opportunities.

Out of a sample of 295 households, 194 respondents, or 65.76%, were in increased agreement that males and women should have equal access to social, economic and political opportunities.

Next Steps

The following are considerations for future dairy interventions in Zimbabwe:

- Consolidation of the small farmer associations along the same milk routes into larger associations to capture economies of scale;
- Dairy nutrition to be supported by fodder seed multiplication and fodder production by individual farmers;
- Strengthen milk quality for better access of small holders into the formal markets;
- Scaling up of small group training for better information dissemination and follow up by practical training for better adoption of techniques;
- Improve information dissemination about current data on – markets, environment, and inputs through strong management information systems such as cellphones, leaflets, and internet;
- Strengthening of animal disease control - vaccination links with vet service providers, strengthen delivery of vet service provision through community livestock health;

- Strengthen dairy herd restocking through purchasing of dairy breeds to be distributed in the project areas;
- Improve the dairy genetic pool through AI and dairy bulls cross breeding with the indigenous cows;
- Improve the machining of small scale dairy equipment such as chopper grinders to support fodder production and conservation;
- Address the gender issues – identify the best channels to educate women so that they have better representation in the steering committees, equitable access to credit and use of the dairy income;
- Address environmental issues- Mitigation of environmental effects are key to sustainability – soil, waste and water management.

Challenges, Lessons Learned and Trends

The following section outlines challenges and lessons learned during project implementation.

Lack of credit: The dollarization of the economy managed to bring some level of order back into the economy and allowed a level of demand to build up for all of the commodities being worked on by this project. However, the lack of credit to recapitalize resulted in a slow response to this increased demand and in the case of dairy, now being supplied with imports.

- ZLD engaged Micro King to develop a new financial product for farmers to purchase quality dairy animals on loan. This was rolled out with the assistance of IRD and will be used as an innovative model for other projects outside of the Zimbabwe context.

Political situation and security: Uncertainty over the political stability affects business confidence at all levels. At times, this results in aiming for short-term gain rather than developing longer-term business relationships.

- **Rebuilding trust** between the farmers, milk bulking centres and the milk processors is a challenge, as many of the stakeholders still see the advantage in a short-term gain over developing a long-term relationship. This has to be broken down slowly by encouraging dialog and building trust.

- In a society that is so polarized, it is often difficult to ask and expect farmers to work together to solve common problems and market together.

Aid dependency: With the large amount of relief that has been given out, stakeholders at times do not understand the nature of an economic growth approach.

- **Managing expectations is critical**. With the use of a pro-business approach to the project, there was some misunderstanding within stakeholders that economic growth does not mean "hand-outs" of factors of production.

- **Lack of business mindset**: The milk bulking centres in the past were managed and run by outside organizations with a large amount of support. They had not been run or seen as a business nor had the farmers tended to have a sense of ownership. The task to change the attitude takes time.

- **Farmer contribution**: ZLD required farmer contribution to almost all activities and operates under a BDS methodology to build services such as AI. The project facilitated a

more enabling operating environment for farmers through strengthening service providers, value chain linkages, farmer groups and farmer capacity.

Project timeline: It was challenging to manage the conflicting short-term nature of the project and the long-term nature of attitude change and livestock. ZLD mitigated for this by building the capacity of partner organizations such as the Zimbabwe Association of Dairy Farmers to continue activities after ZLD close.

Donkeys for traction: There were challenges and successes in using donkeys to transport milk to MCCs. Success was greater in areas of rough or mountainous terrain and where farmers were a further distance from MCCs. A number of entrepreneurs were very successful in contracting donkey delivery services to neighboring farmers.

- **Donkey stigma**: The negative perceptions towards donkeys that they were of lower status had an effect on the uptake of their usefulness. This led to most farmers being unwilling or unable to use donkeys for primary cultivation of fields. Often, the donkey had been better used for secondary cultivation and weeding of the crops.
- ZLD created a **donkey field guide** as a tool for rolling out the donkey model.

Rangeland management: Community involvement is necessary! This is often difficult with generations of polarization between neighbors and communities.

Dairy industry constraints**:** At the end of the project, the milk processing industry was still operating so far below capacity that there was need for some restructuring, and farmers must be ready to adapt to this realignment within the industry. This requires a long term solution, and while ZLD could begin to forge linkages and create opportunities for farmers, this will only take the industry a small part of the way.

- **Volumes dilemma**: The breakeven point for Dairy Board of Zimbabwe to collect milk from the milk centres was at some centres more than many of the farmers were delivering. Increasing milk volumes is therefore essential. However, with some discussions, Dairiboard Zimbabwe Limited encouraged more milk supplies, by introducing a subsidy in milk collections and collected milk every alternate day so that the MCCs could bulk milk for 2 days.

Lack of suitable dairy animals: At the end of the project, quality dairy cattle were in a very limited supply, and the demand was high. ZLD was fortunate to have been able to source locally, which was a huge saving to the project, allowing ZLD to purchase the targeted number of animals. Had the project imported, Land O'Lakes could have secured far fewer cows within the budget.

- **Through Microking and the Cattle Bank Facility,** Land O'Lakes worked to address the cow shortage in a way that would be sustainable after project close. These schemes were both highlights of the project.
- **Land O'Lakes introduced the centralization of the CBF** so that the individual MCCs no longer had to run the facility. Funds of the CBF were pulled into one account and reputable service providers were linked to the farmers; this way, farmers could have an expert to assess the cows before a purchase is made. Buying of cows with no records exposes farmers to the risk of buying poor performers. The CBF is the best option for increasing the dairy

herd among farmers, as most small holder farmers do not have access to loans from financial institutions.

Milk quality: Milk quality and the appreciation of why milk quality is important takes time to convey. The local informal market continued to thrive.

Competing agriculture activities: On farm assessments pointed out those farmers in areas where there is high tobacco production (for example, Guruve and Dohwa), farmers focused their efforts more on tobacco production at the expense of dairy. Dairy took a secondary place in these farm enterprises, and hence, for dairy to be successful there is a need for the farmers to see these enterprises not as competing activities but as complementary ones.

Animal Health: Preventative animal health is highly important to reduce the mortality and morbidity of these highly sensitive animals. As 75% of most diseases are tick borne, tick control was a major focus, and identification of common tick borne disease symptoms is essential knowledge for the farmer. Farmers were also trained on standard vaccinations and a preventative disease control system, and then linked with local veterinary service providers.

- **Paravet restrictions:** The livestock disease prevention services are severely depleted and one solution could be the use of paravets to administer more of the privative and curative services. However, there are service legislative hurdles towards this.
- **Fodder challenges:** After planting fodder crops in the 2012/2013 season, the sites in the southern part of the country were affected by a mid-season rainfall deficit. This was a major drawback to the fodder flow plans, and most of the crops failed. Even the natural grass was very scarce due to erratic rains. Advice to farmers was to salvage the crop failure residues for feeding the animals, and most of the farmers have adopted this advice and are storing these residues on racks. Silage planning also failed due to drought. The project strategized on how nutritive value of the stover could be improved through urea treatment and addition of molasses.

*MCC capacity***:** There was lack of capacity in the business skills at the centre level, which at times cost the famers substantial amounts such as selling the milk on credit, then not being paid.

- There should be regular verifications of data provided by the MCCs. Sometimes the MCCs conceal their true financial position. Such verifications will result in improvements in the management and performance of the MCCs, as the actual challenges can then be addressed. The ABS reports help to address this, and farmers demanded more and more transparency.

Livestock insurance: All the farmers that purchased cows through the CBF were encouraged to insure their cows annually. Since the dairy cow purchased by the farmers was valued at $1,560, it is a very expensive asset, and if it dies then the farmer would lose the cow and the income that comes from the cow through milk production. The farmers that had insured their cows were reimbursed to purchase another cow if the cow died from causes other than poor management diseases.

*Gender considerations***:** At farmer and training level, the meetings and trainings were held in the mornings to allow female farmers to attend having completed the morning chores, with target to be completed before lunch. It was actively encouraged that two members of the household attend

to ensure the knowledge was captured and implemented within the household. Other gender-related findings include:

- Women attended training sessions more frequently than men
- Control over cattle challenged tradition
- Women were the most frequent adopters of improved husbandry
- 39% of beneficiaries of the cattle bank facility were female
- Overall decision making on the use of dairy income was shared by both the males and females
- In some centres, women set up Women in Dairy committees to advocate for increased women participation in dairy projects
- More women got into leadership, staff and extension roles

Partnerships

Zimbabwe Association of Dairy Farmers

ZADF was Land O'Lakes' main partner, and Land O'Lakes' role in assisting them became increasingly relevant as the need for better service for their members continued. The sub award to ZADF came to a close on October 31, 2013, and Land O'Lakes worked closely with ZADF on the handover of activities to best ensure project sustainability.

Highlights included:

Improving Financial Transparency at the Milk Collection Centers through the ABS: ZADF offered services in financial data analysis and production of financial reports so that the centres are run transparently and efficiently. With MCCs continuing to pay the ZADF levy, the ABS service will continue to run after the end of the project

Provision for grants and loans: This enables small scale entrepreneurs to start their own businesses. The donkey and bicycle milk transporters are able to access loans and grants from ZADF so that that they can kick start their business. ZADF has since purchased another load of cans and buckets to benefit the farmers

Extension Provision: ZADF received a 3 year grant from the Swedish Cooperative Center to carry out dairy project activities for their members in the small scale and large scale sectors. Through this grant ZADF will be able to continue with extension on provision strengthened by Land O'Lakes capacity building.

International Relief and Development (IRD)

IRD worked with Micro king to assist in identifying potential loan recipients for the Dairy Fin product. The grant has since come to an end with the end of the project

FINTRAC- ZIM-AIED

Zim – Aied is now working in the former ZDL MCCs in Chipinge, Gokwe and Claremont. Taking over from the ZDL project, their main focus will be strengthening fodder production and business linkages.

Africa Centre for Holistic Management (ACHM)

Land O'Lakes coordinated with ACHM during year one of the project to train six farmers and four Land O'Lakes staff members on holistic management. The lead farmers trained will train their

fellow association members in rangeland management. The trainings at ACHM covered the basic processes of land management that can benefit the soil, plants and animals so that they can all flourish without disadvantaging the others. Without proper management of the rangelands, livestock seek food for survival and can destroy the environment. Holistic management includes a grazing plan which aims at making sure that livestock (and wildlife) have adequate forage all year round, land health is improved, and the plants are given time for regrowth. Planning for the livestock feeds is the core of the training such that in all seasons, livestock moves are planned months ahead.

Tillers International

Tillers international trained farmers on donkey power and traction. Due to the scarcity of information on the capacity of donkeys to plough, extension agents have failed to address issues raised by smallholder farmers on the proper use and management of donkeys for ploughing. This gap was filled by training farmers on donkey management and artisans for machining simple farm equipment.

Zimbabwe Dairy Services and Ag Labs

Zimbabwe Dairy Services and the role of Ag Labs was a key partner in improving milk quality within the smallholder dairy sector and rolling out new milk quality systems. Zimbabwe Dairy Services are the statutory body that must inspect each MCC annually to allow them to operate safely. Ag Labs is a stakeholder owned laboratory that carries out the quality tests to ensure food safety and quality standards are maintained within the country. The work of the Dairy Services as a statutory body continued to be in existence even after the end of the project. The ZDL project enabled the MCCs and the farmers to be licensed through rigorous training on milk quality and the subsequent milk quality testing for the MCCs and individual farmer samples.

National Dairy Coop

The National Dairy Coop is a Zimbabwean organization that owns many bulk tanks and also provides transport for milk to the processors. They are critical in allowing farmers access to the market through the rental of bulk tanks and their servicing. The MCCs rent the bulk tanks from this organization and pay a monthly rental fee. If the bulk tank develops a fault or if the MCC needs to change their bulk tank, the National Dairy Coop fixes faults and can deliver a tank with the suitable capacity to the MCC. After the end of the project the NDC will continue leasing and servicing the MCC bulk tanks.

Zimbabwe Dairy Board Limited, Den Dairies, Kershelmar and Kefalos

The above mentioned large scale dairy processors have indicated the need for more raw milk, as they are running at well below capacity. The processors were at first a little hesitant to share any operating information, but with time, a level of trust has been developed. All the processors mentioned above are receiving milk from the small holder farmers, and the processors will continue collecting milk from the small holder farmers so long as farmers continue to meet the volumes and quality criteria as set by the processors.

Support services, including vet suppliers, Livestock Identification Trust, and feed manufacturers

These service providers are essential for allowing any intervention to be built for a longer period of time. Some have been open to new ideas, others less so. Across the board, however, the level of

service and customer care needs to improve. Land O'Lakes has been in discussion with several of the input suppliers and received support from the private sector input suppliers to support the adaptive research plots within the communities. The project established linkages with the service providers, such that the farmers can continue to use even these after the end of the project. Training encouraged farmers to see farming as a business, and set the environment for the farmers to be able to run their dairy enterprises as a business and continue accessing inputs. The MCC operations were not only to sell milk in bulk but to also encourage purchasing of inputs and bulk to cut transportation costs and benefit farmers from discounts of buying in bulk.

United States African Development Foundation (USADF)

Land O'Lakes held successful discussions with the local United States African Development Foundation (USADF) with indications that during the current fiscal year, the foundation will award a capacity building grant of USD90,000.00 to Mushagashe MCC.

Conclusion

Technical assistance has been the core of the Land O'Lakes project. The baseline survey uncovered the capacity gaps in farmer's technical skills. Trainings were aimed at addressing gaps and introducing new skills to the farmers. Skills adoption has also increased with 99% of the households reporting that they have adopted skills dairy management and business.

The ZDL project has had a great impact on smallholder milk production, with household milk production increasing from 50 liters per household per month to 562 liters per household per month. The fodder plots, which were emphasized by the project, complemented the nutritional component of dairy husbandry with a positive impact in dairy management by the small holder farmers. Training in financial and business management at the farm and the centre will see more small scale farmers becoming business minded and treating their dairy enterprises as businesses, and realizing higher profits. The business training had success and challenges as expected; but the focus on this area allowed the long term sustainability of the project. It is critical that MPAs become profitable if they are to allow farmers better access to markets. The business management systems introduced at farm level and the MCC have complemented the record keeping systems that were existent but major improvements in financial management have been reported. The strategic planning process that the associations were taken through has been quite an eye opener for the farmers such that they now have a roadmap of where they want their business to go.

Milk quality trainings at the centres and at farm level will ensure that the small scale farmers penetrate the formal sector and will continue to improve their operations and hygiene. Capacity building at ZADF made significant progress to better reach out to all members, improving the structure of the organization. The Fodder Field Days has helped to cement in the mind of dairy farmers that fodder is key to competitive dairy farming.

The distribution of dairy breeds to farmers who previously owned traditional breeds and some farmers who had no cattle has greatly boosted the farmers' assets and their dairy genetic pool.

Distribution of donkeys and bicycles for milk transport will see farmers delivering milk to the MCCs with less difficulty. The partnership between Land O'Lakes and Tillers International resulted in better dissemination of donkey traction awareness.

During the course of almost four years, Land O'Lakes rebuilt small-holder milk production and collection in strategic centers of past dairy production. The Land O'Lakes model of benchmarking

program interventions and using a market focused approach will allow the project to have a lasting impact across Zimbabwe. ZDL project activities complemented one another, and this resulted in compounding project success.

ANNEX I: FTFMIS Indicator Table (Attached as Excel document)

ANNEX II: Final Program Report

The Final Program Report was prepared for and presented at the final stakeholder closeout event at Chitungo Farm in November, 2013.

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FROM THE AMERICAN PEOPLE

LAND O'LAKES, INC.
INTERNATIONAL DEVELOPMENT

Building Livelihoods and Food Security in Zimbabwe through Dairy and Livestock

Changing Attitudes: From Subsistence to Sustainability

Executive Summary

Through a $5.797 million, three-year investment made possible by the American People through the United States Agency for International Development (USAID), 1,258 farming households are enjoying markedly improved food security and a 743% increase in annual dairy incomes by producing an estimated 3.6 million liters of milk worth $1,520,595 million.

Implemented by Land O'Lakes International Development, in partnership with the Zimbabwe Association of Dairy Farmers (ZADF), Tiller's International, International Relief & Development (IRD) and MicroKing, the Building Livelihoods and Food Security in Zimbabwe through Interventions in Dairy and Livestock Value Chains (ZDL) program linked smallholder dairy farmers to functioning milk markets; improved access to animal health and on-farm fodder production; and developed donkey traction in support of dairy production and market access.

Zimbabwe historically had a relatively robust dairy industry, filled with commercial farmers, and heavily subsidized smallholder farmers. But land reforms, economic woes and natural disaster devastated the country's dairy sector and its productive industry. Huge portions of the value chain were broken – which could only be fixed by changing mindsets and promoting the intrinsic value of competitiveness.

Conceptualized and implemented as an economic growth program for vulnerable yet viable farmers, ZDL was first launched as a pilot program in January 2010, and then extended into a full program through November 2013. Through the program, ZDL farmers have become more creditworthy, having repaid $283,734 to the revolving Cattle Bank facility, and for stock feed, veterinary drugs, and milking equipment. Meanwhile, USAID-supported Milk Collection Centers (MCCs) have increased production 417%, from an average of 21,000 liters per month in 2009 to more than 108,641 liters in June 2013.

This report seeks to capture the multitude of qualitative and quantitative results from the ZDL Program through the documentation of best practices and success stories. The material for this report was gathered from September – October, 2013, through first-hand interviews with a wide range of program stakeholders. Facts and figures were supplemented by the ZDL Final Evaluation and Quarterly Reports through September 2013.

This report is made possible by the support of the American People through the United States Agency for International Development (USAID). The contents of this report are the sole responsibility of Land O'Lakes International Development and do not necessarily reflect the views of USAID or the United States Government.

Closing Message from Chief of Party Spencer Ngoma

Firstly, I would like to give special thanks to the United States Agency for International Development, USAID, whose recognition of the great potential of the dairy sector has made this entire proejct possible. I would also like to thank David "Dai" Harvey, Land O'Lakes Regional Program Director for Southern Africa. He arrived midway through the implementation of the project's first phase, when we had not achieved even one of our indicators. Thanks to his leadership, six months after his arrival, the project turned the corner and achieved 90% of its targets. This enabled us ZDL to secure the needed financial support to continue the project until November 2013. I would also like to salute the good work put in by our Business Development Specialists, Louise Mugweni, Tandiwe Maringanise and Joseph Matiza; the Livestock and Dairy extension team led by Shepard Mazana and supported by Partson Mazivanhanga, Givemore Chiambiro and Godknows Masunda. Kudos go out to the Monitoring and Evaluation team of Cathrine Mashayamombe and Ozias Mombo; accounting staff made up of Colinie Zhuwao and Memory Chavunduka; and, last but not least, our dedicated logistical and administrative support staff Itai Magiri, Moses Chavhunduka, Marshall Chitsamatanga, Fulgansio Muguse, Phillis Rimbi and James Gurupira. As Chief of Party, I would be remiss if I didn't thank all of ZDL's farmer clients, as well as our partner organizations ZADF, Tiller's International, International Relief and Development and MicroKing. Importantly, I would also like to give my wholehearted thanks for the tremendous support given by Land O'Lakes staff members based in Kenya and in our U.S. Headquarters. We all worked as a team to deliver and I look forward to us working together again before long to achieve desired results. My prayer is that we will be able to find another opportunity to continue resuscitating the small-scale dairy sector and improving lives in Zimbabwe very soon. Thank you, Ndatenda, Siyabonga.

Background

Zimbabwe once had a thriving dairy and livestock industry, led predominantly by large commercial farmers and, to a lesser extent, small-scale farmers incentivized into dairying through a government-led poverty alleviation effort. At the sector's height, in 1990, Zimbabwe was producing up to 260 million liters of milk annually, and was exporting it across Southern Africa. However, a confluence of complex political, economic and environmental factors caused a precipitous decline starting in the late 1990s, with the dairy sector reaching its nadir from 2008-2009.

At that time, the dairy sector and its productive infrastructure were devastated by massive hyperinflation. For small-scale farmers, the impact of the economic crisis was compounded by cyclical droughts and erratic rainfall; the death of their livestock from an inability to access feed, veterinary care and breeding services; and the collapse of the Milk Collection Centers (MCCs) and processing plants that had once provided them with a guaranteed market for their milk at fixed prices.

Annual milk volumes plummeted to less than 35 million liters by 2009, with the industry as a whole operating at below 8.4 percent of installed capacity. Today, in late 2013, Zimbabwe imports more than 60 million liters of milk annually.

Many of the nation's smallholder farmers first started dairying at the invitation of the Zimbabwean government, which saw the sector as a means for reducing poverty, raising farm incomes, and improving nutrition and employment in rural areas. Farmers were linked to MCCs, and inputs, services and transport were often subsidized and administered by the government. While many farmers initially saw far more profits from dairying year-round than they had ever experienced farming seasonal staple crops such as maize, the schemes were not financially viable without external support.

As a result of hyperinflation, all of the government's 35 established MCCs stopped functioning, as the subsidies could no longer be paid while financial markets were imploding. In 2009, seven MCCs reopened and many farmers received improved breed cows through the EU Stabex fund, administered by ZADF. However, this program was heavily focused on milk production, rather than linking with consumer markets and strengthening the financial management of MCCs; consequently, the program did not have resources to rebuild the entire value chain. But with support from the American People through the US Agency for International Development (USAID), Land O'Lakes International Development was able to create the enabling business environment throughout the dairy sector, and market linkages needed to transition families from being donor-dependent subsistence farmers to business partners, who were determined to engage in dairy farming as a business.

Lessons Learned ZDL Nov 15.indd 2 11/15/2013 10:36:45 AM

Program Overview

In this context, USAID partnered with Land O'Lakes to implement the Building Livelihoods and Food Security in Zimbabwe through Interventions in the Dairy and Livestock Value Chains (ZDL) Program. The program was conceptualized and implemented as an economic growth program for vulnerable yet viable farmers, beginning as a one-year pilot in January 2010. This then grew into a formal program during several program extension periods, which culminated in November 2013.

Due to the history of subsidized dairy farming in Zimbabwe, it took time for some farmers to adjust to a market-driven program that treated them as business partners, rather than as charitable beneficiaries of donor funding. Clients were required to invest their own time and resources into extensive training and farm-level preparations before being considered for the Cattle Bank loans that would enable them to purchase (rather than being given) improved breed heifers. Moreover, milk prices were no longer fixed, and MCCs were trained to adopt a cost of production model. Farmers learned that if they didn't improve the quality of their milk on-farm, they might be fined or have their milk rejected altogether, while those who produced the best quality milk were incentivized by premium bonuses from processors. Although this market-driven approach was a hard pill for some to swallow, most participating farmers ultimately asserted that they took better care of their animals, and truly learned how to move from subsistence farming to farming as a business, as a result of ZDL's approaches.

With the ultimate aim of building farmers' livelihoods and promoting food security through interventions in the livestock and dairy value chains, ZDL's components included:

- **Component 1: Dairy Production, Collection and Processing** – linking smallholder dairy farmers to milk markets.
- **Component 2: Increased Capacity in Preventive Animal Health and Rangeland Management** – improving access to animal health and on-farm fodder production.
- **Component 3: Donkey Transport Pilot Project** – to develop donkey traction in support of dairy production and market access.
- **Component 4 Goat production and marketing for vulnerable groups** – this component, focused on goat production in particularly arid areas where the conditions were not ripe for maintaining dairy cattle, was only part of the pilot effort. When the program was extended, ZDL honed in to focus specifically on expanding dairy development as a viable means for growing incomes for smallholder farmers. Meanwhile, goat production was continued under a separate program implemented by Land O'Lakes, the Zimbabwe Livestock for Accelerated Recovery and Resilience (ZRR) program, which is being funded through USAID's Office of Foreign Disaster Assistance through May 2014.

Through the $5.8 million, three-year program, **ZDL effectively rebuilt smallholder milk production and collection for 1,258 farming households in Zimbabwe** and 6,000 indirect beneficiaries nationwide, in areas where dairy production formerly thrived. ZDL also helped to markedly increase incomes and food security for vulnerable households through the restoration of profitable dairy businesses and the stimulation of market linkages across the dairy value chain. Through the program, smallholder farmers' annual **incomes from milk sales have already increased 743% from an average of $312 to $2,943,** and they have delivered 3,041,191 liters of milk to the MCCs over a 3-year period, valued at $1,520,595.

The project ultimately focused on increasing the competitiveness of smallholder dairy farmers as real players in the formal market. This required increasing their milk production, milk quality and marketing efforts, to capture bulk sales and quality premiums at MCCs; rebuilding and improving their dairy herds by providing targeted financial products that enabled the growth of small scale farming businesses; and introducing donkey traction and transport, as an innovative solution to key farming challenges.

Zimbabweans demand about 8 million liters of milk each month. The country currently produces about 4.5 million liters a month (4 million from the formal market and 500,000 from the informal market), while imports fulfill the balance. As Zimbabwe's dairy industry restructures in an economically challenging climate, smallholder producers will have increasingly important roles to play in meeting the nearly unlimited demand, which is currently supplied by imports. This is due to smallholders' relatively low production costs and the tremendous impact dairy has on poverty reduction and economic growth at the household level. Since 2010, **USAID-supported MCCs have increased production 417%, from 21,000 liters per month to more than 108,000 liters** in 2013, and now comprise two percent of national production.

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Program Implementers

Land O'Lakes, Inc. is a U.S.-based, farmer-owned food and agricultural cooperative, with annual sales of $14 billion. Operating as a division of the cooperative, since 1981 **Land O'Lakes International Development** has improved the quality of life for millions of people in 76 nations through more than 275 projects worldwide that are generating economic growth, improving health and nutrition, and alleviating poverty by facilitating market-driven business solutions.

Land O'Lakes had primary responsibility for the execution of all project activities, but closely collaborated with the Zimbabwe Association of Dairy Farmers (ZADF), Tiller's International, International Relief & Development (IRD) and MicroKing. These groups respectively focused on enhancing effective on-farm and MCC-level management and recordkeeping, innovating low-cost solutions for improved animal traction and transport, and scaling up appropriate financial services for the future.

One of the program's key partners was the **Zimbabwe Association of Dairy Farmers (ZADF)**. Known until recently as NADF, the group's aims and objectives are to promote, advance and develop the production of milk and dairy products in Zimbabwe and to protect the interests of all producers. Land O'Lakes worked with ZADF, which was implementing the EU-funded Stabex dairy development program up to 2009, to provide comprehensive business and financial management training to active stakeholders in the smallholder dairy industry. ZADF was a strong partner in reviving several Milk Producer Associations, rehabilitating the infrastructure of MCCs, and in boosting the national herd through revolving loans and advocacy efforts that would link more smallholder farmers with formal milk markets.

To facilitate milk delivery to collection centers and improve the efficiency of fodder production, Land O'Lakes partnered with **Tiller's International**, a nonprofit organization whose mission is to preserve, study, and exchange low-capital technologies that increase the productivity of rural communities. Focused on providing international trainings and consultations on the introduction or maximization of animal power, blacksmithing, woodworking, intensive pasturing and fodder, low-capital technologies, and more, they introduced donkey traction and transport to facilitate milk deliveries to MCCs by ZDL farmers. Tiller's International operates a learning center in Chimoio, Mozambique, as part of Land O'Lakes' USDA-funded Food for Progress Program there, and trained several ZDL farmers on their artisanal techniques for building animal traction and transport solutions.

International Relief and Development (IRD) – Their role was to identify a microfinance institution that would enable small-scale dairy farmers to have access to commercial credit. The objectives of IRD were:

- **Objective 1:** Set up of a fund called DairyFin in a financial institution
- **Objective 2:** Assist the financial institution to grow the active loan portfolio for the DairyFin fund
- **Objective 3:** Build the capacity of local partners to support longevity and depth of interventions

IRD identified MicroKing Finance (Private) Limited as the microfinance institution to work with the DairyFin product.

MicroKing Finance (Private) Limited is a registered Microfinance Institution that began operating in 2001, and which operates as a subsidiary of Afrasia Kingdom Zimbabwe Limited. MicroKing transacts and conducts business in Zimbabwe, and supports sustainable and commercially viable businesses in the informal sector through the provision of financial services and products that promote growth. MicroKing provides its clients with advisory and training services, working capital, and a range of loans, many targeted for the agricultural sector. ZDL farmers who have successfully paid back their Cattle Bank loans will be eligible to apply for a new MicroKing product called DairyFin. Providing they produce at least 200 liters of milk a month and pay the required deposit, qualifying ZDL farmers will be able borrow up to US $5,000 for three cows over 24 months.

Lessons Learned ZDL Nov 15.indd 4 11/15/2013 10:36:50 AM

Key Results Since 2010

- Household-level annual **incomes from milk sales increased 743%, from $312 to $2,943**.
- **3,041,191 liters of milk was tested, bulked and chilled at ZDL-supported MCCs**, valued at $1,520,595.
- Average household production **volumes increased 1,124%, from 50 to 562 liters a month**.
- The **gross margin gain for a cow in lactation increased 4,390%** from the baseline of $26.70 to $1,199.
- The Cattle Bank initially disbursed **$617,615 in loans so that farmers could access 414 animals. As a result of the 63% repayment rate to date of $283,734, an additional 150 cows were made available** through the revolving loan facility.
- An additional **$48,487 has been loaned to farmers to purchase hygienic cans and buckets**, as well as for donkey milk transport equipment, of which $24,756 has already been paid back.
- The volume of milk sold by project farmers increased 417%, **from 21K liters per month in 2009 to 108K liters in 2013, amounting to 2% of national production**.
- **Milk consumption increased 66.7%** in all project sites.
- **681 farmers in 21 MCCs are delivering milk to 5 processors (compared to 1 MCC in 2009), and 90% is Grade A Milk**, average monthly farmer payouts from MCCs have increased 75%.
- At least **932 new full-time jobs created**, with 74% of farmers hiring at least one on-farm employee.
- **Rehabilitated and strengthened 21 MCCs nationwide**, of which 15 will all be operating at or above break-even points by November 2013.
- Of the 247 households that received relevant training, **155 are using donkeys for land clearing, plowing and/or transportation**.
- Female Empowerment led to more balanced decision-making; **65.7% of couples decide together about reinvestments** using money from milk sales.

Lessons Learned ZDL Nov 15.indd 5 11/15/2013 10:36:58 AM

→ ZDL enhanced the bankability of farmers and reduced donor dependency. With the end goal of ensuring that farmers could build up their dairy herds at an affordable cost, clients of ZDL benefited from a Cattle Bank facility organized by Land O'Lakes, and stocked with US $617,615 as an initial investment (with US $283,734 repaid to date, which serves as a revolving fund). To qualify for a loan that would enable them to purchase an improved breed cow, farmers had to attend technical trainings, have a milking parlor, meet established milk quality levels, and pay a financial deposit of US $300. The terms of the loan provided an initial 3 month grace period, but then expected monthly payments of $60 for 21 months. The program is now linking more advanced farmers to the microfinance organization MicroKing, which will provide a product called DairyFin to those who produce at least 200 liters of milk a month with up to US $5,000 for three cows, repaying the funds over 24 months. Farmers who have not performed well with the Cattle Bank will not be recommended by MicroKing for the DairyFin product, but those that have successfully repaid their Cattle Bank loan and meet the other criteria will access all of MicroKing's products, beyond DairyFin.

→ ZDL's Emphasis on On-Farm Fodder Production Increased the Viability of Smallholder Businesses. Despite the arid climate and recurring droughts that would devastate their animals' health, ZDL farmers initially conserved zero fodder, and would only buy concentrates. To drive home the idea of competitiveness, the project established Fodder Plots, adapted from the Land O'Lakes, Inc. Answer Plot® by Winfield approach. In contrast to traditional demonstration plots, the Fodder Plots had a stronger focus on research and linkages to the private sector, so that farmers could see the different technologies they might choose from. The costs for each element at the Fodder Plots were broken down, and soil tests were performed to see the nutritional value each provided in terms of crude protein and energy. This enabled farmers to decide for themselves what they should plant and conserve. As fodder represents 60-85% of farm business costs, on-farm production is a key to profitability. We also taught farmers to understand their feed cost ratio to identify financial inefficiencies, and calculate their gross margin per hectare. As a result, they began farming as a business, and making targeted investments that maximized their limited resources, particularly with respect to growing their own fodder.

"I was greatly encouraged when Land O'Lakes appraached me not as a donor project, but as a business partner, providing me with access to dairy cattle through the Cattle Bank loan facility."

Amos Chitungo,
ZDL Client, Honde Valley

→ Premium bonus systems incentivized smallholders to improve milk quality and consistency. In the past, smallholders received a fixed price for their milk, regardless of quantity and quality. Meanwhile, processors generally held a perception that smallholders' milk was not of sufficient quality to put into the value chain. Through ZDL, Land O'Lakes introduced mastitis testing at the farm level, and platform tests at MCCs. Today, MCCs send their milk samples fortnightly for testing at the independent facility Aglabs. At the commercial processor level, all raw milk is subject to a quality premium scheme, which is based on total milk solids, total bacterial count and somatic cell count levels. Farmers were also provided with stainless steel milking materials, and taught hygienic milking practices. As a result, 90% of MCCs are now producing Grade A milk and are enjoying quality bonuses from processors. Processors that once paid an average of $0.40 per liter are now paying an average of US$0.50 per liter to farmers, because of these quality bonus premiums.

→ Public-Private Partnerships Incentivized Creative Problem-Solving. Given unreliable power supplies, milk's need for continuous chilling presented a challenge to many of the farmers and MCCs. One MCC that struggled to maintain adequate quality was Rusitu United. Land O'Lakes helped Rusitu United acquire an electrical generator on loan from their processor, by paying back the cost over six months through their milk checks. The project leveraged everyone's resources and gave the members a sense of ownership.

→ Recordkeeping played an important role in making farming more lucrative. In the past, the workflow of MCCs was not tracked, and there were many gaps that allowed for the misappropriation of money. But, now, the records of the MCCs are tight and clearly posted for all to see. As a key partner in ZDL, ZADF trained MCC personnel in recordkeeping and producing financial statements, so as to enable farmers to better manage their dairy businesses, while a team of 9 extension staff from ZADF and Land O'Lakes introduced the concept to people in rural areas. Although MCCs were perceived by many as social clubs before ZDL, MCCs are now being run as a businesses and linked to markets. Trainings on the Cost of Production method eliminated fixed pricing, and instead created a sensible method for determining and understanding the pricing of milk.

Lessons Learned ZDL Nov 15.indd 6 11/15/2013 10:36:58 AM

Changes in Attitude Were Keys to Success. In many ways, ZDL demanded paradigm changes for program participants along the value chain. Farmers needed to be convinced that they could trust their MCCs again, that there was value in growing and conserving fodder, and that it was worth investing in their own cattle. Meanwhile, the program helped change the attitudes of MPAs to think bigger than just processing locally, and to learn the value of being transparent with their members. And, processors previously treated the farmers in a somewhat patronizing manner, making them feel their milk was only good for local sale. However, once the project helped the processors realize that smallholders could help them meet their unlimited demand, it enabled the development of viable dairy value chain. Through ZDL, farmers were able to see that value should drive competitiveness; they started micro-processing only as much milk as they could sell locally, and instead sold their surplus milk to more established processors.

"I'm really taking this endeavor seriously now. I'm keeping detailed records, focusing on calf rearing, and making better quality silage. It's not like I didn't have the knowledge of how to be a farmer before. But I didn't necessarily know how to interpret and apply the knowledge without the practical training the program provided."

Washington Sagonda,
Vice Chairman, Tsonzo MCC

Improved Governance and Financial Management of MCCs Enabled Functional Dairy Value Chain. ZDL facilitated an evolution across Zimbabwe's MCCs. At the beginning of the program in 2010, nearly all the country's MCCs had collapsed from the hyperinflation crisis. ZDL started by engaging the MCCs in market analyses. Instead of just focusing on milk production, ZDL brought in specialists with skills in infrastructure, water, electricity and capital to resuscitate the MCCs, and then engaged in robust training efforts. By introducing the cost of production model, farmers learned the price was variable, and that they lost potential savings when prices were fixed. The MCCs now transparently post their costs on their walls, enabling farmers to see when there are allowances available. In addition, the MCCs pay a fee to ZADF for extension services and representation. In FY 2012, ZDL worked with 21 Milk Collection Centers to establish a comprehensive business and financial management system, rehabilitate infrastructure, and facilitate improved services to dairy farmers such as artificial insemination, veterinary services, agro inputs, and other services.

ZDL Helped Bridge the Gap between Knowledge and its On-Farm Application. One challenge that the program found was that there was a huge gap between knowledge and the application of that knowledge on the farms. The fodder plots proved to farmers that on-farm fodder production was at least three times cheaper than purchasing it, enhanced their competitiveness, and enabled them to take control of the things in their power. This costing model was unique and created a dynamic mind shift for farmers. In the past, fodder was not considered a formal crop, and farmers always prioritized feeding their families over their cows. However, the Cost of Production model showed them that if they grew maize and fed it to their animals, the value from their animals' increased production would enable them to buy all the grains their households desired, while having money left over for food that would comprise a more diverse diet. ZDL trained farmers on animal husbandry; milk quality; animal feed and fodder; building proper cattle sheds, milking parlors and calf pens; establishing water and feed troughs; preparing hay; and silage pits to get them through the dry season.

Donkeys Solved Some Traction and Transport Problems, but Uptake was Slow. Knowing that one of the greatest challenges for farmers was milk delivery to MCCs within two hours of milking, the program promoted the use of of donkeys for traction and transport. Although other donors had provided ZDL communities with motorcycles at one point, they broke within months, and the cost of fuel made trucks inefficient. The goal of the donkey component was to move milk and assist with farm traction in a cost-effective way. One challenge was community resistance due to the perceived low status of donkeys, and so MCCs were also given the option of using a bicycle instead. Before ZDL, farmers didn't view donkeys as an asset; however, by showing farmers they could earn a living with them, attitudes changed. In addition to being shared by individual farmers, some entrepreneurial youth outside of dairy farming began engaging in businesses transporting milk for others using donkeys.

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Transparent Governance in Tsonzo Eliminates Crisis of Confidence

A Doiribord employee tests Tsonzo's milk on-site before collection.

While the members of Tsonzo MCC struggled along with the rest of Zimbabwe during the 2008-2009 economic crisis, their history of poor governance and financial mismanagement was among their most difficult legacies when they first tried to restart though the USAID-funded ZDL program.

But, as they proudly take turns posing for pictures with their recently-awarded prize of Most Improved MCC, which was given to them by Land O'Lakes and ZADF at the East and Southern Africa Dairy Association (ESADA) conference in Harare, the MCC's new volunteer leadership believes they've finally turned a corner and have created a viable, sustainable business.

Tsonzo MCC started in 1986 with over 100 members, cumulatively owning 350 indigenous cows producing about 2,000 liters a day, which they delivered to Dairibord. As a result of the hyperinflation crisis in 2008, many farmers lost milking cows due to feed shortages and poor animal health. Membership at the MCC dropped by 36 percent and milk deliveries to the MCC dropped dramatically; as a result the MCC was operating at a loss.

"It was a very tough time, and the members who lost everything had no sources of livelihoods left. Some turned to growing staple crops like maize, or were looking for something they could sell," remembered Justice Maluzika, secretary of Tsonzo MCC. Some of their farmers were able to access stock feed, revolving funds and an in-calf dairy cow though the EU-funded Stabex program administered by ZADF, and the program also helped them clear their debt and establish a processing room. But, despite the Stabex support, their membership continued to erode.

When Land O'Lakes came to Tsonzo MCC in August 2010, the MCC was on the verge of collapse, collecting 20 liters of milk a day. Member Augustin Marenji explained, "There had been poor management of revolving funds from the old committee, and many farmers feared they might be treated unfairly again."

Land O'Lakes encouraged the group to improve their accounting procedures, and trained administrators on how to handle financial statements and recordkeeping, along with three Community Livestock Workers in animal health. The group was also trained in leadership and governance issues; they held new elections to elect the leadership, who are all volunteering their time out of dedication.

The association is still small, four new members recently joined the group and 32 farmers are members of the MPA, 19 of whom deliver milk to the MCC. The center currently produces between 150-200 liters every day, the bulk of which the processor Dairibord picks up directly from the MCC every other day.

"Some farmers were used to donors giving cows away, and so didn't look after their animals well, because they always considered it the donor's animal. But knowing it was theirs through a loan made them care more about their investment," explained Justice, adding, "Only those who learned to farm as a business understood the significance of it all. Especially compared to previous assistance, where there was no real agreement for farmers to pay for their cattle."

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Tsonzo members proudly pose with their award for most improved MCC.

Among the most important things the members of Tsonzo learned were about fodder management; ensuring they had a budget for silage and haymaking; and preparing silage before the rains.

"In the past, we only grew maize silage. But we learned about sugar graze, sun hemp, velvet beans and cowpeas from Land O'Lakes, which really helped us to improve our production," explained 27-year-old Washington Sagonda, Tsonzo's Vice Chair. "And this really worked to improve production. The farmers who ensiled saw great results, getting about 15 liters per day per cow even during the dry season, almost doubling their typical yields for that time of year."

One thing they're very proud of is the fact that they're producing Grade A milk, which translates to 46 cents per farmer. Dairibord pays 56 cents, but the rest is deducted for the MCC's operating expenses which includes ZADF monthly charges of $25. Members like Augustin Marenji say they appreciate how transparent the finances are now.

"The quality bonuses are motivating us and morale is high. We are so proud to have been named the most improved center!" beamed Augustin, who says his monthly dairy income has risen from $100 to $400 a month, by milking 3 cows that produce a total of 30 liters a day. "My family is really enjoying the extra money, because payment for school fees is much easier. I have more food for the family, and more money for maintaining my herd. But I also want to invest in building better shelters for my cows and saving money for a milking machine."

Now that Tzonso MCC is linked to Dairibord, Tsonzo's members say they are pleased to have a reliable market for their milk, which they are confident will last beyond the ZDL program. They are also working to build their relationship with the processor independently, and are in discussions with them to provide inputs on credit after the program ends.

Justice concluded, "For those of us who embraced the idea of being a business partner, this program has made a world of difference in how we see ourselves and our futures. Things were really rough before, but we feel we're well equipped to go on independently at this point."

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Leading the Next Generation in Dairy Farming Success

Washington Sagonda poses with his cow named Queen.

While most young adults dream of "making it" with an important job in the big city, 27-year-old Zimbabwean Washington Sagonda trusted his gut in the belief that real prosperity awaited if he courageously stayed on the farm.

Washington is the only one of his eight siblings to remain on the family farm in Manicaland Province's Tsonzo district, which their grandfather established nearly a half-century ago to grow maize for household consumption. Upon taking over management of the farm when Washington was a young boy, his father converted it from maize production into a piggery, an enterprise that continues to this day.

Like many of their neighbors, the Sagondas also kept some indigenous breed cows on their land and did small-scale dairying on the side, but their cattle died due to drought in 1986, the year that Washington was born. "Despite this setback, we continued dairying on a very small scale, and I increasingly fell in love with taking care of the cows and managing the dairy business as I grew up."

Ironically, it was at the height of the country's hyperinflation and economic turmoil in 2008 – when most rural farmers had no choice but to stop dairy farming for lack of a functional value chain – that Washington fully resolved to make dairy farming his life's work, and took over all management of dairy farming from his father.

"I had already majored in agriculture in college, and I didn't want to work for peanuts somewhere else. Although things were really tough in 2008, I just resolved to move forward independently, even as I watched my money depreciating," Washington reflected.

Not surprisingly, things started out rough, with two of Washington's four indigenous cows dying of disease. In 2009, he was able to access a cow through the EU-funded Stabex program implemented by ZADF, and a second cow who he calls Queen was born when he decided to artificially inseminate one of his local cows with an improved breed.

He joined the Tsonzo MCC shortly after USAID enabled Land O'Lakes to begin working in the district in 2010, and was ultimately elected to serve as the group's Vice Chairman when votes were held. "I'm volunteering my time at the MCC and haven't been paid since I started. I didn't have regular customers or milking chilling facilities, resulting in daily milk losses when I sold at the farm gate, and so I decided it was worth investing my own time to build up the MCC to ensure we could have a reliable market."

In May 2013, Washington bought another cow through the Land O'Lakes Cattle Bank facility, and just started paying off the $1,500 loan, for which he contributed a $360 down payment. He has also amassed a herd of 26 indigenous cows on his own at this point, but he plans on selling them soon so that he can exclusively focus on improved breeds going forward.

When Washington first started delivering milk to Tsonzo MCC, he was crestfallen to find it rejected by the MCC for poor quality. "Having a regular link to a processor incentivized change on my part, and now I'm now testing my milk on a daily basis. I used to use plastic cans, but I've changed to stainless steel, and I'm disinfecting all my tools on a regular basis." Washington's milk now meets the same Grade A milk quality standards as the rest of Tsonzo MCC, and they're getting bonus premiums from the processor as a result.

Given his passion for agriculture and college studies, Washington said, "It meant a lot to me when Land O'Lakes sent me for training in AI and to be a Community Livestock Worker, because I'm now able to put my knowledge into practice, performing AI in my community alongside extension workers from ZADF."

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He's already reaped the rewards of his new skills in AI, and has put the knowledge to use on his own farm. He has two heifers that have been born from AI services, in addition to two others born from the dairy bull he purchased. "At this point, my animals are producing 62 liters of milk a day, which translates into $800-$900 a month. I'm investing one-third directly into the fees that pay for my business, but I'm also helping my parents to pay for household expenses, my sisters' school fees, and to hire labor for the farm three days a month," he beamed.

Beyond strengthening his technical skills, Washington says that he's most grateful for how the program taught him to become a full-time dairy farmer and how to grow his herd. "I'm really taking this endeavor seriously now. I'm keeping detailed records, focusing on calf rearing, and making better quality silage. It's not like I didn't have the knowledge of how to be a farmer before. But I didn't necessarily know how to interpret and apply the knowledge without the practical training the program provided."

To fully utilize his farmland, Washington plans on growing his herd to between 12 and 15 cows. He thinks he'll reach his goal within just two years, when counting his existing heifers, those yet to be born, and his plans of purchasing at least two more cows in the next year through the Cattle Bank, or Microking's DairyFin product, for farmers who have established credit, like him.

Although he dreams of building his own family one day, Washington isn't in a huge rush. "I want to achieve my goals of growing my farm before I get married and start having kids."

Instead, he wants to spend time now working to attract more youths into dairy farming. He and other Tsonzo MCC members have done outreach to encourage more youths and women to join them. "People should be taught at an early age about the benefits of dairy farming, because it can really transform how you see yourself and the possibilities for the future."

Washington Sagonda and his mother.

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Moving Experiments from the Classroom to the Farm

Amos Chitungo shows off how nicely his crops are growing now that he uses cow dung as fertilizer.

Inquisitive by nature and an educator at heart, Amos Chitungo freely confesses that when he first learned about the USAID-funded Zimbabwe Dairy and Livestock (ZDL) program, "the only thing I had in place for a dairy farm was a real inclination to learn."

With training from Land O'Lakes, which is implementing the ZDL program, and his own online research about how to really maximize the resources and space on his farm, in only one year Mr. Chitungo has amassed a herd of 6 cows and 6 calves, including 4 heifers and 2 bulls, and is producing 70-80 liters of milk a day.

A former teacher who has been farming all of his life, Amos' home at the fertile base of Zimbabwe's Honde Valley, in Manicaland Province, is one of the few to be blessed with a constant stream of fresh water. He established a successful banana plantation on his land – the largest in his region, with 4,000-plants – and then tried farming beef cattle. "I had up to 30 beef cattle and tried to make that work for four years. But it just wasn't cost-effective or profitable on a small farm like his. I'd need between 50-70 beef cattle to earn real revenue, and it takes 5 years to build to a significant herd."

Not one to do things halfway, shortly after Amos was introduced to the benefits of dairy farming by Land O'Lakes extension workers, he joined the Honde Valley MCC, and

Amos meticulously prepared his cattle sheds with pipes that filter waste directly into a biogas tank.

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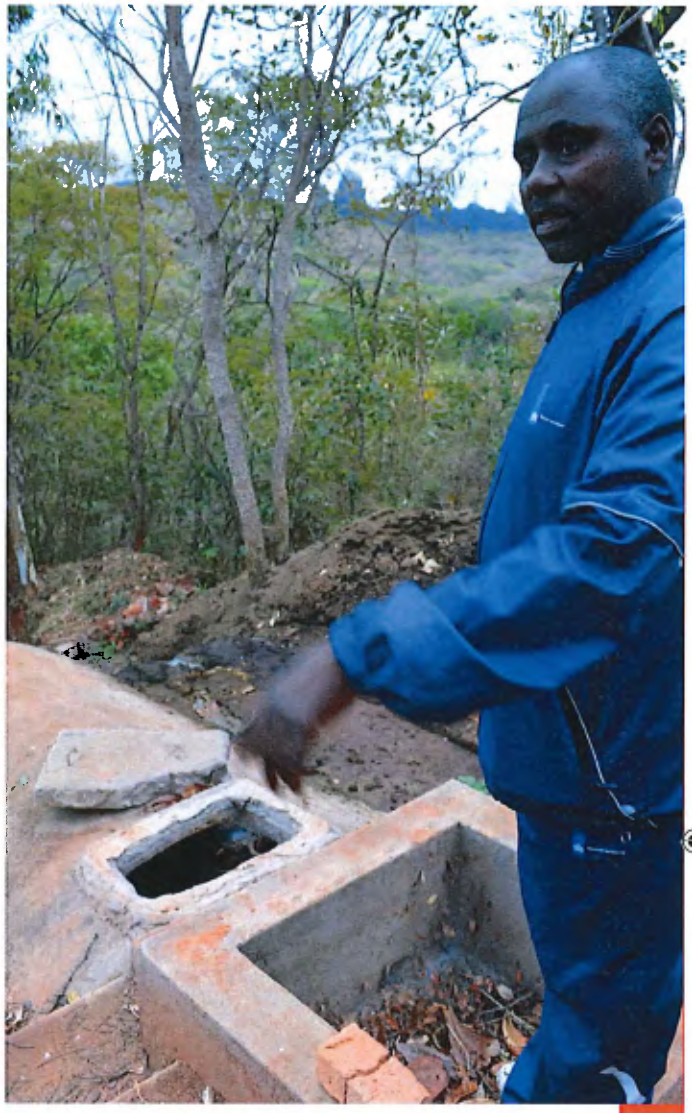
Amos powers his farm using biogas stored in this tank below his cattle sheds.



'took the bull by the horns' by selling all of his beef cattle and reinvesting it into dairy. He explained, "It was a leap of faith; a risk. But, I needed to risk things in a big way to have a meaningful success. Once you have a big investment to put towards an enterprise, you have a real chance of succeeding."

Amos quickly immersed himself in ZDL's trainings, which included attending courses and meetings covering the various technical and administrative aspects of running a dairy farm. He used the sales of his beef cattle to install the right infrastructure on his farm, including water and piping systems, and he built quality cattle pens set up with drainage systems that allow waste to be immediately sprayed directly into a biogas tank below, which he uses to power his farm. "By the time the cattle were here, it was just a question of moving from the theoretical to the practical. The program also enabled me to visit other ZDL clients in Rusitu, to see first-hand the gains local dairy farmers had made there."

Amos is excited about changing expectations of how much he could achieve on only 3 ½ hectares of land, more than half of which is reserved for the bananas. "Usually, there's a dearth of land and people want more and more, claiming that's requisite for success. By making myself the control experiment, I hope I'm inspiring others to know just how much you can achieve on a small-scale farm."

Rather than waste space, he now contracts other farmers to grow the maize he needs for fodder. He also designed a natural gravity-fed water system and is using the runoff water to try a small fish farming pilot, and is using the dung not used for biogas to fertilize his bananas. "I knew I wasn't the only farmer experiencing new challenges, such as what to do with all the animal waste, but that motivated me to find an environmentally friendly solution."

Amos recalled that one of his favorite things to do when he was a teacher was setting up scientific experiments that his students could test and carry out on their own. And so he recently reached out to the local university to set up an internship program for agriculture students on his farm. "I don't think I have all the answers, and I like what the students bring to me. They ask good questions that trigger new ideas and experiments," he explained.

He believes he's likely to reach his vision for milking up to 18 cows, utilizing 100 percent zero grazing feeding methods, within the next several years, and plans on expanding his herd through the Cattle Bank and the Microking DairyFin product. As his calves were all born through AI and are in great health, he's also considering starting his own breeding enterprise. He's also keen on exploring the viability of a home-based industry that focuses on value addition, perhaps using the banana powder from his farm to flavor homemade yogurt.

Amos is the first to acknowledge that anyone who wants to succeed has to understand what's involved in dairy farming and the many responsibilities it entails. But, he says the manner in which he was involved made all the difference when it came to his level of motivation.

"When I was approached, it was not as a donor project, but as a business partner. Knowing this was a loan facility made me feel that this was a truly sustainable approach, and that I was being treated as an equal."

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Stubbornly Pursuing Success with Innovative Solutions to Transport

Zakeo and Susanna Mutengu and their children pose with one of their cows (top) and prepare a donkey to transport their milk up the perilous road that separates their home from Rusitu United MCC (bottom).

Despite the idyllic environs of the four acres of land the government provided to Zakeo and Susanna Mutengu when they agreed to become dairy farmers affiliated with Rusitu United MCC in 1988, the couple found they had a nearly insurmountable problem: Their new home was separated from the MCC by an incredibly long, steep and treacherous unpaved road.

"I used to regularly have issues getting my milk up the road to the MCC. Life would just get in the way, and one thing or another would prevent me from making the harrowing journey," Zakeo explained.

With five sons and one daughter, and caring for his orphaned niece and nephew, Zakeo recalled that life was tough. "I was also growing maize, which I sold to local estates, but the earnings from that and part-time dairy weren't always enough to cover all of my children's school fees." There were times when he questioned his decision to move to the rural area, since he had originally quit his urban job at the regional water authority in the hopes of enjoying a more prosperous life.

But things took a positive turn for the Mutengus when the USAID-funded ZDL Program implemented by Land O'Lakes began providing support in Rusitu in 2010. Through the program, the couple was able to access transportation support using Donkey Traction, a component of ZDL supported through a partnership with Tiller's International.

Zakeo and four other Mayfield farmers now share the donkey to transport their milk, and take turns accompanying it on the journey to the MCC. The transporter earns 5 cents per liter of milk on the days he or she transports it up the hill with the donkey.

"It really alleviated my transportation problem, and I've never missed a day since delivering both my morning and evening milk," Zakeo proudly explained. He is currently milking 11 liters in the morning and 8 in the evening from 2 cows. He has two heifers, and also purchased an improved breed bull, due to difficulty accessing AI in his community.

Although the Mutengus still have several indigenous cattle, they're planning on selling them and reinvesting the profits into purchasing additional improved breeds. "I received one of my cows through the Cattle Bank facility, and found the loan so easy to repay that I've just applied for a Micro King loan today, to get up to three more cattle," Zakeo noted.

The ZDL program trained the Mutengus about the value of on-farm production of their feed and fodder, instead of purchasing it or relying on free grazing. They're now producing dairy meal, velvet beans, sun hemp and dry grass on their land as feed and fodder. Motivated by the Grade A quality premium payments Mayfield Farms has been able to secure from the processor, Dairibord, Zakeo also started testing for mastitis at the farm level, and religiously uses the hygienic stainless steel milk cans provided by the program.

With six paddocks of land and room to grow, Zakeo and Susanna dream of ultimately having about 50 dairy cows. "The sky's the limit, when it comes to growth, now that transport is no longer an issue," Zakeo smiled. "I'm now fully confident I can ensure all of my children complete schooling, and can even afford to hire outside help to work on my farm whenever I need it."

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Rusitu United, Profile of an MCC Determined to Thrive

Clever Mukomondero Mukango (left) and another member of Rusitu United show off their renovated MCC, which is now regularly powered with an electric generator.

After struggling to stay afloat for nearly three decades, the members of Rusitu United Milk Collection Center are finally making a comeback. They are beginning to see real economic improvements through dairy farming. But it's been a long struggle to get to this point.

Located in Zimbabwe's Manicaland Province, in a rural community outside the small city of Chipinge, Rusitu United was initially established by the government's rural development department in 1986. The 345 original members brought an average of four indigenous cattle to the scheme, and then the government provided them with four acres of land on which to farm. They were formed into the MCC, through which they accessed a range of subsidized inputs and services. In those early days, they had no chilling tank, and so the members carried the meager 87 liters of milk they collectively produced to the processing plant in Chipinge.

A few years later, through a Joint Venture between the government and a commercial farmer, they gained access to improved breeds and Artificial Insemination (AI) services, and increased their output to a whopping 9,000 liters a day, with each farmer having an average of 3 improved dairy cows and numerous indigenous cattle.

According to Board chair Mr. Clever Mukamondero Mukanga, times got tough due to a severe drought in 1992 that killed most of their livestock. It was at this point that the government handed management of the MCCs over to the farmers. As a means of helping them to restock their herds, from 1995-6, they secured loans from the Agricultural Finance Corporation to increase their herds. Until 2000, they were running their own business, and doing their best to regain their strength as a producer group.

In 2000, conditions started to decline again. Rusitu United couldn't access new livestock or veterinary drugs. Problems continued to worsen alongside Zimbabwe's overall economy. By 2008, as the value of everything precipitously decreased with hyperinflation, the farmers realized that the cost of transporting their milk to the processor was costing more money than what they earned from the sale of milk. At this point, Rusitu United completely collapsed.

"In those early years, we had a tremendously good life from being dairy farmers here, but those days had become a distant memory. I was forced to sell my surviving cows just to have enough to eat and pay school fees," Clever recalled. To add insult to injury, a large hailstorm also destroyed much of the MCC's infrastructure. Although they had a contract with Dairibord to pay off their milk bulking tanks, the machines were damaged and couldn't even be used to restart their business. Everything was lost.

And so Clever and almost everyone else at Rusitu United turned to agricultural labor, and resigned from the MCC, as dictated by government policy. "It was heartbreaking to have to see all of my efforts going down the drain, and to be forced into farming in the field. I couldn't earn anywhere near the same kind of money by farming maize as I had initially with dairy," Clever said.

But the sparks of hope were rekindled for Clever and other former members of Rusitu United when Land O'Lakes began the Zimbabwe Dairy and Livestock (ZDL) project, which was made possible by the American People through the United States Agency for International Development (USAID).

First, the MCC faced several hurdles to restart. Their milk bulking equipment had been vandalized, and the MCC was in arrears to the processor and the electric company ZESA, which now wanted repayment in US dollars. Another challenge was that Rusitu only had electricity three or four days per week, and faced losing all of their milk if it went without chilling for more than two hours.

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Through ZDL, Land O'Lakes brokered a public-private partnership with the processor Dairibord, whereby they provided Rusitu United with a generator valued at $12,000. USAID contributed $4,000 towards the total cost, and the remaining $8,000 has already been successfully repaid in full in $25 increments from each farmer per month, deducted from the MCC's milk sales to Dairibord. Land O'Lakes also helped Rusitu United renovate their MCC facility, which was a prerequisite for them to pass inspections.

So far, 22 of Rusitu United's members have chosen to make the business investment of increasing their herds with improved breed dairy cows through the ZDL Cattle Bank facility. This provided each farmer with the opportunity to get an improved breed dairy cow valued at US $1,000, which the farmers are now paying back through deductions from their dairy earnings from the processor. "Instead of being gun-shy about getting back into dairy after having lost everything, I was very excited for the opportunity to rebuild my herd," Clever said.

In addition to the Cattle Bank facility, they're also building their herds cost-effectively through the AI services that ZDL has restored to the cooperative, the purchase of some improved breed stud bulls, and the training it provided to four of Rusitu's Community Livestock Workers to become AI technicians. At a cost of only $10 per insemination, including $3 for the technician and $7 for the equipment, AI is providing Rusitu's 120 members, 40 of whom are active, with a viable and cost-effective way to build equity through more livestock over the long term. The 40 active members now have 44 indigenous cows, 22 improved breed cows, and 14 new calves, with more expected to be born in the coming months.

One final piece of assistance the group received was an ingenious solution to some members' confounding transport issues, as residents in the lower valley are separated from the processor by a precariously long and steep unpaved road, which was difficult to walk each day. The ZDL program introduced donkeys for traction and transport in these communities. Now six farmers at Rusitu United are known as Donkey Entrepreneurs, and use the animals to collectively transport the remote neighbors' milk up to the MCC.

"Land O'Lakes and USAID came to help us when we had nothing, and some of our members even have three cows now," said Clever. "While we still have challenges ahead to get back to the level of success we had in the early days, we're now doing it as a business and are completely invested in our success."

Several of the members of Rusitu United MCC

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Rusitu's Second MCC, Mayfield Farms, Exceeds Former Production Record

Mayfield Farms administrator Josephine Matizo double-checks the detailed records they now keep to show how high their milk production levels have become.

In a larger and sturdier building virtually next door to Rusitu United stands another MCC called Mayfield Farms, which split off on its own in 2001 following plethora of political and communal disputes among the members.

According to Mayfield's administrator Josephine Matiza, when the group split off, there were 215 members with 105 animals in production, producing 18,000 liters a month. But, as with nearly the entire dairy sector, Mayfield crumbled with the weight of the economic crisis by 2008. Only a handful of farmers brought their milk in or sold it at the farm gate level.

In 2010, they received assistance from the EU-funded Stabex program implemented by the Zimbabwe Association of Dairy Farmers (ZADF). This enabled them to access 15 improved breed cows through a financial instrument similar to the ZDL Cattle Bank loan. ZADF trained staff and farmers, got them a generator, and also helped renovate their MCC.

Building on this support, Land O'Lakes was able to leverage USAID resources and collaborate with ZADF through ZDL to resuscitate Mayfield Farms, through targeted trainings on topics such as growing fodder, animal care, haymaking, and the use of donkeys for traction and transport, while 28 farmers were able to access improved breed cows through the ZDL Cattle Bank.

Two of the farmers were also taught how to perform artificial insemination and procure the requisite equipment, while others went on a study tour to the Land O'Lakes USDA-funded Food for Progress Program in a nearby part of Mozambique to visit the workshop of Tiller's International, a partner in both programs that is dedicated to developing artisanal machinery and traction devices that are low cost, environmentally friendly, and meet the most critical needs of local communities.

"Improved breeding practices are growing exponentially as a result of the support we've received from USAID and Land O'Lakes," said Ms. Matiza, who reported that 19 cattle had been inseminated in 2011, 53 in 2012, and 43 by the end of September 2013. In addition, 43 of Mayfield's members have accessed the ZDL Cattle Bank loans, with 50 percent of recipients already fully repaid, following the 3 month grace period provided to them.

Now, Mayfield's 214 members have about 800 cattle, and are producing 16,000 liters of milk per month. With the imminent onset of the rainy season and higher volumes from a growing herd enjoying improved feed, she anticipates they will be bulking as many as 30,000 liters per month next season, which would be an all-time record high for their MCC.

"One of the most exciting and motivating factors for our farmers is that we've finally reached Grade A level," explained Ms. Matiza. "When the ZDL program started in 2010, our farmers' milk quality was very poor. But now people are really interested in treating their cows for mastitis and ensuring their milking methods are hygienic, so that they can access the quality bonuses that the processor offers."

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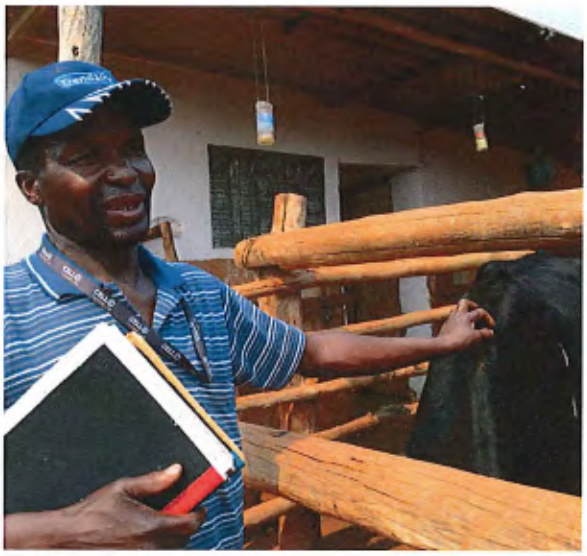
For Peter Manjoko, Dairy Farming Breeds both Heifers and Hope

Peter Monjoko describes how he hos used AI to improve his herd, os well os his neighbors' herds.



It's hard to find a dairy farmer as committed and gung-ho as 57-year-old Peter Manjoko, the chairman of Mayfield Farms MCC, but even his efforts were no match for the devastating weight of Zimbabwe's economic crisis from 2008-2009.

After completing a tour of duty in the Army and spending time as a tractor farmer, Peter Manjoko recalled that he and his wife Gladys jumped at the opportunity to move to this rural area and expand dairy farming.

The government scheme required that he bring four local breed heifers, and he started working with the other farmers at Mayfield/Rusitu United. Local bulls were castrated to protect the growing quality of their breed after the government established its AI program, and Peter took courses to expand his knowledge in the practices. He learned the advantages and disadvantages of using a local bull, and he subsequently began improving his own herd.

But from 2000-2005, Peter stopped delivering his milk through the MCC to Dairibord, because of the ZESA power outages, which greatly complicated efforts to maintain an effective cold chain, and the stoppage of the government's AI program. However, he continued producing milk and selling at the farm gate until 2008, when even his efforts at maintaining a dairy farm ground to a halt.

"It was so exciting when Land O'Lakes came to Rusitu in 2010 with AI kits that would enable us to reinvigorate our herds, since we understood this was the cheapest way to improve and grow our businesses," Peter explained.

He took refresher courses on AI, on how to grow animal fodder and expand his varieties of feed, fodder conservation through ensilage, record keeping, and other courses. While many of these were refresher courses for Peter, he says, "They made a world of difference for most of our farmers. What was most helpful for me were the trainings I received on pregnancy detection, and the training I received to perform AI myself, to benefit other farmers in my community."

Of the 214 farmers at Mayfield Farms, "A good three-quarters of our members are producing much more effectively than before, with their milk volumes rising substantially as a result of the training." He also noted the improvements that came from the ability of about 25 members to access improved breeds from ZDL's Cattle Bank loan facility, and others are considering tapping into a new Micro King product, which will enable farmers to get loans of up to $5,000 for up to three cows.

"Although I think dairy farming has always been in my blood, the difference now is that I'm really farming as a business. I keep meticulous records that allow me to effectively analyze and tweak my expenditures, to maximize growth and minimize losses."

Despite the size of the large family he supports, he says his dairy income alone is enabling him to pay for his seven children's school fees without issue, with money left over to continually reinvest in growth.

But Peter Manjoko is not resting on his laurels, and he has many visions for how he will continue to strengthen and grow his farm. He's keen on crossing Friesian and Jersey breeds, plans to begin irrigating his fodder and banana crops, getting electric lines to his farm, and accessing sexed semen.

"I feel really proud about my evolution as a dairy farmer, and I'm no longer trying to find additional sources of income to supplement dairy farming. This enables me to spend more time at home, raising my children, and trying to pass on my knowledge to them so that they can reap the rewards in the future, too," says Peter.

Lessons Learned ZDL Nov 15.indd 19 11/15/2013 10:38:29 AM

Writing and photography by Jennifer Hyman, November 2013

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LAND O'LAKES, INC.
INTERNATIONAL DEVELOPMENT
Innovative Solutions for Global Prosperity

Website: www.landolakesinc.com

Minnesota Headquarters: 1080 W. County Road F, MS 5120, Shoreview, MN 55126 U.S.A.; Phone 1-651-494-5142
Washington, D.C.: 1725 DeSales St. NW, Suite 800, Washington, DC 20036 U.S.A.; Phone 1-202-370-1700
Nairobi Westlands off Peponi Road, Peponi Plaza-A3, Westlands, Nairobi, Kenya; Phone: 254-20-374-6034

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ANNEX III: End of Project Evaluation Report

AGRIMARKET SERVICES (PVT) LTD

Consulting on Crop/Livestock Production | Food Security & Livelihoods | Value Chain Analysis | Market Linkages | Scoping Studies | Project Evaluations

Final Evaluation Report

Rebuilding Livelihoods and Resiliency in Zimbabwe (ZDL) Project implemented by Land O' Lakes and funded by USAID

By

Dr. Dammika Carr - Team Leader

Consultant- Livestock Production and Market Linkages Development

Mr. Benjamine Mlambo -Team Member

Consultant- Agriculture Economist and M&E Specialist

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14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

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The views expressed in this report, however, are those of the consultants, and do not necessarily represent the views of Land O' Lakes and/or USAID.

A list of all the consulted informants is provided at the end of this report as an annex.

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Abbreviations and Acronyms

ABS	Accounting Bureau System
AGRITEX	Department of Agricultural, Technical and Extension Services
ARDA	Agricultural and Rural Development Authority
BCR	Benefit Cost Ratio
CA	Contagious Abortion
CAHWs	Community Animal Health Workers
CBA	Cost Benefit Analysis
CLWs	Community Livestock Workers
DANIDA	Danish International Development Agency
DDP	Dairy Development Programme
DVS	Department of Veterinary Services
EPE	End of Project Evaluation
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FGD	Focus Group Discussion
FTF	Feed the Future
GMA	Gross Margin Analysis
HEA	Household Economy Approach
HDDS	Household Dietary Diversity Score
HH	Household
IDEAA	Initiative for the Development and Equity in African Agriculture
IRR	Internal Rate of Return
KII	Key Informant Interview
LOL	Land O' Lakes
LPD	Department of Livestock Production and Development
M&E	Monitoring and Evaluation
MCC	Milk Collection Centre
MIHFP	Months of Inadequate Household Food Provisioning
MPA	Milk Production Association
MTE	Mid-Term Evaluation
NPV	Net Present Value
PMP	Performance Monitoring Plan
SLA	Sustainable Livelihoods Approach
SNV	Netherlands Development Organization
SPSS	Statistical Package for Social Sciences
TVC	Total Variable Costs
USAID	United States Agency for International Development
USD	United States Dollar
VCA	Value Chain Analysis
ZADF	Zimbabwe Association of Dairy Farmers
ZDL	Rebuilding Livelihoods and Resiliency in Zimbabwe

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Highlights

- The ZDL project activities included the linking of dairy farmers to high-value milk markets, increasing access to animal health services, increasing capacity of fodder flow management, and promoting the use of donkeys for milk transportation.
- The project has been a major success, setting a foundation for smallholder dairying in Zimbabwe.
- The project distinguished itself through the promotion of a pro-business approach, facilitation of commercial dairy production, capacity building of local MCCs and the ZADF.
- The project achieved an overall physical progress rate of 97.2% against set targets, with the majority of the project's indicators surpassing expectations and the set targets.
- The volume of milk produced per household each month increased from 50 litres at the baseline to 562 litres in 2013 (1,124% increase). This was also a 187% achievement given a project target of 300 litres.
- The number of households with adequate food provision increased by 21.4%.
- The mean Household Dietary Diversity Score (HDDS) was 8.2 compared to averages of 7.2 during the baseline period and 7.6 during the mid-term evaluation period.
- The number of jobs achieved and attributable to the Feed the Future (FTF) initiative stands at 932, with 783 for males and 149 for females.
- Average annual dairy incomes increased by 743%, increasing from US$312 during the baseline to US$2,943 currently, and a paltry US$206 for the control group (non-beneficiaries).

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Executive Summary

Project Overview

Smallholder dairying in Zimbabwe presents the greatest opportunities for unlocking value, generating quick returns to investment, increasing national dairy production, and taking advantage of opportunities for import substitution. However, Zimbabwe has faced a decline in dairy production, between the late 1990s and 2008 due to a complex combination of socio-economic, political and environmental factors. The smallholder dairy subsector remains strained by, inter alia, lack of capital, low herd sizes, poor animal breeds, low farm-level productivity, and a lack of access to markets. In response, Land O'Lakes has been implementing the *Rebuilding Livelihoods and Resiliency in Zimbabwe (ZDL) project* aimed at building livelihoods and promoting food security of farmers through interventions in the livestock and dairy value chains. It was expected that the significant gains from dairy in terms of income, improved food security and improved asset base that had been demonstrated regionally could be replicated in Zimbabwe.

Evaluation Purpose and Objectives

The purpose of this end-of-project evaluation was to carry out the final evaluation of the ZDL project in order to track program progress towards set targets; assess the appropriateness of project design; review constraints and how ZDL addressed them; and document the impacts, key lessons and best practices that will inform implementation of other USAID, Land O' Lakes or local stakeholder development programmes.

Evaluation Design and Methods

The Household Economy Approach (HEA), the Sustainable Livelihoods Approach (SLA) and Value Chain Analysis (VCA) were used as the guiding analytical frameworks for the evaluation. Data collection methods for the evaluation included a desk study and review of project documents, key informant interviews, focus group discussions, administering a household survey questionnaire, conducting gross margin and cost-benefit analysis, and the documentation of most significant case studies. Field data collection was based on a sample of 14 Milk Production Associations (MPAs) out of the 18 MPAs (78%) and 14 Milk Collection Centres (MCCs) out of the 21 MCCs (67%), the ZDL project was working in. The selected 14 MCCs were Murewa, Chikwaka, Marirangwe and Wedza (in Mashonaland East Province), Sangano, Dowa, Tsonzo, Hauna, Mayfield and Mafumise (Manicaland Province), Hama Ruomba (Masvingo Province), Gokwe (Midlands Province), and Umzingwane and Claremont (Matabeleland South Province). A total of 240 beneficiary households (representing 19.1% of the participating 1,258 households) were selected for the household survey and acted as the treatment, while an additional 55 non-beneficiaries were selected as the control group, thereby entailing a total sample of 295 households. Of the 240 beneficiary households, 81.7% were male-headed while 18.3% were female-headed. Household data analysis was conducted using the Statistical Package for Social Sciences (SPSS), while economic performance of the dairy/donkey enterprises and the financial performance of the MCCs were assessed through Gross Margin Analysis (GMA) and Cost Benefit Analysis (CBA). Identified evaluation limitations included reliance on recall, influence of the data collection period on results, and unobservable differences between comparator groups.

Findings, Conclusions and Recommendations

Relevance

Results of the household questionnaire survey showed that dairying remains the main source of household livelihood and incomes in the project areas, with dairying contributing 36.9% to total household income. The contribution of smallholder dairying to total household income is 35.1% in male-headed households and a more significant 55.7% in female-headed households. In comparison, the contribution of smallholder dairying to total household income within the control group (non-beneficiaries) is only 11.3%. The greatest strength of the ZDL project lay in its design. The project distinguished itself through the promotion of a pro-business approach; facilitation of commercial dairy production at smallholder farmer household level; the capacity building of local MPAs, MCCs and the ZADF; use of an integrated approach, and ensuring improved margins and returns at all nodes of the value chain. The project's integrated approach also ensured the achievement of set targets, greater impact, and better sustainability of benefits for project participants.

Effectiveness

The ZDL project has been a major success, and in the process managed to set a foundation for smallholder dairying in Zimbabwe. The project achieved an overall physical progress rate of 97.2% against set targets, with the majority of the project's indicators surpassing expectations and the set targets. A notable achievement under Component 1 (dairy production, collection and processing) has been the total volume of milk produced per household each month which increased by 1,124% from 50 litres at the baseline to 562 litres in 2013. This was also a 187% achievement given a project target of 300 litres. Notable achievements under Component 2 (preventive animal health and rangeland/fodder flow management) have been the number of community based volunteers receiving short-term agricultural sector productivity training as Community Livestock Auxiliaries (100%), the number of farmers and others who have applied new technologies or management practices (103.8%), and the number of hectares under improved technologies or management practices (97.8%). However, the achievement rates under Component 3 (donkey traction and transportation pilot programme) has been subdued due to lower uptake, with rates of 67.8% for the gross margin per donkey in traction business, and 77.5% for the number of households contracted with trained service providers for land clearing, ploughing and/or transportation.

Impact

The ZDL project recorded an increase of 21.4% in household food adequacy levels, with 87.4% of the informants interviewed during the end-of-project evaluation period having adequate household food provision, compared to levels of 66.0% at the baseline period. In comparison, household food adequacy levels were 88.1% for male-headed households and 83.9% for female-headed households. The mean Household Dietary Diversity Score (HDDS) was 8.2 compared to averages of 7.2 during the baseline period and 7.6 during the mid-term evaluation period, which indicates changes in diets and an improved household economic access to food. In comparison, the average HDDS for male-headed households is 8.2, while the mean HDDS for female-headed households is 7.9. This compares with an average HDDS of 7.3 for male-headed households and 6.8 for female-headed households at the baseline stage. The corresponding HDDS averages for the different MPAs range from 6.3 (Umzingwane) to 10.4 (Hauna). The number of jobs achieved and attributable to the Feed the Future (FTF) initiative stands at 932, with 783 for males against a target of 369, thereby entailing an achievement rate of 212%, and 149 for females against a target of 188 (79.3%). Average annual household dairy incomes

increased by 743%, increasing from US$312 at the baseline to US$2,943 in 2013. Comparative analysis across different farmer categories shows average annual dairy incomes of US$206 for the control group (non-beneficiaries). The proportion of more than 80% rural households having either iron or asbestos roofed houses is also evidence of the impact on household welfare as a result of the integration of smallholder farmers into the mainstream economy given averages from comparative data in ZimVAC reports.

Economic Analysis

GMA results for the average dairy enterprise increased from US$324 to US$1,199 per cow for a dairy herd with three lactating cows between the baseline and EPE periods. The average GM/TVC index is 0.63 which means that for every dollar invested by smallholder dairy farmers these farmers are getting a return of US$0.63. Results from comparative scenario GMA show that semi-zero grazing or use of the paddock system generates the highest returns per dollar invested, with GM/TVC figures of up to 3.53. Corresponding, GMA results for donkeys increased from US$328 to US$345 per animal between the MTE and EPE periods. However, due to their lower maintenance costs, the donkey milk transportation enterprise has a GM/TVC of 3.34 entailing a return of US$3.34 for each dollar invested. The shift from individual milk deliveries to the adoption of the group milk donkey transportation model has translated into up to US$50,000 in cost savings for farmer groups on an annual basis. The majority of MCCs are operating as viable entities. Gross profits, based on the differences between historical figures for gross milk sales revenue and direct MCC running costs, were positive for all the six (6) case study MCCs, with a range of US$4,595.70 (Dowa) to US$110,297.86 (Rusitu Mayfield). Data from other sources also show that 15 out of the 21 MCCs are breaking-even as a result of use of the Cost of Production (COP) model which ensures that MCCs can meet all their costs, with those not breaking-even not using the COP model and instead using fixed farmer payouts. CBA shows that smallholder dairying is a quick return investment. The NPV of $3,797,499 over a 5-year period is quite positive and worthwhile, the BCR of 1.85 entails that the ZDL project can yield US$1.85 in discounted money for each US$1.00 invested, while the IRR of 104% is very competitive given that financial interest rates range from 18 – 35%.

Efficiency

There was timeliness in service provision and the distributions of inputs. Farmers cost-sharing and a pro-business approach, which made farmers bankable, have proved to be more cost effective. The use of the revolving cattle loan facility is an efficient way of distributing livestock to beneficiaries. The introduction of the group milk donkey transportation model has also brought tangible benefits for the farmers in the form of increases in the milk volumes transported, great cost savings and greater milk delivery efficiency. The CBA analysis based on the option of acquiring in-calf heifers from South Africa at US$2,200 instead of purchasing locally at US$1,500 not only ensured cost savings for the local option but also better financial analysis results. Efficiency issues that need to be improved related to coordination issues with government, an issue related to USAID's policy.

Sustainability

Training and capacity building formed a significant component of the ZDL project. Such training has had the impact of reinforcing social and institutional capital by strengthening capacities at the farm, MCC and community levels and hence increased the resilience of not just individual dairy enterprises but for entire MPAs and communities. This entails that benefits can continue to accrue to target communities post-project funding and indeed beyond the lifespan of the ZDL project. By involving implementing partners, e.g. public stakeholder institutions, commodity associations (notably ZADF), financial institutions, and private agribusiness firms, processors, the ZDL project ensured the development of in-built sustainability mechanisms for all project initiatives. However, some MCCs may not remain sustainable because of inherent challenges within MPAs and the specific MCCs.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Best Practices and Lessons Learnt

There are a number of good practices that the ZDL project adopted that ensured success, enhanced efficiency, and stakeholder buy in which can be replicated by other projects. One of the best practices was the adoption of a pro-business approach which improved the bankability of resource-poor farmers through capacity building by business development specialists and ensuring that smallholder dairying remained viable, training of producers and MPAs in strategic planning, linking MPAs with milk processors and ensuring improved milk quality and volumes, and initiating sustainable linkages with the private sector since established linkages are likely to continue beyond the lifespan of the ZDL project. The other ZDL project best practices were the use of a Cost of Production model in determining farmer payments and thereby ensuring that smallholder dairying remains both viable and sustainable, the capacity building of ZADF as the local partner to ensure that their services are more appropriate to the need of smallholder dairy farmers, linking producers to insurance and other financial services, and the introduction of record keeping and the Accounting Bureau System (ABS). A number of lessons learnt also emerged. Managing expectations in an area where there is a long history of donor aid, and changing mindsets within a short-term project is problematic. While the introduction of the group donkey transport model was a noble idea, in some areas the long distances made alternative and traditional modes of transport, e.g. bicycles, more appropriate. Dairying is a volumes business, and it is essential that the break even volumes are reached for the centers to break even. As livestock and dairying is a medium term investment, farmers' time horizons need to be further than one season.

Constraints and Challenges

Given the history of smallholder dairying, from a humanitarian then a relief and now a pro-business approach, beneficiaries and target groups took longer to understand the motives, goal and objectives of the project. Consistent training and capacity building efforts established a common and shared vision. Due to USAID regulations and the short nature of the project MPAs where there had been existing structures were targeted. While appearing to be useful in terms of time and impact, often these sites for the MPAs/MCCs are no longer central to milk producers, and in addition often have poor access to formal processors current milk collection routes. Many MCCs and stakeholders view that "value addition" or the processing of milk for MPAs is a viable option when producing for a local market. However, analysis jointly conducted by the ZDL project and MPAs to help determine cost of inputs and viability showed most as non-viable. Private sector view of smallholder farmers in the past was one of corporate social responsibility rather than a reliable business partner. Due to the short duration of the initial 16 months for the dairy project, this led to challenges with targeting and approach in some areas in phase 1. With a longer time horizon, earlier implementation and approaches would have been different e.g. more time was necessary for strengthening the cattle bank facility/revolving fund, allowing farmers to be better prepared and targeting of MCCs with direct links to processors. The commercialization of the services offered by Community Animal Health Workers was not fully appreciated and supported by the communities. This could be linked to the donor-dependency syndrome and expectations by farmers to receive free services from one season to another. Despite emerging as an innovative and cost-effective milk transportation model, the use of donkeys in group milk collection was not adopted as well as originally anticipated. This is because donkeys are culturally viewed as the poor man's animal, with some target beneficiaries perceiving this as a drawback. In other areas this was because of the long distances between the production areas and the MCCs e.g. up to 50km in Wedza. The ZDL project redesigned the intervention by giving the MPAs bicycles.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Recommendations

Given the ZDL project's overall physical progress achievement rate of 97.2%, an increase of 21.4% in household food adequacy levels, and an increase of 221% in average annual dairy incomes, there is need to upscale and replicate this intervention in other Land O' Lakes and USAID sites, with slight tweaking in project design for adaptation purposes only but no major reviews are necessary. A major identified constraint has been the short-term nature of the ZDL project which has not allowed ample time for Cattle Bank Facility (CBF) loan repayments, viability and for individual dairy farmers to achieve full potential. We, thus recommend more time to allow farmers having started with one cow from the CBF to graduate to the Micro King loan products to access more than one animal thus reaching the optimum herd size of 3-5 cows faster, and thereby ensuring the viability of participating smallholder dairy farmers. There has been a significant increase in the area under improved pastures and fodder crops. Future programming should consider ways of ensuring an exponential increase in adoption and the expansion of the area under improved pastures and fodder crops e.g. as the case of conservation agriculture in Zimbabwe. Such phenomena would reduce the cost of feed and thereby increase the annual gross margin per dairy cow in lactation. While the introduction of Community Livestock Workers (CLWs) has promoted the idea of dispersed, active and locally accountable community workers who can work in a range of livestock activities, addressing services that are in demand and are best delivered locally, there is need to expand the CLWs concept e.g. through the training of more dairy farmers as CLWs. Despite the low uptake, the group donkey transportation system remains innovative and very cost effective. In addition, despite the fact that dairy cows have the potential to be milked thrice per day, a number of farmers are still making morning milk deliveries only due to the distances and low unit volumes thereby limiting overall milk supplies to the MCCs. There is thus need for further scoping studies on present and alternative transport systems especially for farmers who are located at a distance from the MCCs. Such a study could focus on the suitability of donkeys in all areas, factors affecting the adoption of such an innovation, long-term costs and benefits, comparative costs for tricycle milk collection systems, and other alternative models. Finally, there is need to extent the programme for another three-year phase to build capacities before weaning off the current target MPAs/MCCs.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

1. Project Overview

1.1 Project Rationale

Livestock production systems are an important component in local economies at both the national and farm household level, where cattle constitute the main livestock species kept by farmers. Specifically, the dairy sub-component has proved to be practically vital, especially in the smallholder sector where milk is an important source of protein to young children and supplementary income to often cash-starved farm households. Despite the challenges prevalent within the smallholder dairy subsector, the large numbers of current and potential producers entail that the smallholder dairy production system has the greatest potential and thus provides the best basis for increasing national dairy production. Demand for dairy products in Zimbabwe surpasses supply from local dairy production, with the gap being currently filled-in through imports. The estimated demand for milk and milk products is 180 million litres, which presents a supply gap of 129 million litres. This, thus creates vast opportunities for import substitution within the local dairy sector. The local dairy industry can also take a leaf from how farmer cooperatives/associations transformed dairy production and processing in countries such as Denmark, Kenya and Rwanda. Smallholder dairying in Zimbabwe also presents the greatest opportunities for unlocking value, generating the highest and quickest returns to investment due to the diversity of dairy products and the higher margins that can be gained from niche markets e.g. through public-private sector partnerships, by providing platforms for private sector–led economic growth, and/or through responding to unsatisfied demand for feta cheese in Europe.

Zimbabwe had once been a major milk producer and exporter of milk throughout the SADC region, peaking at approximately 262 million liters in 1990. During the same period, several Zimbabwean companies exported milk and purchased other milk producing companies regionally. However, Zimbabwe has faced a decline in agricultural production, for nearly a decade between the late 1990s and 2008 due to a complex combination of socio-economic, political and environmental factors. This has negatively affected the ability of many dairy farmers to remain in viable milk business, with total annual milk volumes declining to less than 35 million liters in 2008. A number of milk processing plants in the country shut down, with the country running at less than 30% of installed capacity. See Figure 1.

The signing of the Global Political Agreement (GPA) in September 2008 which led to the formation of an "all inclusive government" and the subsequent dollarization of the economy in February 2009 saw a recovery in many sectors of the economy. However, the large-scale commercial agricultural productive base, which had been eroded by the Fast Track Land Reform Programme (FTLRP), saw large-scale commercial dairy farmers decreasing from 423 in 2000 to less than 120 in 2012 (ZADIT, 2012). Despite the recovery in national milk production to 56 million litres in 2012, Zimbabwe is still importing more than 60 million litres of milk annually.

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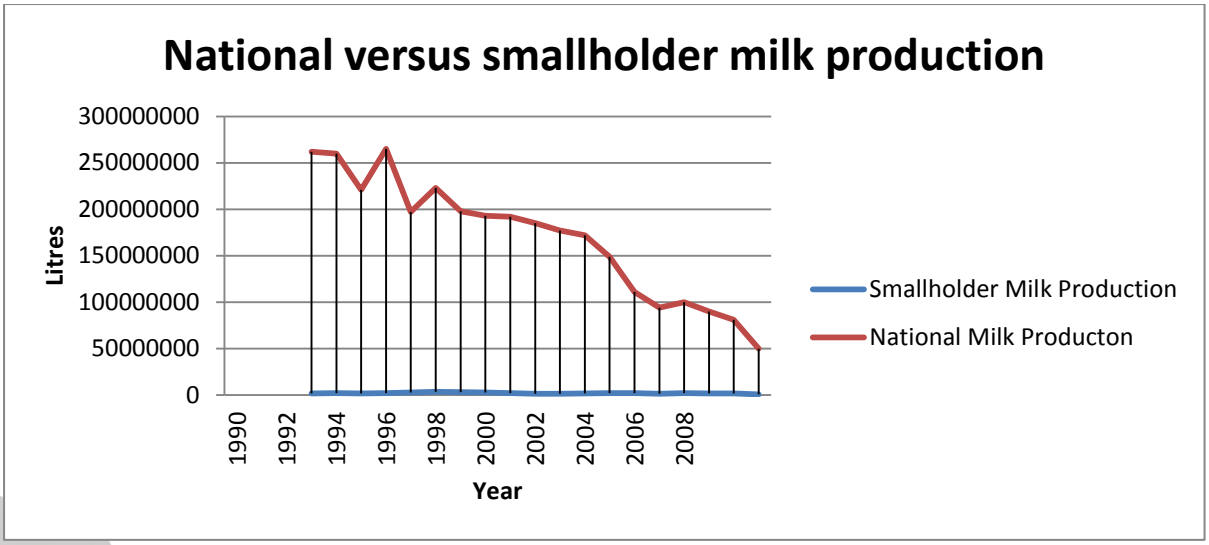

Figure 1: *National versus smallholder milk production trends.*

Milk production within the smallholder dairy sector fluctuated from 2.7 million litres in 1990 to 1.5 million litres in 1998 and 1.13 million litres in 2011. Most smallholder dairy projects, initiated by the Government and supported by development partners, and smallholder milk production suffered a slump during the period 2006 to 2008 with some closing as a result of the prevailing hyperinflationary environment (Figure 2). The smallholder dairy sector has infrastructure in place and vast knowledge disseminated since inception in 1983. Nevertheless, its major weaknesses are poor commercialisation, weak organisation, poor governance, and low productivity as the major constraining factors hindering growth. Vast opportunities prevail in the current demand supply deficit and threats have been in the non-availability of dairy stock and reduced service provision from a cash strapped public support system.

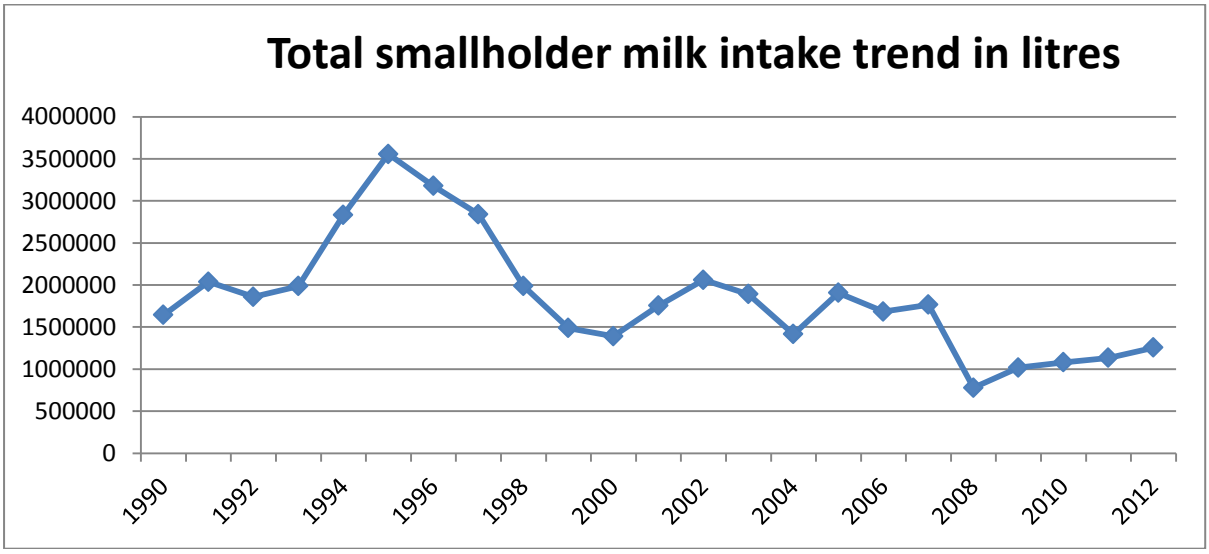

Figure 2: *Smallholder milk intake trends by year.*

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Recent reviews of the Zimbabwean smallholder dairy subsector (Dube and Hanyani-Mlambo, 2012) reveal some signs of subsector recovery since 2009. The review also indicates that the subsector remains strained by a reduced producer base, lack of capital, low herd sizes, poor animal breeds, low farm-level productivity, lack of viability and sustainability, and weak institutional support. In a dairy value chain study, Kagoro and Chatiza (2012), established that dairy farmers had little or no access to dairy stock with very few farmers having dairy cows, dairy cattle loans, markets, improved breeding technology and animal health services. The majority of dairy cattle succumbed to diseases while macro-economic challenges eroded any opportunities for farmers to raise capital and rebuilt their dairy herds. Subsequently, there have been no adequate dairy animals to sustain milk production, deliveries to the MCCs, and MCC operations leading to the collapse of a number of smallholder dairy schemes.

1.2 ZDL Project Goal, Objectives and Components

In response to challenges bedeviling the smallholder dairy sector, Land O'Lakes has been implementing the *Rebuilding Livelihoods and Resiliency in Zimbabwe (ZDL) project* since January 2010. The project was being implemented in five provinces namely, Manicaland, Mashonaland East, Masvingo, Midlands and Matabeleland South. This USAID-funded project was designed to rebuild the livelihoods and promote food security of farmers through interventions in the livestock and dairy value chains. As already highlighted, livestock were once an important pillar of Zimbabwean households' food production capacity and livelihood asset base, but herds and productivity have been decimated as households sold off their livestock and other assets for lower prices mostly at farm gate levels in order to secure their staple foods. The livestock and dairy sectors, and the Zimbabweans that depended on them, were left in dire straits. ZDL focused on assisting vulnerable households, particularly women-led households, to increase milk production, rebuilding the cattle and dairy herds through a cattle bank facility/revolving fund, improving rangeland/fodder flow management, preventative animal health services, stimulating market linkages between value chain actors, building profitable livestock and dairy businesses, and promoting the use of donkey draught power in dairy production. The program has been implemented in two phases with more or less the same activities: January 2010-April 2011 (16 months); and May 2011 – November 2013 (30 months).

This programme had thus three components *viz:*

(i) Linking of 1,258 households receiving dairy cattle to high-value milk markets.
(ii) Increasing access to animal health services for 1,258 farmers through training of Community Animal Health Workers, as well as increasing capacity of rangeland/fodder flow management.
(iii) Promoting the use of donkeys for animal traction services and milk collection.

1.3 Project Support for USAID's Operational Plans

The ZDL project was initiated with the objective of supporting USAID - Zimbabwe's Assistance Objective 3 and 4:

Assistance Objective 3: Livelihoods Restored and Maintained/Economy Stabilized and Growing.

- IR 3.2: Basic Economic Activity and Livelihoods, Income Generation, and Employment.
  - Sub-IR 3.2.1: Improved Livelihoods, Income Generation, and Employment.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Assistance Objective 4: Increased Income and Employment Generated by the Agricultural Sector.

- IR 4.1: Increased Agricultural Production.
  - Sub-IR 4.1.1: Contract Farming and Out grower Schemes Strengthened.

It was expected that the significant gains from dairy in terms of income, improved food security and improved asset base that had been demonstrated regionally could be replicated in Zimbabwe.

2. Evaluation Purpose and Objectives

2.1 Evaluation Purpose

The purpose of this end-of-project evaluation was to carry out the final evaluation of the ZDL project in order to document the impacts (intended or unintended) of this project considering project design, project targets, budget and the outcomes. More importantly the final evaluation will provide an opportunity to reflect and to document key lessons and best practices that will inform implementation of other USAID projects, programs, new interventions, and innovation strategies. Finally, lessons learned will be made available to USAID/Zimbabwe, other development partners and local stakeholders who may continue to implement similar support strategies.

2.2 Evaluation Objectives

Specific objectives of this assignment included:-

(i) Carrying out a quantitative survey of a sample of 1,258 participating farmers, and smallholder milk producer associations working with the program to track program progress towards set targets.
(ii) Assessing program progress in addressing environmental, youth and gender concerns.
(iii) Identifying any weaknesses in the implementation approach, project design, activity implementation and what could have been done more effectively or efficiently.
(iv) Documenting cases (using case studies/testimonies) and quantify the extent to which the project made a positive impact at the household and community level.
(v) Documenting the impact using quantitative analysis and capital investment appraisal methods.
(vi) Identifying the most significant constraints and/or difficulties in implementing the project and, where appropriate, how ZDL addressed them.
(vii) Documenting lessons learned that have implications for similar interventions in the future, especially regarding the sustainability of similar projects.

2.3 Scope of Work

The team understood that the development of an appropriate survey design, including using statistical techniques to estimate the optimum sample size and random selection of survey participants, survey tools and methodology for conducting the evaluation was to be carried out

with the collaboration with Land O'Lakes staff. The team then took the primary lead in providing local expertise in the design phase, actual enumeration, and data collection during implementation in the field, data analysis and interpretation, support in drawing conclusions regarding the efficacy of the selected process and the results of the assessment, and drafting a final evaluation narrative report. A detailed SOW is provided as Appendix 1.

3. Evaluation Design and Methods

The end-of-project evaluation assignment was implemented through three main phases *viz*: (i) inception phase; (ii) field data collection phase; and (iii) data analysis and report writing phase. For a detailed discussion of the evaluation design and methods see Appendix 2.

3.1 Inception Phase

The inception phase was characterized by several induction meetings between the evaluation team and Land O' Lakes staff members. These included discussions with key Land O'Lakes staff to discuss the study and evaluation protocol, and the proposed methodology for undertaking the evaluation. Other discussions centered on full briefings with priority given to what the Land O'Lakes team felt to be the principal accomplishments made over the life of the project, as well as lessons they have learnt. The project staff outlined areas of program accomplishments, challenges, and where efforts may not have reached expectations (and why). In addition the team collated and compiled all the relevant project documents, reports and secondary information relating to the project during this phase. Following literature reviews and initial consultation meetings the team submitted an *Inception Report* to Land O'Lakes staff.

3.2 Field Data Collection Phase

A number of diverse but complementary analytical approaches were adopted for this final evaluation. The Household Economy Approach (HEA), the Sustainable Livelihoods Approach (SLA) and Value Chain Analysis (VCA) were used as the guiding analytical frameworks. In addition to improving the analytical rigor, these diverse but complementary analytical approaches were selected to allow for both quantitative and qualitative analysis, and to facilitate both technical and socio-economic analysis.

Below is an evaluation matrix which provides details of the specific methods that were used in addressing specific evaluation issues. See Table 1.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Table 1: *ZDL Project Final Evaluation Matrix.*

Scope of Work as informed by the TORs	Follow-up Evaluation Issues/Questions	Data Collection Methods and Sources of Information
a) Micro enterprise level program data **Farm level**	-**Farm budgets:** Yield, cost of production and gross margins from the dairy enterprise -Access and use of Business Development Services?: Level of adoption of productivity enhancing technologies, including: Adoption of Artificial Insemination; stainless steel cans and bucket, fodder establishment, feed conservation, among others -**Dairy husbandry practices**, including: Calving interval, culling interval, milking period, heifer breeding maturity, animal housing, feeding, milk handling practices, routine health practices – drenching, and de worming among others -**Access to financial services** as defined by farmers accessing loans by financial service providers Estimate number of short term jobs created at farm level in Full Time Equivalent (FTE)? -**Milk production at farm level**	Review of project proposal, baseline reports, and mid-term evaluation report. Data was collected for this scope of work from KII, Household survey, FGD
Micro enterprise level program data **Milk Collection Center level**	-Volume and value of milk purchased from smallholder dairy farmers (2010 to current) -Volume and value of other inputs and services besides milk cooling and processing offered by the MCC. This will include a breakdown by input e.g. feeds; semen, drugs etc. (2010 to current) from MCCs that offer these inputs as an embedded service -Financial performance of the MCCs based on ABS records	Review of project proposal/documents, baseline reports, mid-term evaluation report. Data was collected from KII and FGD with MCC
Micro enterprise level program data **Milk value chain**	-Volume and value (from 2010 to current) from selected milk processors working with the program - the key variable being the volume and value of milk sold by the small holder farmers to the processing plants.	Review of project proposal, baseline reports, mid-term evaluation report. Data was collected for this scope of work from KII, FGD with dairy value chain
Other stakeholders	-Views and perceptions about the program	KII using a semi-structure questionnaire with those who worked with the program.
b) Environmental concerns **Farm level**	-Have there been environmental threats on use of acaricides, AI, overgrazing, control of milk-borne diseases, and fuel wood among program beneficiaries?. -What are the program mitigation measures on farm-level?	Review of project proposal/documents, baseline reports, mid-term evaluation report. Household survey, and FGD with farmers (all four different groups as in TORs) KII with stakeholders
MCC level	Compliance with set environmental standards as evidenced by compliance certificates from Dairy services for all MCCs.	FGD with MCC and KII with related stakeholders -Dairy Services and others
Gender Concerns Gauge the effectiveness of USG efforts to promote gender equality	- Have the attitudes changed about whether men and women should have equal opportunities in social, political, and economic spheres? - Have the level of participation, including benefits accruing to women changed during the project period?	Review of project proposal/documents, baseline reports, mid-term evaluation reports. Data was collected from KII, Household survey, FGD

Throughout all analysis gender lenses was applied to see how the programme is mainstreaming and responding to gender issues, such as for example the participation of women in key decision making structures, whether the impacts of interventions as intended or are negatively affecting women or men and causing social disharmony.

3.3 Sampling

The Zimbabwe Dairy and Livestock (ZDL) Project had intervention activities working with 18 Milk Production Associations (MPAs) in 21 Milk Collection Centres (MCCs) in 17 wards spread across five different provinces. Sampling for the final evaluation was guided by sampling criteria that included geographical coverage, agro-ecological regions, the location of specific interventions and project components, and the performance of the different MPAs/MCCs. On this basis, the evaluation team selected 14 of the 21 MCCs (67%). The selected 14 MCCs were Murewa, Chikwaka, Marirangwe and Wedza (in Mashonaland East Province), Sangano, Dowa, Tsonzo, Hauna, Mayfield and Mafumise (Manicaland Province), Hama Ruomba (Masvingo Province), Gokwe (Midland Province), and Umzingwane and Claremont (Matabeleland South Province).

The primary target for the household questionnaire survey, FGDs and case studies were direct project beneficiaries. There was, however, a need to include a control group of non-beneficiary households for this ZDL Project final evaluation. To maintain consistency with sampling procedures during the baseline and MTR periods, a linear systematic sampling procedure was adopted for sampling for the household questionnaire survey. As such, 240 beneficiary households (representing 19.1% of the participating 1,258 households) and 55 non-beneficiaries were sampled for the final evaluation. The total sample size was, therefore, 295 households. Of the 240 beneficiary households, 81.7% were male-headed while 18.3% were female-headed. The mean age of the head of the male-headed households is 57.8 years and 60,1 years for female-headed households. The proportion of chronically ill members is 2.5% in male-headed households and 4.7% in female-headed households.

3.4 Data Analysis

Data entry, cleaning and analysis of household survey questionnaires was conducted using the Statistical Package for Social Sciences (SPSS) Version 16. The collected evaluation data was synthesized, analyzed and presented in user-friendly tables and illustrational charts/graphs. Data and data analysis was also disaggregated by gender and youth. Qualitative information was analyzed by establishing emerging common patterns and trends on the basis of discourse analysis. On the other hand, economics performance analysis hinged on Gross Margin Analysis (GMA) and Cost Benefit Analysis (CBA).

3.5 Study/Evaluation Limitations

Identified study/evaluation limitations included, *inter alia*:-

(i) Data collection during the final evaluation relied on recall, with the challenge that in some cases respondents could not be able to recall past events and details.

(ii) The period of data collection at baseline, mid-term review and the final evaluation were different which also influenced assessment results e.g. influence of period, especially for studies conducted closer to the harvest season.

(iii) In some instances and for some analysis there were unobservable differences between comparator groups, thus making comparative analysis difficult.

(iv) While a lot of effort was invested in ensuring a complete and quality data set, e.g. through training and in-field supervision, the resultant data set had missing information for some cases for selected variables.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

4. Findings, Conclusions and Recommendations

4.1 Relevance

Relevance of the ZDL Project

Results of the household questionnaire survey showed that dairying remains the main source of household livelihood and incomes in the project areas, with dairying contributing 36.9% to total household income. The contribution of smallholder dairying to total household income is 35.1% in male-headed households and a more significant 55.7% in female-headed households. This entails that smallholder dairying plays an even more significant role in uplifting the livelihoods of rural female-headed households. In comparison, the contribution of smallholder dairying to total household income within the control group (non-beneficiaries) is only 11.3%. Analysis of household data from the group of ZDL project beneficiaries show the contribution of other sources of income as livestock sales (15.4%), formal employment and casual labour (12.3%), field crops (11.8%), gardening and citrus (10.1%), remittances (9.1%) and other sources (4.4%).

Targeting and Project Design

Targeting for the ZDL project tended to be component specific. Beneficiary MPAs and MCCs were selected on the basis of need and the scale of the challenges faced. Beneficiary selection for the dairy producers for dairy training and capacity building, preventive animal health training, rangeland and fodder flow management, as well as the donkey traction and transport was open for all farmers within the targeted MPAs/MCCs. On the other hand, selection of beneficiaries for in-calf heifers was based on whether or not the interested farmers had the required, appropriate and adequate infrastructure, fodder banks, stock feed resources, and a minimum deposit for the in-calf heifers.

The greatest strength of the ZDL project lay in its design. The project distinguished itself through the promotion of a pro-business approach; facilitation of commercial dairy production at smallholder farmer household level; the capacity building of local MPAs, MCCs and the ZADF; use of an integrated approach, and ensuring improved margins and returns at all nodes of the value chain. The project's integrated approach (encompassing the facilitated access to new dairy stock by smallholder dairy farmers, improvements in dairy cattle breeds, enhanced milk yields through improved fodder flow planning and management, better access to preventive disease veterinary services, and linkages with dairy processors) also ensured the achievement of set targets, greater impact, and better sustainability of benefits for project participants.

4.2 Effectiveness

Overall Project Effectiveness

The ZDL project has been a major success, and in the process managed to set a foundation for smallholder dairying in Zimbabwe. The project achieved an overall physical progress rate of 97.2% against set targets, with the majority of the project's indicators surpassing expectations and the set targets. Data from the household survey, key informant interviews and focus group discussions reveal a very positive assessment *vis à vis* project achievements as measured against the set targets and outputs.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Component 1: Dairy Production, Collection and Processing

Component 1 of the ZDL project focused on dairy production, milk collection and processing. Specific ZDL project component 1 interventions included:-

(i) Provision of in-calf heifers through a cattle loan facility designed as a revolving fund and later through linkages to a micro-finance institution (Micro King).
(ii) Training in farm business management including instruction on dairying as a business, business planning, farm budgeting, record keeping, financial management, economic analysis, etc.
(iii) Training in livestock management practices encompassing capacity building on dairy infrastructure development e.g. milk parlours, general dairy animal husbandry, dairy animal breeding, use of artificial insemination, heat detection, calf rearing, and calf management.
(iv) Training in MCC management practices e.g. training of MCC administrators and processors on MCC administration and management, milk hygiene and milk quality, record keeping, accountability at MCC level, transparency and governance, and the use of cost-of-production model in determining farmer payouts.
(v) Provision of grants and loans for MCC renovations.
(vi) Facilitation of exchange of information and experiences through exchange visits and dairy field days.

The ZDL project intervention, through its cattle loan facility and the provision of in-calf heifers, significantly increased the number of farmers with dairy/lactating cows thereby reviving dairying for a number of households who were out of business for a long time. Before the intervention by the ZDL project, only a few farmers were milking and delivering milk to the Milk Collection Centre (MCC) e.g. of the households surveyed in dairy sites during the baseline period, only 31% have been delivering milk to the MCC during the preceding 12 months, with the average quantity of milk delivered to the MCC being 50 litres per household per month.

The final evaluation shows that the majority of the ZDL project's indicators surpassed expectations and the set targets. Notable achievements under Component 1 (dairy production, collection and processing) include the total volume of milk produced per household each month which increased by 1,124% from 50 litres at the baseline to 562 litres in 2013. This was also a 187% achievement given a project target of 300 litres. Comparatively, the total volume of milk produced per household each month for male-headed households is 441 litres and 336 litres for female-headed households. The value of milk collected by MCCs each month achieved a progress rate of 152%, while the number of jobs attributed to the implementation of Feed the Future (FTF) initiative achieved a progress rate of 167% against set targets. Assessments to ascertain the increase in annual household incomes from milk sales showed an increase of 743% from US$312 at the baseline to US$2,943 in 2013. This also represents an achievement rate of 85.2% against the end-of-project target of US$3,455. Detailed, comparative and gender aggregated dairy/household income data is discussed under the impact section. See Table 2 for physical progress achievement rates for Component 1.

Table 2: *Component 1 Progress Report*

Indicator	Baseline	End of Project Evaluation		
		Project Target	Achieved	Achievement Rate %
Total volume of milk produced per household each month	50	300	562	187.00
Number of households producing milk for collection by MCCs	390	1200	681	56.75
Value of milk collected by MCCs each month	-	396750	603444	152.10
Number of MMCs collecting milk from producers	6	20	19	95.00
Number of jobs attributed to FTF implementation	0	557	932	167.32
Value of incremental sales attributed to Feed The Future (FTF) implementation	0	1473429	1527117	103.64
Number of producer organizations that applied new technologies or management practices	0	20	21	105.00
Number of firms (excluding farms) or Civil Society organizations (CSOs) engaged in agricultural and food security related manufacturing services	0	15	15	100.00
Increase in income of vulnerable households ($)%	312	3455	2943	85.18
Number of rural households reporting increased incomes from program intervention	0	1200	887	73.92
Gross margin per dairy cow in lactation	324	1151.7	1199.00	104.11
Number of food security private enterprises (for profit), producer organizations, water users associations, women's groups, trade and business associations, and community based organizations (CBOs) receiving USG assistance	0	20	21	105.00
Number of rural households benefitting directly from USG interventions	0	1200	1258	104.83
Value of agriculture and rural loans	0	675000	374824	55.53
Number of MSMEs receiving business development services from USG assisted sources	0	1220	1279	104.84
Numbers of individuals who have received USG supported short term agricultural sector productivity or food security training	0	1240	1298	104.68
Proportion of target population reporting increased agreement with the concept that males and females should have equal access to social, economic resources	-	65.00	66.1	101.69
Proportion of female participants in USG assisted programs designed to increase access to productive economic resources	0	30	41	136.67

Despite the existence of seasonal variations, the volume of milk delivered to the MCCs has consistently increased since the advent of the ZDL project, with the 2013 milk production season recording the highest volumes amid signs of recovery in the smallholder dairy sub-sector. See Figure 3. Pictures 1 and 2 shows evidence of improvements at both the farm and the MCC levels.

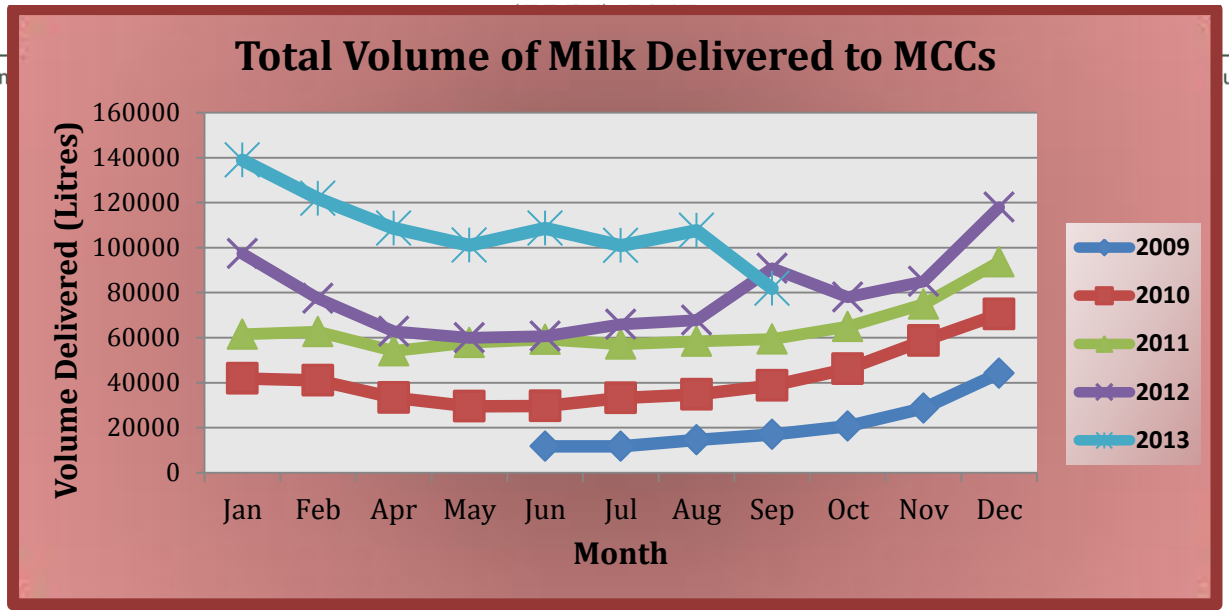


***Figure 3**: Total volume of milk delivered to MCCs from June 2009 – September 2013.*

***Picture 1:**Friesian cows awaiting milking.*

***Picture 2:**Processed milk ready for marketing.*

Component 2: Preventive Animal Health and Rangeland/Fodder Flow Management

Component 2 of the ZDL project focused on preventive animal health and rangeland/fodder flow management. Specific ZDL project component 2 interventions included:-

(i) Training of para-vets (Community Animal Health Workers) on disease identification and treatment.
(ii) Establishment of drug revolving funds and stocking of veterinary drugs.
(iii) Promoting farmer consultation of LPD, DVS and other service providers.
(iv) Establishment of demonstration plots for forage and fodder production.
(v) Training in forage establishment, fodder production (silage and hay), fodder conservation, fodder utilization, and animal nutrition.
(vi) Establishment of stock feed revolving funds.

Notable achievements under Component 2 (preventive animal health and rangeland/fodder flow management) have been the number of community based volunteers receiving short-term agricultural sector productivity training as Community Livestock Auxiliaries (100%), the

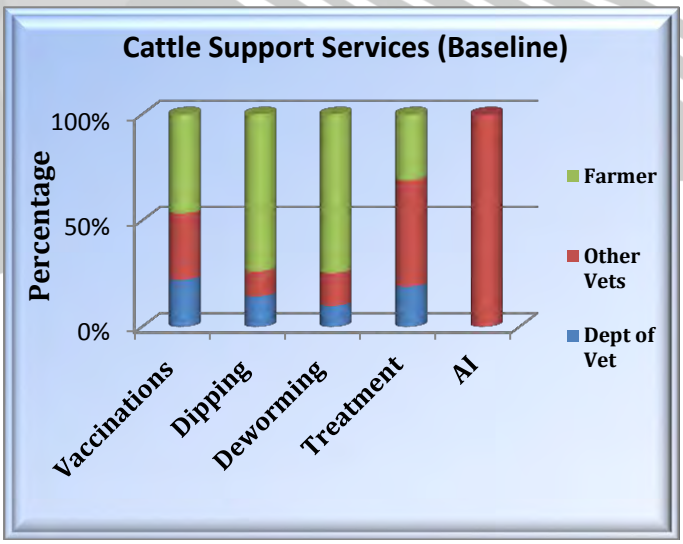
14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

number of farmers and others who have applied new technologies or management practices (103.8%) as dairy farmers outside the scope of the project also adopted new technologies or management practices, and the number of hectares under improved technologies or management practices (97.8%). See Table 3.

Table 3 :*Component 2 Progress Report*

	Basline	End of Project Evaluation		
Indicator		**Project Target**	**Achieved**	**Achievement Rate %**
Number of community based volunteers receiving short-term agricultural sector productivity training as Community Livestock Auxiliaries	0	60	60	100.00
Number of farmers and others who have applied new technologies or management practices	0	1200	1245	103.75
Number of hectares under improved technologies or management practices	0	1700	1663.00	97.82

The ZDL project's training and capacity building initiatives in preventive animal health has meant that more and more smallholder dairy farmers are now self-sufficient in identifying diseases and treating their own dairy animals. Trained Community Animal Health Workers have also provided assistance to smallholder dairy producers in other cases. This has translated into an improvement in farmers' access to preventive animal health services (both in terms of availability and affordability), the need for timely interventions, and the timely seeking of assistance. See Figures 4 and 5.



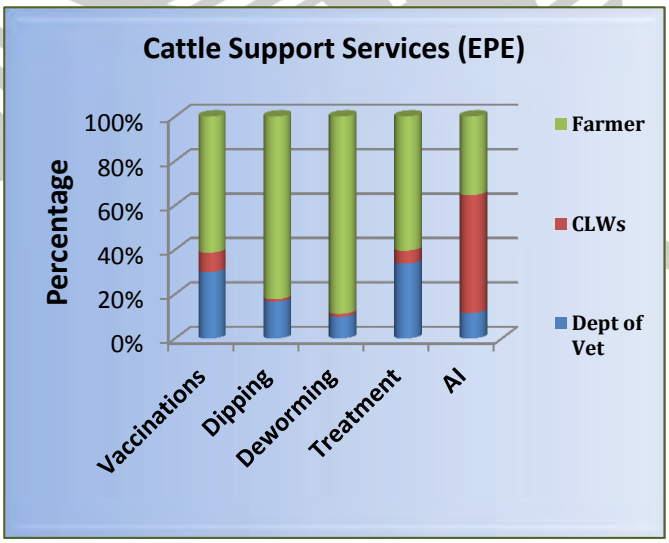


Figure 4 and 5: *Animal health and animal husbandry support at baseline and end-of-project.*

The ZDL project's integrated approach also ensured that revival and the resuscitation of smallholder dairying is supported not just through the provision of in-calf heifers designed to rebuilt the dairy herd but also by ensuring improved feed management. In this regard, the project supported the establishment of a stock feed revolving fund to facilitate smallholder farmers' access to dairy concentrates, and the promotion of fodder establishment, conservation and utilization. See pictures 3 and 4.

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Picture 3 and 4: *Bana grass and good quality silage in Hauna*

Picture 5 and 6: *Hay bales for winter feeding in Umzingwane and Stock feed in Marirangwe.*

The result has been a significant increase in the area under improved pastures and fodder crops. The most significant increases were recorded in Hama Ruwomba in Masvingo Province where the average land under fodder production is now 1.33ha and in Rusitu Mayfield where the average land under fodder production is now 1.21ha. See Figure 6.

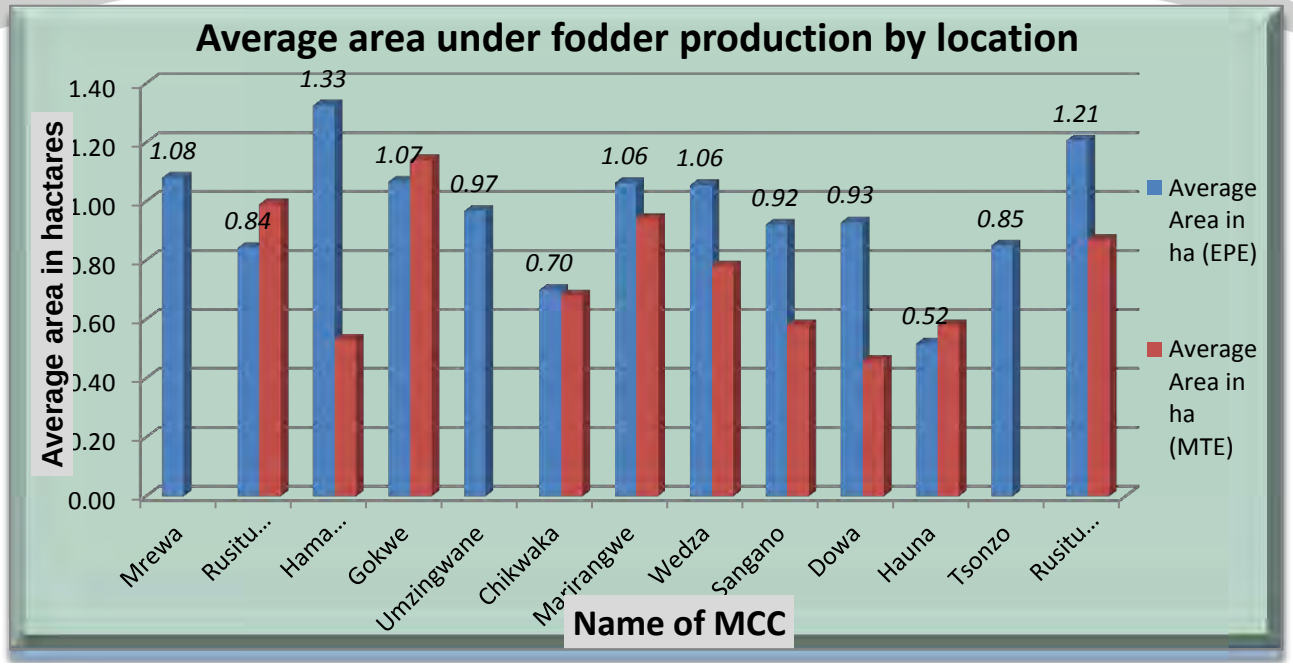

Figure 6: *Average area under fodder production*

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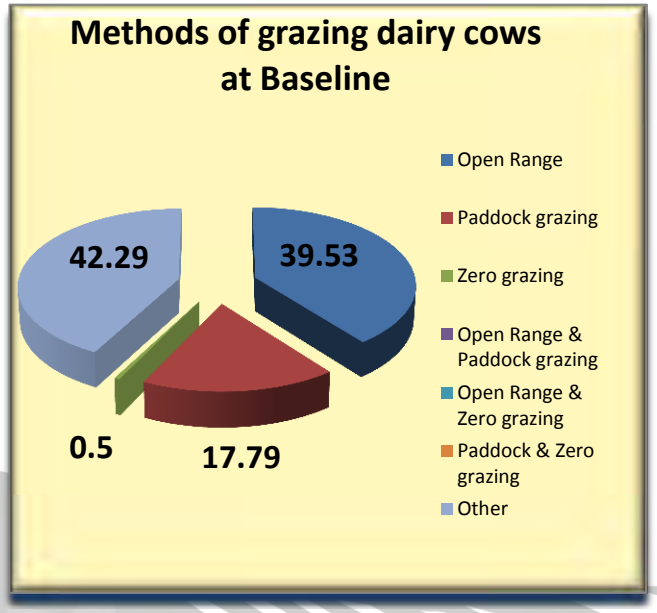
The analysis of methods of grazing and the type of feed for dairy analysis also indicate an increase in the adoption of fodder utilization and feed management practices i.e. greater utilization of fodder and cultivated pastures. See Figures 7 – 10.



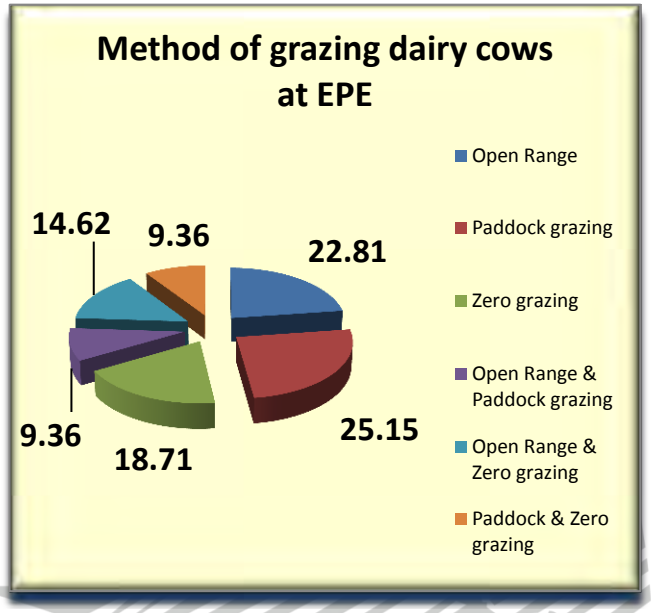
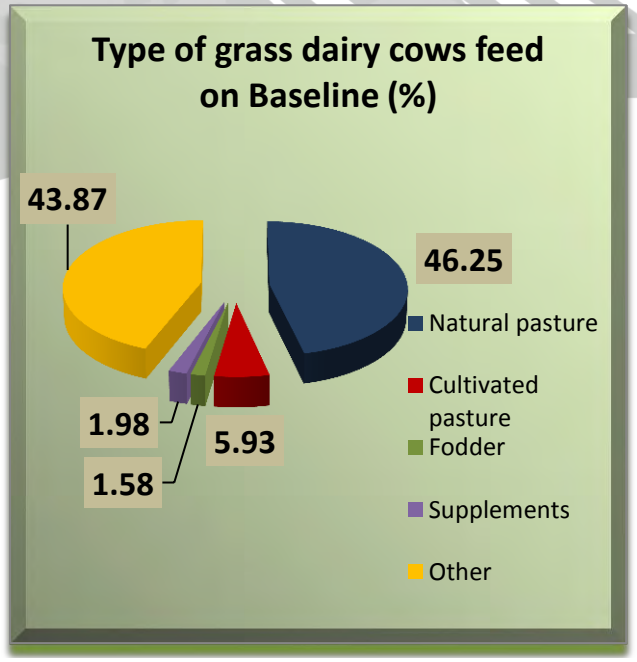


Figure 7 and 8 : Method of grazing dairy cows



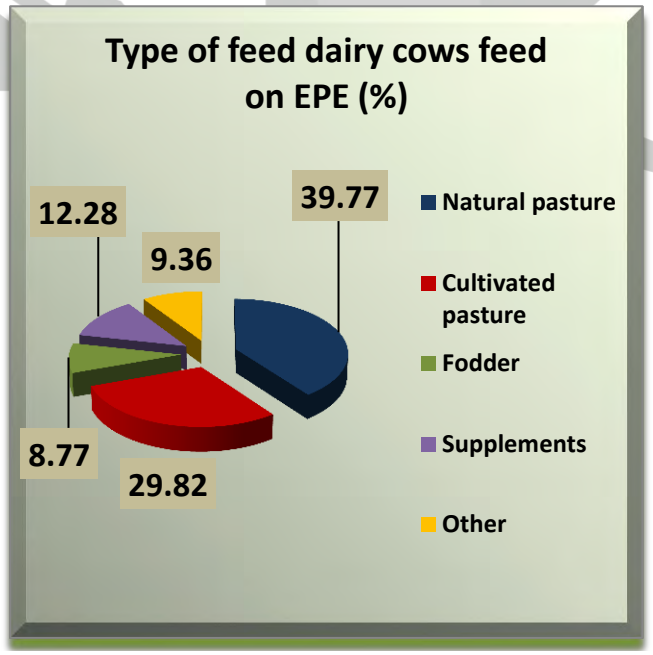


Figure 9 and 10: Type of feeds for dairy cattle.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Component 3: Donkey Traction and Transport Pilot Programme

Component 3 of the ZDL project focused on a pilot programme that promoted donkey traction and transportation. Specific ZDL project component 3 interventions included:-

(i) Facilitated acquisition of donkeys by selected dairy producers.
(ii) Farmer training on donkey management encompassing feeding the donkeys and caring for the acquired donkeys.
(iii) Farmer training on donkey traction.
(iv) Farmer training on donkey harnessing and transportation system.
(v) Farmer training on the design and development of harnessing equipment.
(vi) Training of donkeys in traction, harnessing and commodity (milk) transportation.
(vii) Promotion of the use of the donkey transportation system.

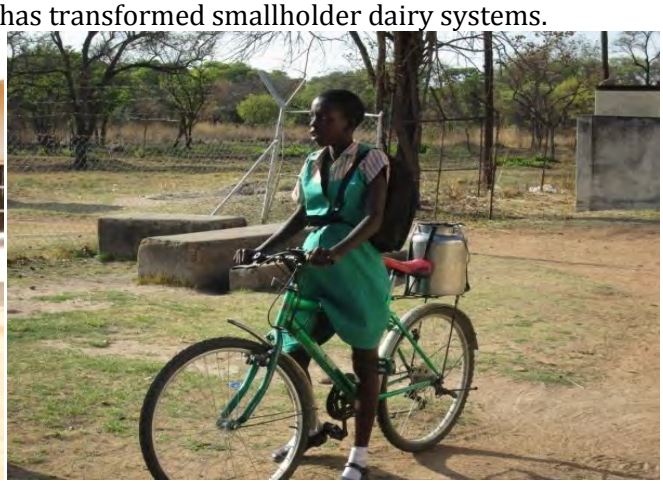
Insights from key informant interviews and focus group discussions revealed how the training and subsequent promotion of donkey traction and milk transportation transformed the smallholder dairy system. However, the achievement rates under Component 3 (donkey traction and transportation pilot programme) have been subdued due to lower uptake. This was largely due to incompatibility with local perceptions, with farmers perceiving donkeys as a poor man's animal and the innovation as retrogressive. Achievement rates with respect to set targets were 41.4% for the gross margin per donkey in traction business, and 77.5% for the number of households contracted with trained service providers for land clearing, ploughing and/or transportation. See Table 4.

***Table 4** :Component 3 Progress Report*

	Baseline	End of Project Evaluation		
Indicator		Project Target	Achieved	Achievement Rate %
Gross margin per donkey in traction business	-	833	345.00	41.42
The number of households contracted with trained service providers for land clearing, ploughing and/or transportation	0	200	155	77.50

Pictures 5 to 8 show how the donkey transportation system, through the use of individual donkeys or specifically designed donkey carts, has transformed smallholder dairy systems.

***Picture 5:**Traditional milk deliveries on foot.*



***Picture 6:**Traditional milk deliveries by bicycle.*

Picture 7:*Group individual donkey transportation.* ***Picture 8:****Group donkey cart transportation.*

In some areas the ZDL project distributed bicycles for both Community Animal Health Workers and to facilitate the transportation of milk to local MCCs. This subsequently improved smallholder dairy farmers' access to a diverse range of milk transportation models. See Figures 11 and 12.

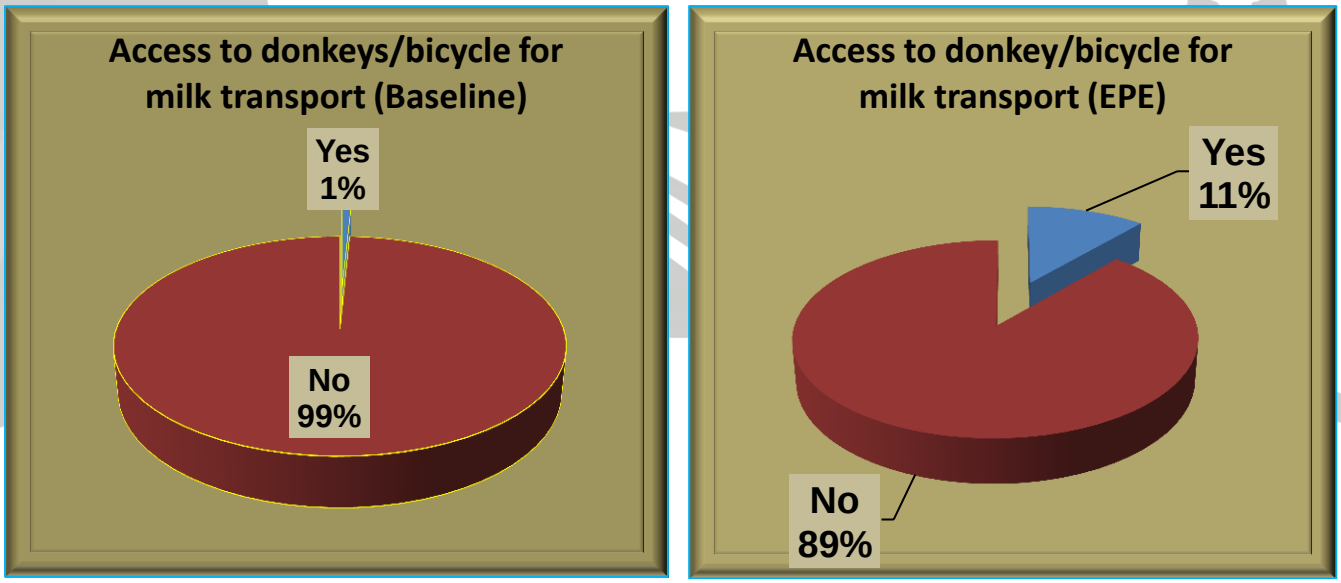


Figure 11 and 12*: Access to donkey/bicycle for milk transport.*

Project Progress in Addressing Environmental, Youth and Gender Concerns

The project addressed environmental concerns by ensuring the monitoring, proper use and safe disposal of syringes and drug containers, prevention of veld fires and the safeguarding of local grazing resources. Through the project's youth in dairy initiative there was promotion of youth incorporation in smallholder dairying, with the youth comprising the highest number of people who received and who stand to benefit from the Community Animal Health Workers training programme. The project also consciously promoted gender equity and the empowerment for both men and women in access to resources and opportunities.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

4.3 Impact

Impact on Household Food Security

Comparative analysis of household data between the baseline period and the end-of-project evaluation periods show strong evidence of the impact of the ZDL project based on results of analysis of months of household inadequate food provisioning. While data from the baseline show strong seasonal variations with between 20 – 25% of the households reporting cases of inadequate food provisioning between October to February, the same period show a proportion of between 4 – 5% of the household reporting cases of inadequate household food provisioning during the final evaluation period. See Figure 13.

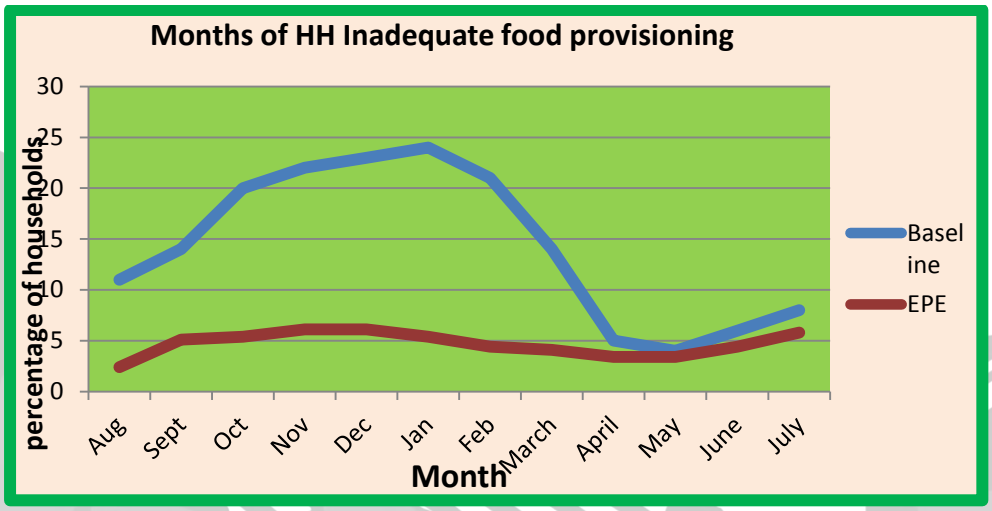
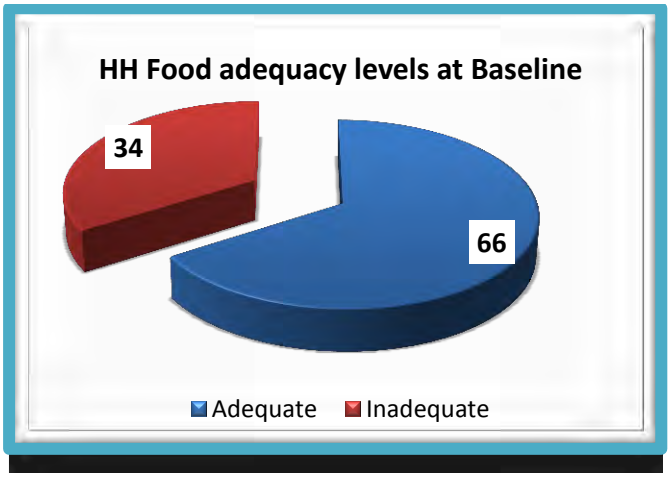
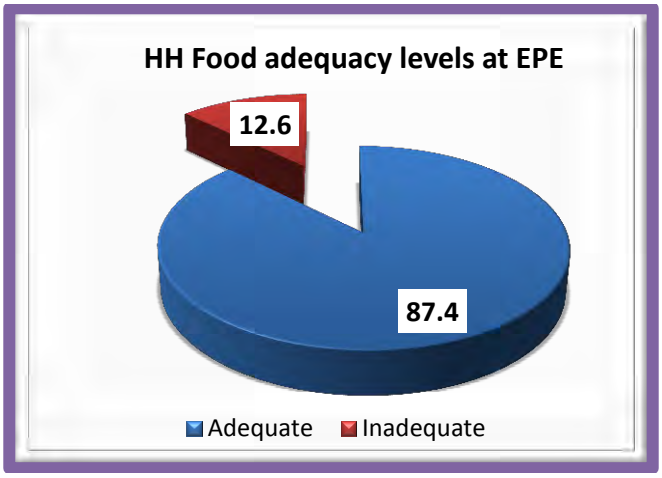


Figure 13 : Months of Household inadequate food provisioning

The project recorded an increase of 21.4% in household food adequacy levels, with 87.4% of the informants interviewed during the end-of-project evaluation period having adequate household food provision, compared to levels of 66.0% at the baseline period. See Figures 14 and 15. Gender disaggregated analysis showed that more male-headed households (88.1%) had adequate household food provisioning compared to female-headed households (83.9%). In a reversal of fortunes, gender disaggregated analysis at the baseline stage showed that less male-headed households (75.7%) had adequate household food provisioning compared to female-headed households (77.8%).





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Figures 14 and 15: *Household food adequacy levels*

Household Dietary Diversity Score (HDDS)

The end-of-project evaluation also assessed the Household Dietary Diversity Score (HDDS) which is calculated by summing the number of food groups consumed in the household over the 24 hour recall period. The HDDS is the sum of the following 12 food groups (cereals, white roots and tubers, vegetables, fruits, meat, eggs, fish and other sea foods, pulses, milk and milk products, oils, sweets and spices). The HDDS is meant to provide an indication of household economic access to food, thus items that require household resources to obtain, such as condiments, sugar and sugary foods, and beverages are included in the score. The dietary diversity scores facilitate the assessment of changes in diet before and after an intervention (improvement expected). The mean HDDS was 8.2 compared to averages of 7.2 during the baseline period and 7.6 during the mid-term evaluation period, which indicates changes in diets and an improved household economic access to food. The corresponding HDDS averages for the different MPAs range from 6.3 (Umzingwane) to 10.4 (Hauna). See Figure 16.

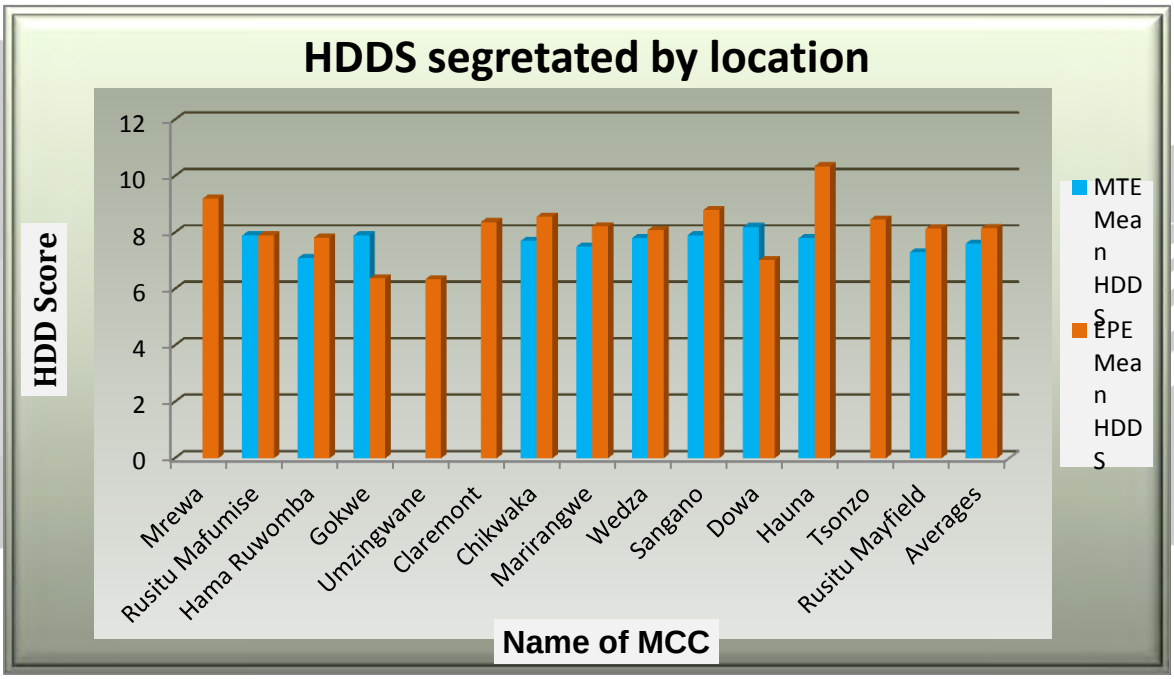

Figure 16: *Mean HDDS segregated by location*

In comparison, the average HDDS for male-headed households is 8.2, while the mean HDDS for female-headed households is 7.9. This compares with an average HDDS of 7.3 for male-headed households and 6.8 for female-headed households at the baseline stage. In both cases, differences are largely due to a differential access to socio-economic resources by male- and female headed households.

Impact on Employment Creation

The number of jobs achieved and attributable to the Feed the Future (FTF) initiative stands at 932, with 783 for males against a target of 369, thereby entailing an achievement rate of 212%, and 149 for females against a target of 188 (79.3%). In tandem with previous statistical results, a higher proportion of male-headed households employed at least one employee (58%) compared to female-headed households (51%). This is based on differential access to resources as discussed above.

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Impact on Household Incomes

Average annual household dairy incomes increased by 743%, increasing from US$312 at the baseline to US$2,943 in 2013. Comparative analysis across different farmer categories shows average annual dairy incomes of US$206 for the control group (non-beneficiaries). The 743% increase in annual dairy incomes is testimony of the impact of the ZDL project. The differences in income levels across the gender divide can be explained by male-headed households' greater access to productive resources that include capital, land, labour, information and technical backstopping services.

Likewise, comparative analysis across different farmer categories also shows average annual household incomes of US$3,021 for the participating households, US$3,374 for participating male-headed households, US$1,420 for participating female-headed households, and US$1,826 for the control group (non-beneficiaries). In comparison, data from the 2011 ZimVAC report show average annual rural household incomes of US$1,560.

Impact on Household Welfare

The proportion of more than 80% rural households having either iron or asbestos roofed houses is also evidence of the impact on household welfare as a result of the integration of smallholder farmers into the mainstream economy given averages from comparative data in ZimVAC reports. See Figure 17.

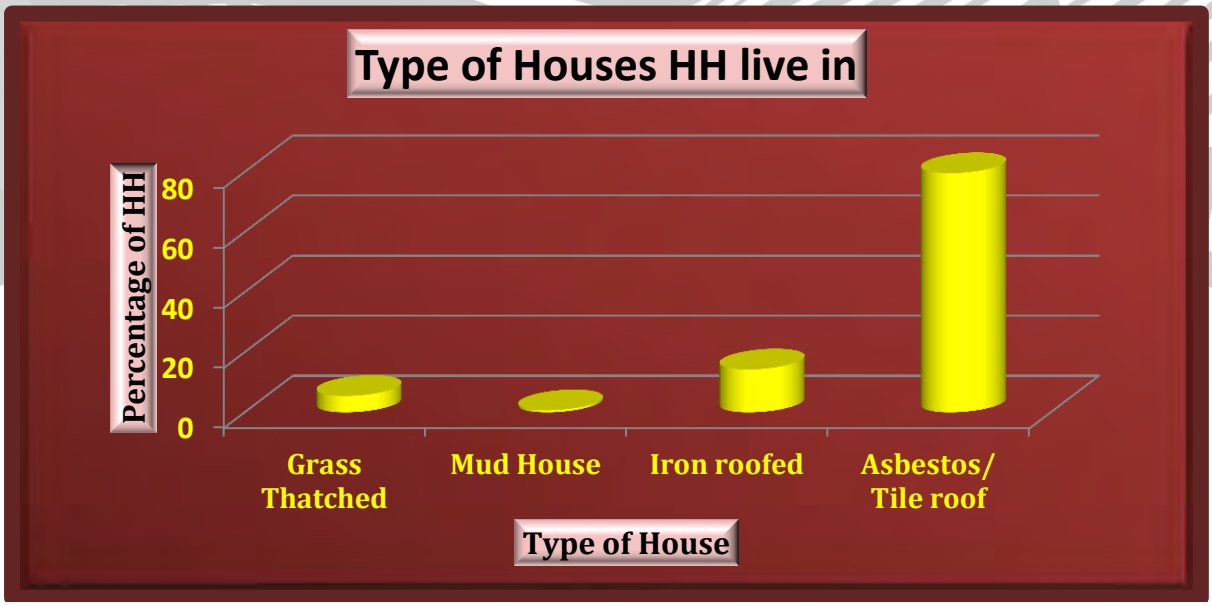

Figure 17: *Types of houses households live in.*

4.4 Economic Analysis

Dairy Gross Margin

Sampling for the Gross Margin Analysis

Farmer selection for Gross Margin Analysis (GMA) adopted a case study approach to allow for in-depth analysis. Thus, while the household survey targeted 240 beneficiaries, GMA was then based on case studies of a diversified but representative group of 30 smallholder dairy farmers

from the selected 14 MCCs, entailing a target sample of at least 2 smallholder dairy farmers from each MCC. However, sampling of GMA case studies were also guided by the need to select and compare the economic performance of smallholder dairy producers across different farmer categories and within the same categories e.g. farmers in the same agro-ecological regions, having benefitted from similar interventions, having the same dairy herd sizes, using the same breeds and management practices. GMA results presented in Table 5 are, however, based on an average case scenario, while results presented in Figure 19 and Table 6 are based on scenario analysis.

Average Scenario GMA

GMA was based on reviews of actual financial revenues and variable costs, while shadow pricing was used to determine the opportunity cost of variable such as family labour. The average scenario dairy GMA established an average gross margin of US$1,199 per cow for a dairy herd with three lactating cows. Viability assessments, based on returns per invested dollar showed a GM/TVC index of 0.63 which means that for every dollar invested by smallholder dairy farmers they are are getting a return of US$0.63. The training and capacity building component within the ZDL project also resulted in a transformation of business management practices e.g. training in "Dairying as a Business" (DaaB) resulted in the abandonment of the false economy where dairy producers limit dairy cow feeding in the hope of cutting on feed costs and increasing margins. However, further GMA analysis based on the equi-marginal principle in economics which is hinged on the realization that optimal profits can only be attained when a dollar invested returns an additional dollar, shows that smallholder dairying although viable is yet to achieve a point of optimal returns.

Table 5: *Dairy gross margin analysis based on a 3-cow unit.*

Details	Unit	Quantity	Price per unit	Cost
Dairy Income		3 Cows		
Value of milk sold to MCC	litres	15661.8	0.45	7047.80
Value of milk sold locally	litres	2264	1.00	2264.00
Dividends received				0.00
Total Gross Income				9311.80
				19925.8
Variable Costs				
Purchased feeds stock feeds	kg	8750	0.36	3150.00
Home grown feeds Hay	bale	28	2	56.50
Home grown feeds Silage	kg	966	0.05	48.30
Veterinary costs				240.00
Hired labour				600.00
Family labour				900.00
Transport costs				720.00
Total Variable Costs				5714.80
Gross Margins				
Gross Margin				3597.00
GM per Cow				1199.00
GM/TVC				0.63
GM per feed costs				1.11
GM per Litre				0.20

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Scenario GMA

All scenario GMA were hinged on dairy herds with cross-bred animals and herd sizes based on the number of lactating cows. Scenario GMA was then based on analysis of gross margin case studies in three different scenarios *viz:-*

(i) Category A (Zero grazing, Benefitted from in-calf heifer from LOL, 1st lactation).
(ii) Category B (Zero grazing, Benefitted from in-calf heifer from LOL, 3rd lactation).
(iii) Category C (Paddock or Free/Open range grazing, Using own dairy cross-bred animals but benefitted from training from LOL, 3rd lactation).

Cross-category comparative GMA shows that Category C farmers (relying on semi-zero grazing through use of the paddock system, with their own animals but benefitting from the ZDL project training and capacity building initiatives, and with cows on their 3rd lactation) tended to be better performing economically, with better GMA results. The need for a minimum threshold of two or three lactating cows to ensure viability of smallholder dairying remains the same. See Figure 18.

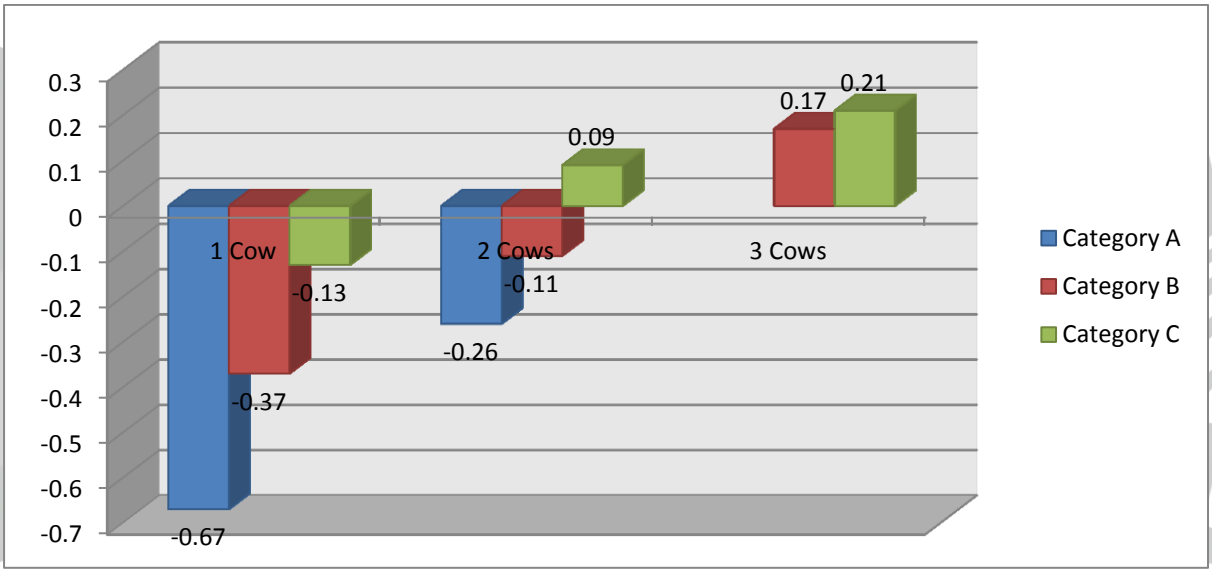

Figure 18: *Cross Category GMA comparative results.*

The results from comparative scenario GMA ran by Land O' Lakes supports the results above in which semi-zero grazing or use of the paddock system generates the highest returns per dollar invested, with GM/TVC figures ranging from 2.14 – 3.53. See Table 6.

Table 6: *LOL scenario GMA*

MCC	**Scenario 1** *Maize Cash Crop; Buying All Feed*	**Scenario 2** *High Value Cash Crop; Buy All Feed*	**Scenario 3** *Combination of Maize and Fodder for Feed*	**Scenario 4** *Grazing; Buy Feed as and when Necessary*	**Scenario 5** *Zero Grazing of all Dairy Cows; Buy all Feed*
Hauna	0.99	1.38	1.77	2.60	1.09
Rusitu	1.18	1.35	1.80	3.53	1.01
Marirangwe	0.74	0.27	0.83	3.45	0.88
Gokwe	0.84	-	1.57	2.14	0.45

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Donkey Gross Margin

As elaborated in the two case studies below, donkey transportation is now an alternative income generation activity for smallholder dairy farmers. A GMA of the donkey milk transportation enterprise based on a case study of 4 donkeys each with a capacity to transport 40 litres to the MCC twice per day. However, the donkey GMA was based on actual schedule, cost and returns on the ground. Due to their low maintenance costs, the donkey milk transportation enterprise has a gross margin of US$345 and a GM/TVC of 3.34 entailing a return of US$3.34 for each dollar invested. See Table 7.

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Table 7: *Donkey gross margin analysis.*

Details	Unit	Quantity	Price per unit	Cost
Donkey Income		4 Donkeys		
Income from milk transportation	$	35866	0.05	1793.30
Total Gross Income	$			1793.30
Variable Costs				
Purchased feeds				0.00
Maize grain supplements	kg	195	0.12	23.40
Veterinary costs				30.00
Hired labour				0.00
Family labour	months	12 * 0.5	60	360.00
Total Variable Costs				413.40
GROSS MARGINS				
Gross Margin				**1379.90**
GM per Donkey				**345.00**
GM/TVC				**3.34**
GM per Feed costs				**58.97**

Cost Savings from Group Milk Transportation

The group transportation of milk using donkeys has transformed the milk delivery and transportation system within the smallholder dairy subsector. Below are two case studies.

Case Study 1: Rusitu United

The Before Situation:

Before the Land O' Lakes ZDL project intervention, milk marketing, just as in milk production, was a very individualized activity. Each farmer would ferry their own milk to the MCC using their own means. The majority of farmers used to carry milk cans on person and walked to the MCC. An insignificant few used bicycles. Distances from the production plots to the MCC ranged from 1 – 8km, with farmers in the 6 – 7km radius failing to deliver milk in the afternoons. This is because a usual trip would require an hour for the forward journey, half-an-hour at the MCC, and another hour for the return trip (total of 2½ hours for a single trip and 5 hours for 2 trips). As a result, double trips within a single day left farmers with very little time to do anything else n the farm. Milk volumes ranged from as little as 2 – 14 litres per farmer, which made deliveries to the MCC an unviable venture for a number of smallholder dairy farmers leading to increased cases of side-marketing and/or total abandonment of the enterprise. A number of producers were discouraged by the long distances and low milk volumes delivered resulting in non-deliveries and viability challenges for the MCCs and MPAs.

Group Transportation Model and Arrangements:

The ZDL project facilitated farmers' access to in-calf heifers through a revolving cattle loan facility, facilitated improvements in MCC administration and management, provided training on preventive animal health and rangeland/fodder flow management, and promoted the use of donkeys in traction and milk transportation. Milk production volumes have since improved to an average of 10 litres per farmer. A group of farmers in Rusitu United acquired eight donkeys through LOL's revolving fund. The group has a potential membership of 20 farmers which can make use of 5 donkeys at any given time. Each donkey cost US$150 including the transport fee. Beneficiaries are individual farmers who own these donkeys but with the potential for group ownership within the framework of a cooperative group arrangement. For the group transportation arrangement, individual farmers deliver milk to a sub-collection centre. The milk is then weighed, assessed for quality and recorded. The milk is then bulked and is ferried to the MCC by the donkeys. Each donkey has the capacity to carry 40 litres of milk for each trip, with farmers paying US$0.05 per litre. Group milk donkey transportation has meant great time savings for the involved farmers. This has in turn reduced the problem of side-marketing and improved milk deliveries to the MCC. The MPA and individual members also stand to benefit from an incremental premium bonus of up to 15% paid by the processor (DZL) as an incentive for increased milk deliveries. The other donkeys can also be utilized for traction, ploughing, fetching water.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Case Study 2: Sangano

The Before Situation:

Between 2010 and 2012, the Milk Producers Association (MPA) in Sangano had a vehicle which used to collect milk from distant milk producers and deliver processed dairy products to the markets. The association also had a tri-cycle which was used for collecting milk from farmers living up to 12km from the MCC. However, the two modes of transportation proved to be expensive for the association and for the individual farmers. Even when a milk collection charge of US$0.03 was levied on every litre collected, the money raised by the MPA was inadequate to cover mileage (fuel and maintenance) costs for the vehicle. Evidently, the association was failing to maintain or repair the vehicle every time the vehicle broke down. On the other hand, increasing the milk collection charges beyond US$0.03 rendered smallholder dairy production unviable due to the very low production volumes then. Individual deliveries of milk to the MCC was also too expensive for the farmers in terms of the unit cost to the individual farmers and the opportunity cost of their labour.

Group Transportation Model and Arrangements:

Land O' Lakes' ZDL project then took two farmers per MPA to Mozambique for training on donkey traction and transportation. Training focused on donkey management, donkey traction, donkey harnessing and transportation system, the design and development of harnessing equipment, as well as the use of donkeys in traction, harnessing and commodity (milk) transportation. LOL facilitated the acquisition of a group of donkeys by the farmer group in St. Faith Mission area. The ZDL project then fabricated a light donkey cart for use in ferrying the milk.

Impact to Date:

Compared to other modes of milk transportation, donkeys have proved to have an economic comparative advantage. As examples, donkeys provider a cheaper transportation option than use of an association vehicle or commuter omnibuses (see analysis below); donkeys are harder, faster and can go for longer distances than cattle; they are smaller in stature and are therefore easier to work with; donkeys can carry heavier loads than bicycles; donkeys are a lower maintenance animals surviving largely through veld grazing while the supplementary feeding of donkeys is usually not necessary; donkeys can run on nothing or very little medication; the light donkey cart comprises of only a few parts which drastically lowers maintenance costs. Tangible benefits for the farmers have included an increase in the milk volumes transported, reduced unit milk transportation costs, great cost savings and greater milk delivery efficiency.

Comparative economic analysis have since shown that the shift from individual milk deliveries to the adoption of the group milk donkey transportation model has translated into US$2,992.50 in cost savings for the group on an annual basis. See Table 8. Similarly, comparative economic analysis for the Sangano case study have shown that the shift from individual milk deliveries to the adoption of the group milk donkey transportation model has translated into US$50,966 in cost savings for the group on an annual basis. See Table 9.

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Table 8: Cost savings based on individual donkey milk transportation (Rusitu)

Conventional Individual Milk Transportation		Group/Cooperative Donkey Milk Transportation	
Details	**Cost (USD)**	**Details**	**Cost (USD)**
Labour		**Capital Costs**	
Opportunity Cost of Labour 2.5 hrs x 2 trips x 365 days x 20 farmers x $0.125/hr*	4562.50	Purchase of 5 donkeys at US$150 each	750.00
		Feed	
		Natural grazing for the 5 donkeys	0.00
		Supplementary feeds	0.00
		Veterinary Costs	
		Basic veterinary costs e.g. treating donkey sores	100.00
		Labour	
		Hired labour for transportation and donkey care	720.00
		Cost Savings	**2992.50**
Total Cost	**4562.50**	**Total Cost**	**4562.50**

* Cost of casual labour = US$5/8-hr labour day

Table 9: Cost savings based on donkey cart milk transportation (Sangano)

Conventional Individual Milk Transportation		Group & Cooperative Donkey Milk Transportation	
Details	**Cost USD**	**Details**	**Cost USD**
Transport Cost		**Capital Costs**	
US$5 x 365 days x 25 farmers	45625.00	Purchase of 2 donkeys at US$150 each	300.00
		Light donkey milk cart	350.00
Labour		**Maintenance Costs**	
Opportunity Cost of Labour 7 hrs x 1 trip x 365 days x 25 farmers x $0.125/hr*	7984.38	Maintenance costs @ US$5/month	60.00
		Feed	
		Natural grazing for the 2 donkeys	0.00
		Grain supplements	93.60
		Veterinary Costs	
		Basic veterinary costs e.g. treating donkey sores	40.00
		Labour	
		Hired labour for managing group transportation	1800.00
		Cost Savings	**50965.78**
Total Cost	**53609.38**	**Total Cost**	**53609.38**

* Cost of casual labour = US$5/8-hr labour day

When compared with vehicle running costs (even when these are proportionally calculated), the donkey milk transportation model still amounted to US$71,171.40 in annual cost savings for the MPA and the farmers.

MCC Viability Assessments

MCC viability assessments were targeted at only six (6) of the 14 selected MCCs. The viability assessments showed that the majority of MCCs are operating as viable entities. Gross profits, based on the differences between gross milk sales revenue and direct MCC running costs, are positive for all the six (6) selected case study MCCs, with a range of US$4,595.70 (Dowa) to US$110,297.86 (Rusitu Mayfield). Operational expenses which include farmer payments, for the period under review (October 2011 – November 2012) have been very steep, hence all schemes, with the exception of Gokwe, had a negative net operating income. However, after taking cognizance of other income which includes office rentals, margins from feed and drug sales, farmer subscriptions, and AI service fees a number of MCCs managed to declare positive net incomes. Notable cases include Gokwe with a net income of US$65,312.03, Marirangwe (US$4,681.91) and Rusitu United (US$4,364.12). Meanwhile, the net income for Rusitu Mayfield has been insignificant while Hama Ruwomba and Dowa shows struggling enterprises but still managing to break-even. Data from other sources also show that 15 out of the 21 MCCs are breaking-even as a result of use of the Cost of Production (COP) model which ensures that MCCs can meet all their costs, with those not breaking-even not using the COP model and instead using fixed farmer payouts.

In addition to generic challenges within the smallholder dairying sector, some dairy schemes are constrained by their design as suppliers of a primary product (raw milk) to established processors. In some cases, low production volumes have also acted as an inhibiting factor to supplying established processors or setting up of own processing initiatives. On the other hand, low production volumes, high feed costs, low producer prices, meager returns and subsequent low incomes have encouraged non-delivery to MCCs and side-marketing by MCC members, thereby negatively impacting on MCC viability. Sustained efforts in capacity building tied to improvements in individual farmer and association dairy herd sizes, quality of dairy breeds and management can significantly improve gross profits, net operating incomes and net incomes.

ZDL Project Cost-Benefit Analysis

Impact and economic analysis, based on capital investment appraisal methods focused on the use of the Cost Benefit Analysis (CBA) tool in assessing the returns to total project investment. While an economic CBA would have been more appropriate considering the intangible costs and benefits to the communities as well as the existence of both positive and negative externalities, limited resources and a limited timeframe made this impossible.

In conducting the financial CBA consideration during the four year ZDL project period focused on all ZDL project costs (the investment) as determined by:-

(i) In-calf heifer acquisition costs,
(ii) Annual support for MCC upgrades and capacity building,
(iii) Support for other initiatives e.g. training and capacity building for dairy farmers.
(iv) ZDL project personnel and administration costs.

Likewise, estimated value of benefit streams were largely drawn out of:-

(i) Incremental milk sales volumes and values.
(ii) Incremental sales and value of other dairy products.
(iii) Growth in dairy stock/asset values.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Project costs and benefits beyond the 14-year project period were estimated based on a multiplier factor determined by, *inter alia*, the expected herd growth rate. Specific assumptions for both the cost and benefit streams were:-

(i) There are no significant variations in weather.
(ii) There are no changes in policy and the macro-economic environment.

(iii) Annual dairy incomes increase by a factor of 1.7 or 70% based on an increase in average dairy incomes from US$312 in 2010 to US$2,943 in 2013.
(iv) The dairy herd and the dairy stock asset base grows by an annual factor of 1.3 or 30%.
(v) Beneficiary households also gain from cost savings e.g. by using organic manure in place of chemical fertilizers in their fodder and crop production, whose value is also factored in the determination of total benefits.
(vi) A discount rate in tandem with international lending rates of 10%.

Detailed results of the financial CBA are presented below in Table 10.

Table 10: *Financial cost benefit analysis of the ZDL project.*

Year		BENEFIT Revenue	COST Total Expenses	Net Income
1	2010	553,315.15	1,152,615.01	(599,299.86)
2	2011	1,182,825.76	1,072,475.47	110,350.29
3	2012	1,913,927.78	1,220,276.39	693,651.39
4	2013	3,127,738.43	2,351,633.13	776,105.30
5	2014	5,153,434.89	0.00	5,153,434.89

The financial CBA produced the following results:-

(i) NPV = $3,797,499.06
(ii) BCR= 1.85
(iii) IRR= 104%

CBA shows that smallholder dairying is a quick return investment. The NPV of $3,797,499 over a 5-year period is quite positive and worthwhile. The BCR of 1.85 entails that the ZDL project can yield US$1.85 in discounted money for each US$1.00 invested, while the IRR of 104% is very competitive given that financial interest rates range from 18 – 35%.

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4.5 Efficiency

Efficiency Analysis

Efficiency measures the input-output relationships during project implementation, and answers the question on howcost-effective project implementation has been. Despite minor hiccups in some areas, reports from the ground provide the impression that there was timeliness in service provision (e.g. training and capacity building) and the distributions of inputs (seed/planting material for demo plots). Farmers cost-sharing and a pro-business approach, which made farmers bankable, have been more cost effective. Use of the revolving cattle loan facility was also an efficient way of distributing livestock to beneficiaries. The challenge of dead mileage, an inherent problem in a number of rural development projects, was non-existent given the strategic placement of Land O' Lakes project areas in places that allowed them easy access to all the 2 – 3 MPAs/MCCs they were working with. The introduction of the group milk donkey transportation model has also brought tangible benefits for the farmers in the form of increases in the milk volumes transported, great cost savings and greater milk delivery efficiency. Efficiency issues that need to be improved related to coordination issues with government, an issue related to USAID policy which prohibits the funding of government activities.

ZDL Project Quantitative Efficiency Analysis Results

Quantitative efficiency analysis were based on the CBA of the ZDL project by comparing the differences in returns when in-calf heifers are bought locally (as was the case) and when they are imported from South Africa (based on the alternative option that was available for the ZDL project). The CBA analysis based on the option of acquiring in-calf heifers from South Africa at US$2,200 instead of purchasing locally at US$1,500 not only ensured cost savings but also better financial analysis results. This is because the South African option has lower returns to investment given an NPV of US$2,814,840.78, a BCR of 1.52 and an IRR of 61%.

4.6 Sustainability

The ZDL project initiatives, activities and benefits accruing to smallholder dairy farmers and the target communities are likely to be sustainable beyond the lifespan of the project. This is based on various exit strategies put in place by Land O' Lakes as elaborated below.

Exit Strategies in Place

Revolving Dairy Cattle Loan Scheme

The introduction of a revolving dairy cattle scheme, through the facilitated access to in-calf heifers by farmers, coupled with training and capacity building (as elaborated below), transformed the thinking in smallholder farmers on how they approach dairying as a business. As already highlighted, the dairy cattle loan facility and the provision of in-calf heifers, significantly increased the number of farmers with dairy/lactating cows thereby reviving dairying for a number of households who were out of business for a long time. However, the cattle bank facility will only continue to be sustainable if farmers continue to repay their loans.

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Collaboration with Strategic Partners

The ZDL Project, while being implemented by Land O' Lakes, had a number of implementing and collaboration partners on the ground. Public/government implementing partners included the Dairy Development Programme (DDP), the Department of Livestock Production and Development (LPD), the Department of Veterinary Services (DVS), and the Department of Agricultural, Technical and Extension Services (AGRITEX). Collaborating partners roped into the initiative by Land O' Lakes included private sector firms, notably processors such as Dairibord Zimbabwe Limited (DZL), Dendairy, Kefalos and Red Dane Farm. On the other hand, the main financial institution collaborating on the ZDL project was MicroKing, which is a subsidiary of Kingdom Bank. By involving implementing partners, such as public stakeholder institutions, commodity associations notably the Zimbabwe Association of Dairy Farmers (ZADF), financial institutions, and private agribusiness firms, the ZDL project ensured the development of in-built sustainability mechanisms for all project initiatives thereby warranting continued service provision and the accrual of benefits to target communities.

Training and Capacity Building

Training and capacity building formed a significant component of the ZDL project. Specific training was targeted at individual beneficiary dairy farmers, MPA and multiple committee members, as well as MCC staff. Technical training was fortified by training on business management, transparency and governance. Such training has had the impact of reinforcing social and institutional capital by strengthening capacities at the farm, MCC and community levels and hence increased the resilience of not just individual dairy enterprises but for entire MPAs and communities. This entails that benefits can continue to accrue to target communities post-project funding and indeed beyond the lifespan of the ZDL project.

Community Structures Managing the Project

A number of committees were developed and established to assist in managing the ZDL project. Examples include MCC management committees, MPA executive committees, cattle bank facility committees, livestock committees, fodder production committees, AI/cattle breeding committees, marketing committees, community livestock workers committee, women in dairy committees, and youth in dairy committees. Such committees are useful in assisting in programme and activity planning, facilitating the implementation of project activities, monitoring and reviewing progress, provision of feedback, and ensuring that corrective action has been taken. Sustained project management through established local community structures has also been enhanced due to, as highlighted above, training and capacity building of not just the individual beneficiary smallholder dairy farmers but also the various local structures.

Sustainability Risk and Potential Challenges

However, some MCCs may not remain sustainable because of inherent challenges within MPAs and the specific MCCs. Case examples include Dowa and Umzingwane where low milk yields and deliveries, poor governance, the long distances to the markets, and poor road network and complementary infrastructure could hamper sustainability. A killer assumption for the sustainability of smallholder dairying that all serves as a major risk factor is socio-politico-economic stability. The moment that this socio-politico-economic stability is lost this will entail another demise of smallholder dairying.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Potential for Up-Scaling

The Land O' Lakes ZDL project activities have great potential for replication and up-scaling given that the project addressed a real felt need, smallholder dairying significantly supports local livelihoods, dairy production is a traditional practice entailing widespread skills in the practice, and due to the potential benefits and rewards that can be reaped form participating in the smallholder dairy sub-sector. There is also scope for easy entry and exit in the enterprise given that local indigenous cows can easily be crossed through cutting-edge technologies such as artificial insemination for purposes of initiating and growing the smallholder dairy herd.

4.7 Best Practices and Lessons Learnt

Best Practices

There are a number of good practices that the ZDL project adopted that ensured success, enhanced efficiency, and stakeholder buy in which can be replicated by other projects. One of the best practices was the adoption of a pro-business approach which improved the bankability of resource-poor farmers through capacity building by business development specialists and ensuring that smallholder dairying remained viable, training of producers and MPAs in strategic planning, linking MPAs with milk processors and ensuring improved milk quality and volumes (e.g. the project's promotion of platform tests which improved smallholder dairy milk products' access to formal markets), and initiating sustainable linkages with the private sector since established linkages are likely to continue beyond the lifespan of the ZDL project (e.g. cost sharing, the cattle bank facility and the Micro King provision). The other ZDL project best practices were the use of a Cost of Production model in determining farmer payments and thereby ensuring that smallholder dairying remains both viable and sustainable, the capacity building of ZADF as the local partner to ensure that their services are more appropriate to the need of smallholder dairy farmers, linking producers to insurance and other financial services, and the introduction of record keeping and the Accounting Bureau System (ABS).

Lessons Learnt

This end-of-project (final) evaluation produced the following lessons that can be used as an input in future LOL and/or USAID programming:-

- Managing expectations in an area where there is a long history of donor aid, and changing mindsets within a short-term project is problematic.
- While the introduction of the group donkey transport model was a noble idea, in some areas the long distances made alternative and traditional modes of transport, e.g. bicycles, more appropriate.
- The ABS system is important to reveal the true financial position of the MCC, and it assists the farmers to plan their operations efficiently.
- To allow the current MCCs to operate effectively and efficiently and to build confidence with the stakeholders, it is important to address governance and financial transparency issues.
- Dairying is a volumes business, and it is essential that the break even volumes are reached for the centers to break even.
- The involvement of the private sector to help provide services, especially in regard to the agro inputs, is key to sustainability.
- As livestock and dairying is a medium term investment, farmers' time horizons need to be further than one season.

- Capacity development should be an integral component of any rural economic development initiative.
- Community structures, group work and coordination are key to project success.
- The idea of a revolving fund is a noble one but it requires consistent monitoring, which is an area where most MPAs are still lagging behind.
- The establishment of a good farmer association and having farmer contracts are not sufficient conditions for success in smallholder dairying when there is no enforcement or when the environment on the ground does not facilitate the enforcement of such legislation.

4.8. Constraints and Challenges

Constraints and Challenges at the Farm Level

The following constraints and challenges were identified at farm level:-

- The commercialization of the services offered by Community Animal Health Workers was not fully appreciated and supported by the communities. This could be linked to the donor-dependency syndrome and expectations by farmers to receive free services from one season to another.
- As already highlighted, there were issues of poor coordination with the government as a result of USAID policy which forbids funding of government activities. However, the ZDL project, responded by establishing the ZADF working group.
- Private sector view of smallholder farmers in the past was one of corporate social responsibility rather than a reliable business partner.
- Due to the short duration of the initial 16 months for the dairy project, this led to challenges with targeting and approach in some areas in phase 1. With a longer time horizon, earlier implementation and approaches would have been different e.g. more time was necessary for strengthening the cattle bank facility/revolving fund, allowing farmers to be better prepared and targeting of MCCs with direct links to processors.

Constraints and Challenges at the MCC Level

The following constraints and challenges were identified at MCC level:-

- Due to USAID regulations and the short nature of the project MPAs where there had been existing structures were targeted. While appearing to be useful in terms of time and impact, often these sites for the MPAs/MCCs are no longer central to milk producers, and in addition often have poor access to formal processors current milk collection routes e.g. Dowa which is ± 60km from both Marondera and Rusape lack access to viable, reliable and sustainable markets.
- Many MCCs and stakeholders view that "value addition" or the processing of milk for MPAs is a viable option when producing for a local market. However, analysis jointly conducted by the ZDL project and MPAs to help determine cost of inputs and viability showed most as non-viable.
- In some areas and for some MCCs, the lack of understanding by some stakeholders of the benefits they were supposed to derive from the project resulted in lack of or poor cooperation.
- Inherent profitability and viability challenges in some MCCs.
- Poor administration and governance in some MCCs which have resulted in closures.
- Founder member syndrome characterized by an unwillingness to attract new members. Many MCCs struggling to understand value drivers of volumes and membership to viability of centres due to historical dependency syndrome and operating for too long under a relief mode e.g. some MPAs perceive MCCs as donor sinks.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

Constraints and Challenges at the Milk Value Chain Level

The following constraints and challenges were identified at milk value chain level:-

- Given the history of smallholder dairying, from a humanitarian then a relief and now a pro-business approach, beneficiaries and target groups took longer to understand the motives, goal and objectives of the project. Consistent training and capacity building efforts established a common and shared vision.
- Despite benefitting from training and capacity building, farmers still fail to optimize production due to lack of inputs (seed, fertilizer) and equipment for critical processes e.g. silage cutting. To this end the project trained artisans and made available manual silage cutters which farmers refused since they had already been exposed to and favoured motorized silage cutters. However, the facilitated link with Micro-King can assist dairy farmers to access resources for inputs and equipment.
- Despite emerging as an innovative and cost-effective milk transportation model, the use of donkeys in group milk collection was not adopted as well as originally anticipated. This is because donkeys are culturally viewed as the poor man's animal, with some target beneficiaries perceiving this as a drawback. In other areas this was because of the long distances between the production areas and the MCCs e.g. up to 50km in Wedza. The ZDL project redesigned the intervention by giving the MPAs bicycles.

14 John Plagis Avenue, Alexander Park, Harare, Zimbabwe. Phone: +263 774 168 290. Email: dammicarr@hotmail.com

4.9 Recommendations

The following are key recommendations, on the basis of which continued and future programming can be improved:-

(i) Given the ZDL project's overall physical progress achievement rate of 97.2%, an increase of 21.4% in household food adequacy levels, and an increase of 221% in average annual dairy incomes, there is need to upscale and replicate this intervention in other Land O' Lakes and USAID sites, with slight tweaking in project design for adaptation purposes only but no major reviews are necessary.

(ii) A major identified constraint has been the short-term nature of the ZDL project which has not allowed ample time for Cattle Bank Facility (CBF) loan repayments, viability and for individual dairy farmers to achieve full potential. We, thus recommend more time to allow farmers having started with one cow from the CBF to graduate to the Micro King loan products to access more than one animal thus reaching the optimum herd size of 3-5 cows faster, and thereby ensuring the viability of participating smallholder dairy farmers.

(iii) Small herd sizes and low dairy stock numbers have been making it difficult for both smallholder dairy producers and MCCs to breakeven. Subsequently, the introductions of the CBF and linkages to the Micro King facility have been reversing smallholder dairy producers' fortunes. However, there is need to sustain the facilitated access to in-calf heifers of an appropriate breed (preferably crosses) by vulnerable households.

(iv) Beneficiary smallholder dairy producers have been failing to optimize production due to lack of inputs and equipment for critical processes, notably for silage cutting. To this end the project trained artisans and made available manual silage cutters which farmers refused since they had already been exposed to and favoured motorized silage cutters. This makes it critical that there be facilitated linkages with alternative sources of input finance e.g. Micro-King can assist dairy farmers to access resources for inputs and equipment.

(v) There has been a significant increase in the area under improved pastures and fodder crops. Future programming should consider ways of ensuring an exponential increase in adoption and the expansion of the area under improved pastures and fodder crops e.g. as the case of conservation agriculture in Zimbabwe. Such a phenomena would reduce the cost of feed and thereby increase the annual gross margin per dairy cow in lactation.

(vi) While the introduction of Community Livestock Workers (CLWs) has promoted the idea of dispersed, active and locally accountable community workers who can work in a range of livestock activities, addressing services that are in demand and are best delivered locally, there is need to expand the CLWs concept e.g. through the training of more dairy farmers as CLWs.

(vii) Given coordination challenges on the ground, coordination with public players should be prioritized e.g. wider pre-implementation stakeholder consultation and the joint planning of interventions to ensure that interventions are more need-based and can generate greater impact on the ground.

(viii) Despite the low uptake, the group donkey transportation system remains innovative and very cost effective. In addition, despite the fact that dairy cows have the potential to be milked thrice per day, a number of farmers are still making morning milk deliveries only due to the distances and low unit volumes thereby limiting overall milk supplies to the MCCs. There is thus need for further scoping studies on present and

alternative transport systems especially for farmers who are located at a distance from the MCCs. Such a study could focus on the suitability of donkeys in all areas, factors affecting the adoption of such an innovation, long-term costs and benefits, comparative costs for tricycle milk collection systems, and other alternative models.

(ix) Three years of project cycle is insufficient particularly for a dairy project to see significant impact or the long term sustainability of the project. Hence there is need to extend the programme for another three-year phase to build capacities before weaning off the current target MPAs/MCCs.

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Appendixes

Appendix 1: Scope of Work

Appendix 2: Detailed Description of Evaluation Design and Methods

Appendix 3: Key Informant Interview Checklist

Appendix 4: HH Survey Questionnaire

Appendix 5: FGD Guide

Appendix 6: GMA Tool

Appendix 7: MSC Case Study Tool