

# **MID-TERM REVIEW**

**Land O'Lakes Zambia**

**Title II Development Activity Program**

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## **EXECUTIVE SUMMARY**

### ***Introduction***

1. Land O'Lakes Zambia (LOL/Z) is currently implementing a five-year P.L. 480 Title II program with the aim of promoting improved food security among rural smallholder farmers. The project, entitled *Title II Development Assistance Program*, is a grant from USAID's Office of Food for Peace (FFP) and aims to contribute to FFP's new Strategic Objective (SO) of "reducing food insecurity among vulnerable populations". The program is specifically designed to target the food access element of food security by working towards improved smallholder incomes through dairy development and expansion of a warehouse receipt marketing program.

2. The Title II DAP is now at its mid-point and this external review was commissioned by LOL/Z to look with fresh eyes at the development process set in motion and to help Land O'Lakes, its subcontractors, and FFP program managers to understand better how project activities are (or are not) contributing to USAID's food security strategic objective and results indicators. In so doing, the mid-term consultant was requested to identify major lessons learned from the experience so far and to recommend strategies for increasing the program's effectiveness with the resources and time remaining under the current agreement.

3. The Mid-Term Review (MTR) was also asked to reflect on whether and how a dairy activity like the Land O'Lakes program might be incorporated in future Title II programs. This is the first time Land O'Lakes has implemented a Title II activity and project managers expressed interest in knowing how well the value chain approach works when focused specifically on food insecure beneficiaries. Equally, FFP expressed interest in knowing about the program's cost-effectiveness and potential outreach of dairy development as a model for sustainable poverty reduction. What aspects of the DAP are working well and what aspects are not, how appropriate is an incomes approach to reducing food insecurity, and is dairy development really an effective model for reaching the main Title II target group?

### ***Objectives of the DAP***

4. In the Zambian context, the challenge of reducing food insecurity for vulnerable people most usually means helping communities to cope better with the risk of drought. Less than 12% of the country's total estimated irrigation capacity is currently being utilized and the most frequent cause of food deprivation is the failure of rain-fed crops on smallholder farms. Moreover, because virtually all Zambian farmers grow maize as their staple food, variability in rainfall is particularly dangerous and exposes a great many household to food insecurity. Other causes of food insecurity in Zambia relate to the high unemployment rates following the restructuring of the country's mining sector and other generally adverse economic conditions that are mirrored in the high rural and urban poverty rates.

5. Taken together, these strategic and practical considerations suggest that the main objective for an income-based food access program like the DAP is to prevent vulnerable households from requiring food assistance during the next drought or other economic crisis. To achieve this result, Land O'Lakes is focused on long-term access elements of food security. Through a unique value chain approach, LOL is looking to improve rural incomes from dairy production and warehouse receipt marketing. The program specifically targets households who live below FFP's definition of the food security threshold (less than 6 months of adequate household food provisioning) with the prospect that they will eventually become resilient to external shocks, and cope more easily with negative trends and seasonality. By increasing farmer capacity to earn greater income through formal milk marketing, and maximizing livestock product yields, program beneficiaries are expected to

be less dependent over the long-run on variations in traditional crop production. The program not only increases household access to food through income earnings, but also by increasing the consumption of milk by household members and other dairy revenue streams, and by providing manure that can be used to fertilize up to about 1ha of maize per year or for vegetable gardens around the house. Land O'Lakes says it is specifically focused on two Intermediate Results (IRs) set out in the FFP strategic framework including IR2.2 – Livelihood capacities protected and enhanced, and IR2.4 – Community capacity to influence factors that affect food security increased.

### ***Progress to Date***

6. Unlike all new Title II programs, LOL/Z is not carrying out any sort of food distribution or other emergency relief activity. Instead, 100% of the food aid provided by FFP is being monetized to support two highly innovative areas of agriculture production and long-term market development. The bulk of the program's resources are focused on helping vulnerable smallholder farmers become first time dairy producers through intensive training and material support for individuals, farmer groups, and milk collection centers. To support these developments and build new market linkages, Land O'Lakes is also assisting dairy processors with product improvements and quality assurance systems and undertaking general dairy promotions to increase the domestic demand for milk and build future markets for smallholder farmers.

7. In recognition that targeted dairy farmers are involved in crop production as well, The DAP is also supporting a parallel warehouse receipt component that aims to introduce storage and marketing of non-perishable commodities among smallholder farmers. This system is intended to enable farmers to obtain better prices for their produce and to facilitate their ability to obtain credit by using the receipts as collateral.

8. **Farmer development.** At the farm level, the DAP's dairy work is focused on improving the genetic quality and management of dairy cattle owned by smallholder farmers. The DAP primarily works with individual farmers and producer groups whose members meet established criteria for Title II assistance, but are at the same time capable of managing the extra costs and physical demands of dairy production. In practice this means Land O'Lakes is primarily focused on people who drift in and out of not having enough to eat and are otherwise especially vulnerable to more severe food insecurity during times of drought. Current data reveal that the average beneficiary has between 3.92 and 3.27 months of inadequate food provisioning per year, which is a somewhat higher range than Land O'Lakes originally envisioned for the program's target group.

9. According to current operating procedures, food insecure individuals who complete the required training program and demonstrate they are capable of caring for an exotic dairy animal are provided an in-calf dairy heifer. Land O'Lakes has developed a detailed check list to determine if a farmer is prepared to receive the heifer and the estimated cost to the farmer of meeting these requirements is between ZMK 1.2 million (USD 343) and ZMK 600,000 (USD 171) for initial dairy start-up. Also according to current design, farmers who received a female calf when the heifer gives birth are meant to pass that calf on to another member of the farmer group at about 1-year old, thereby further impressing upon the original recipient a sense of ownership for the original dairy animal and extending the DAP's benefits to a second generation of new dairy producers. A new female calf takes about three years to mature into a mature dairy cow, at which point farmers begin to receive profit from milk sales. First generation in-calf heifer recipients, therefore, have a critical advantage of only waiting 2 to 6 months before the start of dairy production compared to a second generation beneficiary, who must maintain an unproductive calf for at least 24 months before the animal provides any cash income.

10. Thus far, the DAP has provided training to a little more than 2,000 farmers organized into 70 farmer groups. As of August 31 2006, a total of 540 in-calf heifers had been given out to 503 especially vulnerable households. Of the distributed animals, approximately 259 have since given birth and are now in full milk production. By the end of the DAP, Land O'Lakes plans to distribute a total of at least 1,000 in-calf heifers to qualifying farmers. This is in addition to another 100 heifers being given out under a parallel 1-year program funded by the Office of Foreign Disaster Assistance (OFDA).

11. So far, around 57 heifers have died, equal to a 10.5% mortality rate. Tick borne disease due to inadequate use of acaracides and birthing problems are the main cause of livestock mortality. Although any kind of detailed veterinary analysis was not the focus of this MTR, the overall impression is that the distributed herd is in mixed health. Some farmers are doing very well with their new animals and are milking well beyond a normal yield expectation. The enthusiasm of virtually all recipient farmers is actually quite overwhelming and most households appear to be putting enormous energy toward the care of their dairy animal. Every recipient met also seemed to have a good appreciation for the value of the animal and recognized the importance of caring for the livestock as the key to success.

12. That said there is often a large gap between LOL's recommended practices, farmer understanding of these recommendations, and what is actually being carried out. Despite farmer enthusiasm, for example, it is also clear that many animals are not receiving a sufficiently nutritious diet to achieve targeted yields and are also suffering from poor use of acaracides. Continued training in increased fodder production and emphasis on the importance of animal dipping clearly need to be intensified during the second half of the DAP. This is particularly important because poor feeding not only impacts milk production, but also makes heat detection difficult and so compromises the DAP's artificial insemination and breeding work. Inadequate dipping to control tick borne disease, of course, can lead directly (and quickly) to animal mortality. By the end of the program, assuming no more than 10% mortality, total milk production from the 1,000 DAP heifers should be in the range of 2.2 to 2.4 million liters of new milk per year.

13. **Milk marketing.** At the assembly level, the project seeks to increase the quantity of raw milk supplied by smallholder farmers to rural milk collection centers (MCCs) for onward sale to dairy processors and other buyers. Because smallholder dairy is relatively new enterprise in Zambia, and completely new in some areas where the DAP is working, Land O'Lakes has had to invest considerable time and resources in working with existing MCCs and helping to build other centers completely from the ground up. Technical assistance has focused in particular on quality analysis and installation of new cooling tanks and other dairy hygiene equipment needed for small farmers to compete in the formal market.

14. While the program's quality control and other technical assistance is important and appears to be making excellent progress, these investments only go part of the way to building the type of stable markets first time dairy farmers require. In this respect, other fundamental aspects of market development, including training in business management and cooperative principles are not being given the same systematic treatment. Several MCCs are, in fact, struggling with deep management problems and lack the capacity to prepare a realistic business plan that is focused on the core responsibility of a marketing center, which is to provide farmers a secure and remunerative outlet for their milk.

15. The DAP's market development work is also being complicated by elaborate arrangements at the MCC level including promises that the marketing center will manage various types of revolving funds, group procurement of inputs, and artificial insemination services. Because little distinction is usually made between the farmer group and MCC, these centers are also variably regarded by different stakeholders as a focal point for

nutrition clubs and awareness building on prevention and care of HIV/AIDS. These development goals are each important, but must not get in the way of the center's primary marketing function and other fundamentals of good business management.

16. **Processor improvements.** In addition to getting the fundamentals of MCC management right, these new centers also require market linkages with formal sector processors. Land O'Lakes is following an indirect, but highly effective route to achieve this outcome by working directly with small and medium-scale processors to improve their quality control systems and develop new product lines.

17. To understand the importance of this, it is first necessary to recognize that Zambia is a net dairy importer. This means the best way to increase the competitiveness of local production is to improve on the price and/or quality of local supplies. By convincing small and medium dairy processors to install milk analyzing equipment alone, LOL has been able to take a very significant step towards this objective by reducing wastage in the marketing system and by guaranteeing quality milk is used to produce the type of local products that can compete with imports at the highest end of the domestic market.

18. Even more important from the Title II perspective, however, the support being provided to dairy processors has enabled LOL to build direct market relations between the smallholder groups the DAP is targeting and the assisted firms. At least three processors have so far established, or are in the process of establishing, direct market linkages with participating farmer groups. Would these new market linkages have developed without LOL's processor-level support? This hypothetical question is, of course, difficult to answer, but it is worth noting that each of the companies mentioned specifically commented that they were worried about the quality of smallholder milk and would have been reluctant to buy from these farmers without first working on their own process improvements with LOL. Very simply, this experience helped establish a foundation of trust that later enabled LOL to introduce these companies to the individual farmer groups and MCCs the DAP is primarily supporting. Milk from other collection centers is mainly being delivered to Parmalat, which is Zambia's largest dairy processor, but fluctuates between daily milk surplus and deficits depending on production by commercial farmers and seasonal variations.

19. With this in mind, it appears that LOL would do well to continue and even expand its work at the processor level, but with a more clear-cut focus on building long-term linkages and even business partnerships between new MCCs and interested processors. Land O'Lakes should also start to count the progress of its processor work in these terms in addition to volume turnover and capacity utilization figures, which is how Land O'Lakes is monitoring its progress at the processor level now.

20. **Product promotions.** Although the money spent on dairy promotions is relatively small compared with other program activities, the investment of Title II resources in this area is still considered important by Land O'Lakes to ensure a long-term place in the market for the new dairy farmers it is assisting. Because Zambia is a relatively strong net dairy importer, however, growth in the overall market is probably of less immediate consequence compared to more urgent product and process improvements that increase the competitiveness of domestic milk. Although this depends critically on size of Zambia's milk deficit which is not clear, from the food security perspective it is more immediately important to focus on marketing bottlenecks at the MCC level and opportunities for processor improvements and creation of direct market linkages through that channel. Long-term investments in market expansion are still important, especially with respect to Land O'Lakes commitment to build the capacity of the Zambia Dairy Processors Association (ZDPA) as a sub-recipient of DAP support, but this is also not the most direct or immediate way to improve the trade competitiveness of vulnerable farmers.

21. **Warehouse receipts.** In design and practice, this part of the DAP is following a separate approach to food security improvement than the dairy development work discussed so far. The warehouse receipt component is also being implemented exclusively on a sub-grant basis and is therefore at least partially intended to improve the capacity of the Zambia Agriculture Commodity Agency (ZACA) to extend its outreach to smallholder farmers. By helping smallholder farmers participate in the warehouse marketing program, LOL is expecting these producers to obtain better prices for their crops and eventually to have improved access to credit from using warehouse deposits as collateral.

22. From the Title II perspective, the warehouse receipt component is doing an effective job of extending the program to smallholder farmers with some impressive gains in total deposits by these individuals. Little attention, however, is being paid to whether these deposits are being made by *vulnerable* farmers or well-off smallholder producers. Equally, the DAP is not tracking the deposits by participating dairy producers and farmer group members, so the linkages between this work and the main dairy development group is not clear. Strategically, the warehouse receipt work offers several important benefits that FFP may want to explore through more careful consideration of how this impacts vulnerable individuals' cash flow and income from crop sales. As a capacity-building sub-grant, this could be a very significant contribution of the DAP if the issues are explored systematically with proper analysis of the best development options and lessons for the future. In accepting this challenge, however, LOL and FFP must also recognize there is risk of diverting resources from other critical aspects of the dairy development work which is the program's main line of business. A strong case, for example, could be made to say that the Land O'Lakes should focus on just one innovative area of agriculture rather than risk spreading Title II resources too thinly across sectors.

23. **Impact monitoring.** In reviewing the overall effectiveness of the DAP's M&E system, two main issues stand out. First, is that LOL has been struggling to measure goal level impact in very narrow food security terms defined for this program; and second, that many of the IR results indicators chosen for the DAP do not adequately track the process of dairy development or show how this contributes to reduced food insecurity. In many ways, of course, these two issues go hand in hand. Considerable evidence was found during the review to show that the program is having (or certainly can have) a positive food security impact on selected beneficiaries, but the M&E system is cumbersome to report on and provides relatively little of the data needed to make this case and understand the multidimensional ways in which dairy development contributes to improved rural livelihoods and reduced food insecurity.

24. In the first place, dairy development is by definition a long-term undertaking that requires considerable investment and recurrent support and follow-up to maintain smallholder production at profitable levels until the system becomes self-sustaining. Under these conditions, there is no doubt that dairy production makes a direct contribution to improved household food security in a number of important ways. First and foremost is the resiliency to shock and improved ability to cope with seasonal shortages of staple food crops. Many other benefits of dairy, however, are only realized over the long-term as farmers fulfill their pass-on obligation and eventually build-up from a 1-cow to a 2-cow or even a 3-cow production unit where the enterprise becomes much more profitable (see financial analysis in Part Four). Investments in artificial insemination likewise have a long time horizon since the new livestock won't become productive cows for several years. For these and other simple reasons, traditional measures of food security impact such as MIHFP, HDDI, and IDDI will at best provide only a partial picture of the DAP's outcome within the life of the program.

25. At the intermediate results level, the problem again is that the data being tracked provide only a partial indication of the program's food security impact and process through which dairy production, dairy marketing, and warehouse receipt development actually contribute to improved livelihoods for vulnerable people. One particular weakness, for example, is that the routine monitoring data do not adequately disaggregate between heifer recipients, other group members who benefit from direct training, and non-member who also sell milk and so benefit from the market development work. Roughly 1/3 of the total population in the program area was determined by USAID to require emergency food assistance during the last drought, so these other beneficiaries not only need to be counted, but also need to have their special needs and development potential taken into account in future program activities.

### ***Main findings and recommendations***

26. In addition to the overview of performance issues and achievements to date, the following specific findings and recommendations also stand out.

⇒ **Dairy production can make an important contribution to reduced food insecurity for vulnerable (yet viable) farmers.**

27. Although dairy is a complicated and demanding business to manage, this enterprise is especially attractive as a model for food security improvement for capable farmers because of the multiple income sources dairy production generates. In addition to cash income from milk, dairy cows also provide milk for home consumption, and manure that can be used to fertilize vegetable gardens and staple food crops. Over the long-run, significant income can also be earned from cull cow and calf sales. These other benefits are, in fact, sometimes more valuable than cash income from milk.

⇒ **Program activities have so far focused too narrowly on heifer recipients.**

28. Although the DAP is working on many other levels than with direct heifer recipients, the program's progress has all too frequently been measured by the number of animals given out. This is unfortunate, not only because most of what LOL has been doing already has far greater outreach to other beneficiaries that need to be counted, but also because these other beneficiaries need to be considered more explicitly in the design of program activities to increase impact and lead to more sustainable development.

⇒ **Poor animal health and nutrition are important threats.**

29. The provision of a proper diet and adequate veterinary care for livestock to maintain good milk production is an important challenge that is likely to require a re-concentration of program efforts. Left unchecked, poor nutrition and inadequate use of acaracides are probably the greatest threats to successful dairy development on smallholder farms. In addition to problems with reduced milk yields, poor nutrition also makes heat detection difficult and is an important threat to the success of the artificial insemination program. Moreover, farmers could easily become de-motivated and lose interest in dairy production if high yields are not maintained.

⇒ **The pass-on modality should be dropped or completely revised.**

30. Although the objectives of the current pass-on arrangements are clear, the MTR finds that the requirement for a new dairy farmer to give up their first female calf is likely to have very serious negative consequences. First, the original recipient will just take longer to reach the point where dairy truly becomes a solid enterprise either by managing 2 milking cows or by earning additional revenue from calf sales. Likewise, from the second generation

recipient's point of view, the new dairy calf won't produce any revenue for at least two years so is actually a major liability until the animal matures. Unless current pass-on arrangements are modified significantly, these threats could seriously undermine the program's long-term sustainability and potential contribution to food security outcomes.

⇒ **Investments in artificial insemination should be given greater priority as a key to extend the program's benefits.**

31. Aggressive expansion of the AI program through a mass insemination campaign could be one of the most effective ways to expand the program's outreach and dramatically increase the amount of milk being delivered to MCCs in the medium term. This would enable the program to reach a far larger number of food insecure people and could also help MCCs to achieve the types of volumes and capacity utilization figures they need to negotiate long-term supply contracts with dairy processors.

⇒ **LOL should develop practical field manuals to support new dairy farmers.**

32. LOL should develop a set of very practical, vernacular language field manuals with information first time dairy framers need. Such manuals do not exist in Zambia for smallholder farmers and these materials could be one of the DAP's most enduring contributions to dairy development on smallholder farms. In addition to AI beneficiaries, first generation heifer recipients are also need reminding of essential dairy skills and an easy to understand field guide could go a long way to improving the program's total impact.

⇒ **Dairy would be a more effective tool for food security improvement in countries with better developed smallholder markets and more favorable climatic conditions.**

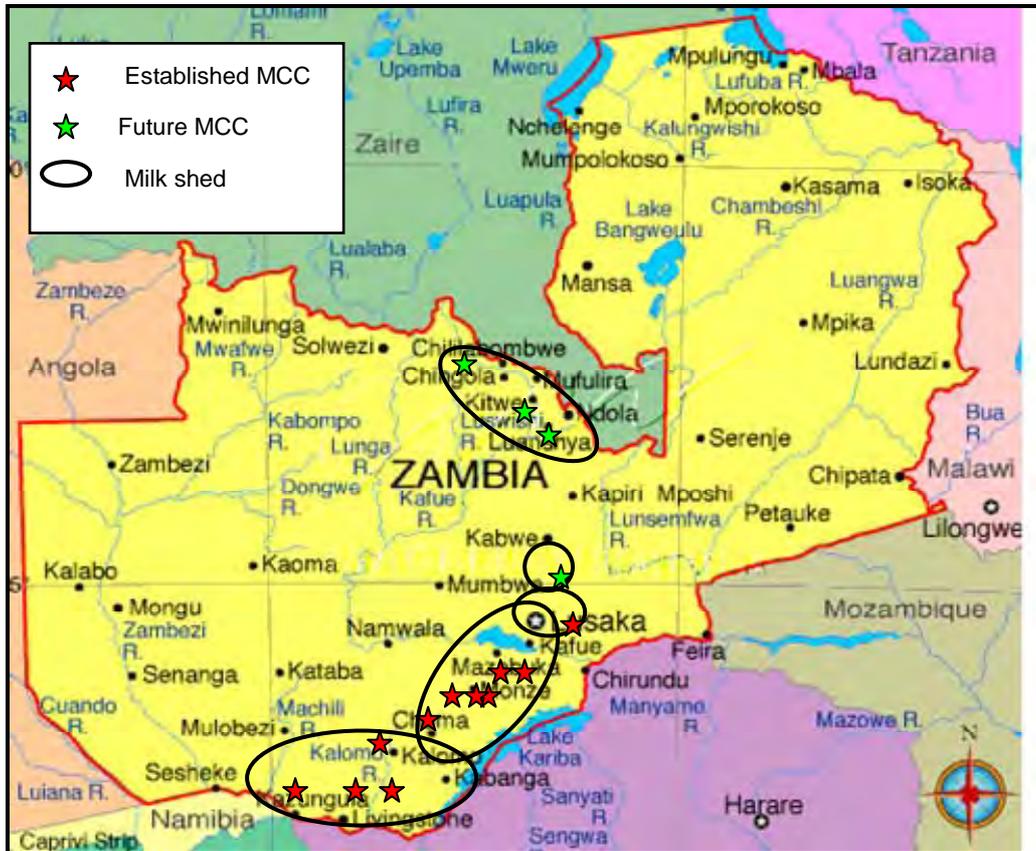
33. While the MTR finds that dairy development can be an effective tool for achieving reduced food insecurity among a fairly wide group of vulnerable individuals, there can also be no doubt this would also be much easier to achieve in a country where more of the basic marketing infrastructure and other support services needed for smallholder dairy is already in place. Not only does the relatively low population density and somewhat dry conditions in DAP's program area make it difficult to achieve effective economies of scale at the MCC level and with the artificial insemination program, but Land O'Lakes has also had to invest in new veterinary systems, quality control improvements, and product development. These types of investments would not be required to the same extent in another country with an already well developed smallholder dairy sector. Under these conditions, Title II assistance would be better able to focus exclusively on helping vulnerable individuals to establish a viable dairy unit.

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Questions and comments on this report are welcome by writing to the author at Box 35220, Lusaka, Zambia or by email to [jck@zamnet.zm](mailto:jck@zamnet.zm). The findings, interpretations, and conclusions expressed in this report are entirely those of the author and should not be attributed in any manner to Land O'Lakes, its subcontractors, or the United States Agency for International Development (USAID).

## MAP OF MAIN PROGRAM AREAS



## CURRENCY EQUIVALENTS

Currency Unit = Zambia Kwacha (ZMK)

USD 1.00 = ZMK 3,500

ZMK 1,000 = USD 0.2857

## WEIGHTS AND MEASURES

1 liter (lt) = 1.06 quarts (qt)

1 hectare (ha) = 2.417 acres (ac)

1 kilogram (kg) = 2.204 pounds (lbs)

1,000 kilograms (kgs) = 1 metric ton (mt)

1 kilometer (km) = 0.62 miles (mi)

## LIST OF ABBREVIATIONS

AERF	Annual equivalent revenue factor
AI	Artificial insemination
CF	Conservation Farming
CFU	Conservation Farming Unit
CLW	Community livestock worker
CRS	Catholic Relief Services
C-FAARM	Consortium for Farming, Agriculture, AIDS, Resiliency, and Marketing
C-SAFE	Consortium for Southern Africa Food Emergency
CLUSA	Cooperative League of the USA
DACO	District Agriculture Coordinating Officer
DAP	Development Activity Program
DRC	Democratic Republic of Congo
DVO	District Veterinary Officer
FANTA	Food and Nutrition Technical Assistance Project
FFP	Food for Peace
GART	Golden Valley Agriculture Research Trust
GNI	Gross national income
GRZ	Government of the Republic of Zambia
HPI	Heifer Project International
HDDI	Household Dietary Diversity Index
IDDI	Individual Dietary Diversity Index
IR	Intermediate Result
IPTT	Indicator Performance Tracking Table
LIFDC	Low income food deficit country
LOL	Land O'Lakes
LOL/Z	Land O'Lakes Zambia
M&E	Monitoring and evaluation
MACO	Ministry of Agriculture and Cooperatives (GRZ)
MCC	Milk collection center
MIHFP	Months of inadequate household food provisioning
MTR	Mid-term review
NGO	Non-governmental organization
OFDA	Office for Foreign Disaster Assistance (USDA)
PGCI	Producer Group Capacity Index
PMP	Program Monitoring Plan
QR	Quarterly Report
SO	Strategic Objective
UHT	Ultra-high temperature
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
USG	United States Government
VA	Veterinary assistant
WWS	World Wide Sires
ZACA	Zambia Agricultural Commodity Agency
ZATAC	Zambia Agriculture Technical Assistance Center
ZDEI	Zambia Dairy Enterprise Initiative
ZDPA	Zambia Dairy Processors Association
ZNFU	Zambia National Farmer's Union

# MID-TERM REVIEW

## Land O'Lakes Zambia

### Title II Development Activity Program

#### PART ONE – INTRODUCTION

1. Land O'Lakes Zambia (LOL/Z) is currently implementing a five-year P.L. 480 Title II program with the aim of promoting improved food security among rural smallholder farmers. The project, entitled *Title II Development Assistance Program*, is a grant from USAID's Office of Food for Peace (FFP) and aims to contribute to FFP's new Strategic Objective (SO) of "reducing food insecurity among vulnerable populations." The program is specifically designed to target the food access element of food security by working towards improved smallholder incomes through dairy development and expansion of a warehouse receipt program.

2. The Title II DAP was signed in February 2004 and became operational at the field level seven months later following monetization of the first year's consignment of P.L. 480 food aid. Since then, LOL/Z has used Title II proceeds to follow a value chain approach to dairy development that seeks to address major barriers to successful smallholder milk production and marketing as a route to increased rural incomes and reduced food insecurity. More precisely, the program provides different types of training and material support at each stage of the domestic value chain as follows.

- **At the farm level**, the DAP is focused on improving the genetic quality and on-farm management of dairy cattle owned by smallholder farmers, thereby increasing their milk output.
- **At the assembly level**, the project seeks to increase the quantity of raw milk supplied by smallholder farmers to rural milk collection centers (MCCs) for onward sale to dairy processors and other buyers.
- **At the processing level**, the program seeks to expand the market demand for milk supplied by smallholder farmers by assisting dairy processors with product improvement and the introduction of quality assurance systems.
- **At the marketing level**, the program aims to improve both sales and consumption of milk through educational and promotion campaigns developed in collaboration with dairy processors and their representatives.

3. In recognizing that targeted dairy farmers are involved in crop production as well, the DAP is also supporting a **warehouse receipt component** that aims to introduce storage and marketing of non-perishable commodities among smallholder farmers. This system is intended to enable farmers to obtain better prices for their produce and to facilitate their ability to obtain credit by using the receipts as collateral.

## **I. OBJECTIVES AND SCOPE**

### **A. Objectives of the Review**

4. The Title II DAP is now at its mid-point, and this external review was commissioned by Land O'Lakes to look with fresh eyes at the development process set in motion and to help LOL, its subcontractors, and FFP program managers to understand better how project activities are (or are not) contributing to USAID's food security strategic objective and results indicators. In so doing, the mid-term consultant was requested to identify major lessons learned from the experience so far and to recommend strategies for increasing the program's effectiveness with the resources and time remaining under the current agreement.

5. From a larger strategic perspective, the Mid-Term Review (MTR) was also asked to reflect on whether and how a dairy activity like the Land O'Lakes program might be incorporated in future Title II programs. To begin with, this is the first time Land O'Lakes has contracted to implement a Title II activity, and project managers expressed a great interest in knowing how well the value chain approach they have adapted from other Land O'Lakes dairy projects works when focused specifically on food insecure beneficiaries. Equally, FFP expressed an interest in knowing about the program's cost-effectiveness and potential outreach of dairy development as a model for sustainable poverty reduction. What aspects of the DAP are working well and what aspects are not, how appropriate is an incomes approach to reducing food insecurity, and is dairy development really an effective model for reaching the main Title II target group?

6. To address these issues, the MTR specifically focuses on the following key questions that cut across different levels of investigation and program activity.

**(1) How effective is the program at achieving its stated goal of reducing food insecurity security among vulnerable populations?**

**(2) Which program services are the most and least relevant to Title II strategic objectives?**

**(3) What improvements can be made to increase the program's effectiveness in the time remaining?**

### **B. Approach and Limitations**

7. The MTR was conducted over a ten-week period from early August to mid-October 2006. The process included a review of relevant program documentation, meetings with all principal LOL/Z project staff and local subcontractors, discussions with LOL home office advisors, consultations with FFP program managers and USAID/Zambia SO team leaders, and meetings with other USAID contractors working on food security and economic growth topics in Zambia.

8. Field visits were carried out together with LOL/Z project staff to sites in Southern Province, Central Province, and the Copperbelt in order to meet with participating farmers, milk collection centers, and other local stakeholders. Four dairy processors were also visited during the evaluation to discuss their engagement with the DAP and relevance of program support at this level to the main Title II target group. Major findings and recommendations were discussed with LOL/Z during the review and a full-day debriefing was held in Lusaka to share the MTR's main conclusions and recommendations with project staff and other local stakeholders.

9. Throughout the review process, the overall approach has been to look at the effectiveness of different activities being undertaken in contributing to FFP's food security objectives. Because baseline indicators for food provisioning and dietary diversity are just now being compiled, this meant looking at the development process being followed rather than attempting to report on actual results or sustainable changes in beneficiaries' food security status. As described in Annex 3, a parallel survey of roughly 400 new and old dairy beneficiaries was carried out at the same time as the MTR to update the program's Indicator Performance Tracking Tables (IPTT) and establish a baseline for monitoring changes in months of inadequate meal provisioning and household and individual dietary diversity scores. The main MTR report, however, does not discuss the survey results in any great detail and instead focuses more on understanding how well program activities are contributing to these expected outcomes rather than trying to quantify the impact at this early stage.

10. In this respect, the MTR mainly looks at the relevance of different activities to FFP strategic objectives and how well these are being carried out. How effective is the beneficiary selection process; are beneficiaries being adequately served by the farmer training work; and what is the underlying financial viability of one-cow dairy production as a livelihood model? Similarly, the MTR also considers the relevance of other value chain activities to the task of reducing food insecurity including the effectiveness of market linkages work, support for processor improvements, and need for dairy product promotions. With respect to the warehouse receipt component, the MTR similarly looks at the development process and contribution to long-term food security objectives.

11. In addressing these issues, various quantitative and qualitative methods were used. First, from the qualitative perspective, wide-ranging discussions were held with different groups of beneficiaries and implementing partners to assess the relevance of program activities to the needs of food insecure households. These discussions focused on understanding what is required for successful dairy development at the smallholder level, ways that smallholder farmers are likely to use their income from dairy, the relevance of the dairy promotions and product development work to Title II objectives, and effectiveness of the warehouse receipts program in promoting market participation. Similarly, with respect to the program's M&E system, the approach is to look thematically at the relevance of LOL's results data to the activities being undertaken and potential to tell the story about the specific impact LOL is having on reduced food insecurity for vulnerable populations.

12. From the quantitative perspective, a set of indicative production models and cost schedules for different program activities were developed to look at the types of up-front and recurrent costs and revenues associated with smallholder dairy. Cost models were likewise prepared to look at the financial viability of artificial insemination (AI) services as a key determinant of sustainability. While this is may be an unusual method of analysis for Title II assistance, the models nevertheless provide considerable insight to the effectiveness of dairy development as a route to increased incomes and sustainable reductions in food insecurity. This approach in fact complements Land O'Lakes focus on rural livelihoods and is recommended to be integrated as part of the ongoing M&E system.

13. It should also be noted that to achieve its stated goals the MTR has had to be selective and focuses only on the most important aspects of program activity and big picture operations rather than minute detail. No attempt has been made, for example, to carry out any sort of an audit of LOL results reports, program expenditures, or compliance with specific FFP and other USAID procedural guidelines except where these issues arise in the main discussion of program effectiveness and sustainability.

14. Finally, in carrying out both the quantitative and qualitative aspects of the review, the approach taken has been to be as open and honest as possible. At the outset, it was agreed that the MTR could only hope to interpret program performance accurately and make constructive recommendations by freely sharing all ideas on the effectiveness of the program and difficulties being faced. Where areas of weaknesses are discussed, this is done solely to raise awareness of important implementation issues so program managers can attempt to address these points and consolidate the gains made elsewhere during the time remaining. It should go without saying that all the views expressed in this report, unless otherwise noted, are exclusively those of the mid-term consultant and should not be attributed in any form to Land O'Lakes, its subcontractors, the Office of Food for Peace or the United States Agency for International Development.

## **II. ORGANIZATION OF THE REPORT**

15. The MTR report is organized in five main parts including the current introduction. Following a few introductory remarks in about the dairy sector and food security situation in Zambia that help set the background for the rest of the review, Part Two provides a general overview of the program's design features and objectives including FFP strategic considerations, component structure, program budget, and M&E system.

16. Part Three then presents the main implementation review. This chapter is organized in six subsections including one section for each of the DAP's main operational components, one that reviews the contribution of each subcontractor and sub-recipient, and one that looks at effectiveness of the current M&E system and results reports in describing the real work that is being done and progress toward FFP objectives. Part Four of the MTR presents the financial analysis of smallholder dairy production. Although this type of analysis is not usually included in a Title II evaluation, the financial models are extremely useful for showing how well smallholder dairy works as a model for income improvement and where certain aspects of the program could be strengthened to help farmers get even more from their dairy system. The MTR concludes in Part Five with a thematic summary of findings and recommendations.

## **III. BACKGROUND**

### **A. The Zambia Dairy Sector**

17. Before turning to the detailed review of program activities, it useful to note a few basic features about the Zambian dairy sector that help to interpret the discussion that follows. More background information on recent sector performance issues and long-range growth opportunities can be found in the various project documents and other sources listed in the bibliography. It is assumed that most readers already have some knowledge of the Zambian dairy sector and this information is included simply to establish a basic context for understanding the report's recommendations.

18. To begin with, it is estimated that Zambia now has around 2.5 million cattle, of which 83% are found in the traditional sector where cattle are mainly kept as a store of wealth. Animals owned at this level are rarely sold or slaughtered except in times of severe need or for a special occasion such as a wedding or a funeral. With respect to milk production, most traditional cows produce just 1 to 2 liters per day over a short 180-day lactation period. Moreover, calves are required to drink most of this milk, leaving very little for home consumption or cash sale. By comparison, the third generation Jersey and Black and White crosses now being distributed by Land O'Lakes can yield around 7-11 liters of milk per day over a 220- to 270-day lactation period. This is an improvement of more than 500% compared with traditional livestock and provides the fundamental basis for participation of

new dairy farmers in the cash economy. On commercial farms, pure-bred dairy animals sometimes produce more than 20 liters per day over 290- to 300-day lactation period.

19. Nationwide, the Zambian dairy herd is estimated to consist of less than 60,000 animals. Most of these livestock are held by commercial farmers in herds ranging in size from about 20 milking cows to more than 300. In total, Zambian dairy and non-dairy cattle produce around 150 to 190 million liters of milk per year. Of this total, only around 64 million liters (less than 43%) is sold for cash including counter sales at MCCs and trade in local markets. Around 70% of milk supplied to the formal processors comes from commercial farmers.<sup>1</sup> Market-based production by the smallholder sector is still a very new activity. Only from about the late 1990s, when the USAID-funded ZATAC and ZEDI projects and other donor efforts began to focus on smallholder dairy, did development at this level begin to emerge.

20. Today, most smallholder dairy production is concentrated along the line of rail in Southern Province and around Palabana, which is about 40 km east of Lusaka. Although no formal boundaries exist, smallholder farmers may usefully be said to fall into one of three milk sheds. Farmers in the far south of Southern Province, for example, generally look to processors in Livingstone for their main market, whereas those further north and around Palabana look to dairy companies in Lusaka. In the future, farmers delivering to milk collection centers being established in the Copperbelt will fall into a new milk shed, and farmers in Central Province are likewise expected to deliver to a large commercial processor operating at Chisamba (see map).

21. Total consumption of milk in Zambia is in the range of 250 to 300 million liters per year. Although it is frequently said that this is very low in per capita terms compared with other African countries, domestic production still does not satisfy total local demand and Zambia must import between USD 4-6 million of dairy products annually to satisfy its milk deficit. These imports including more than 12 million liters of UHT milk, various yoghurts, cheeses, butter, and milk powder (see table). Even these figures, however, are widely known to understate the true extent of dairy imports since large quantities regularly enter the country by traders who are able to evade duty.

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<sup>1</sup> These data are from a report prepared for Land O'Lakes by David Daka (2006), Deputy Director of Livestock and Veterinary Services in the Ministry of Agriculture and Cooperatives (MACO). Like all agriculture statistics in Zambia, however, these figures need to be treated with caution and should at least open to a great deal of questioning. During a review meeting with Land O'Lakes to discuss the Draft MTR Report, for example, counter evidence was provided to suggest that Zambia only has a 13,000-liter average daily deficit, which is equivalent to less than 4.75 million liters per year. This is a significantly different estimate of Zambia's total milk deficit that can be derived from the MACO figures, which correspond to an annual deficit of at least 34 million liters. Any reliable projection is almost impossible to make because of the very large share of illegal dairy imports and the truth no doubt lies somewhere between these estimates.

**These discrepancies are very significant with respect to the final recommendations for the DAP's product promotions work.** Direct heifer recipients being supported by the program are expected to produce some 2.2 to 2.4 million liters of new milk per year when the animals are all mature (based on 10% mortality and somewhat optimistic yield estimates). Whether or not this milk can easily find a place in the market at current demand levels, therefore, depends critically on total production and total consumption. If the total milk deficit is only around 6 million liters per year, then the need for product promotions is much more clear and easy to justify because of its direct relevance to the vulnerable first time dairy farmers Land O'Lakes is supporting. If, on the other hand, the total deficit is around 25 million liters per year, the need for any investment in product promotions is much less clear.

**Table 1: Zambia Dairy Imports, 2000-2004 (USD '000)**

	2000	2001	2002	2003	2004
Butter of cow milk	151	84	197	276	186
Cheese of cow milk, processed	14	6	23	37	19
Cow milk, cream, fresh	45	8	15	110	15
Cow milk, skimmed, dry	179	239	188	111	550
Cow milk, skimmed, fresh	42	66	9	11	11
Cow milk, whole, condensed	177	68	207	86	46
Cow milk, whole, dry	2,179	2,499	1,558	1,689	3,265
Cow milk, whole, evaporated	101	299	183	128	326
Cow milk, whole, fresh	200	258	23	219	19
Ice cream and other edible ice	381	172	149	139	159
Yoghurt	40	31	12	77	85
<b>Total (USD '000)</b>	<b>3,509</b>	<b>3,730</b>	<b>2,564</b>	<b>2,883</b>	<b>4,681</b>

Source: FAOSTAT, FAO Statistics Division (7 Sept 2006).

22. Taken together, this brief profile suggests there is good potential for continued growth and improved competitiveness of the Zambian dairy sector. Depending on what estimates one uses, Zambian farmers could satisfy less than two-thirds of the total domestic demand. Notwithstanding occasional gluts during rainy season, therefore, any new milk that is brought into the formal economy (whether it is from traditional livestock or improved breeds) should enjoy a ready market as long as these producers are able to compete on both price and quality with other domestic supplies and imports. Secondly, the national picture shows that there is almost limitless scope for improved smallholder production and increased market participation. For farmers who profitably integrate improved dairy animals as part of their livestock system, there is no doubt that increased milk production can provide a new source of cash income and additional food for home consumption.

## **B. Food Security in Zambia**

23. Acute food insecurity in Zambia is most often associated with drought. Small farmers in the southern and western parts of the country, therefore, are often considered the most vulnerable since these locations have the most erratic rainfall. While Zambia has certainly never experienced anything like famine conditions in modern history, recurrent droughts have led to widespread food distribution in recent years. The last emergency distribution was in 2004-05 when an estimated 1.23 million people were estimated to require almost 120,000 mt of food, primarily in Southern, Central, and Western Provinces. In the project areas covered by Land O'Lakes alone, around 30% of the total population (including individuals with livestock) was determined to require food assistance. Weather-related problems, of course, sometimes affect other part of the country as well, and many people in both rural and urban areas regularly drift in an out of times of having enough to eat because of the poor economic conditions. With stunting levels among children under two (height for age) running to approximately 50%, Zambia hosts a significant population of chronically food insecure people who annually experience periods of household food gaps.

24. With over 75% of the population deriving their livelihoods from the land, food security in Zambia is driven by the agricultural sector, which is the second most important economic activity after mining. Zambia's staple food is predominantly maize; hence most of the land and resources under agriculture are utilized for maize production. Other important crops are cassava, rice, sorghum, and millet.

25. The country is usually considered to be food secure at the macro level when it has produced enough maize to meet the annual consumption requirements of its nationals. The other crops grown in the country usually complement rather than supplement the availability of maize in that they can either be sold to raise money for purchasing maize or they can be consumed alternatively with maize. However, even if adequate agriculture production levels are sufficient for assuring food availability at the country level, they do not guarantee that all households will have access to enough food. Improving agriculture productivity and increasing incomes are both very critical to improving food security in Zambia.

26. According to the 2005 Vulnerability and Needs Assessment, it is clear that own production remains a dominant source of livelihood. An average household produces about 0.80 mt of maize calorie equivalents of cereals, of which 80% (0.64 mt) is retained for home use. To meet their cereal needs for the year, the households supplement the retained 0.64 mt with an additional 0.18 mt obtained through other means (purchases, casual labor, remittances, etc.). Thus, more than three-quarters (78%) of the cereals utilized by the household are from own production.

27. Given that the bulk of the remaining 20% of the produced cereals is sold, the contribution of own production to livelihood is even larger. In addition to contributing towards cereal purchases, the income earned through cereal sales also helps to meet other cash needs. Maize still plays a very critical role, accounting for almost all (98%) of total cereal production. The dominance of own production in the household's food basket confirms these households' vulnerability to production-related food insecurity risk. This is further reinforced by the fact that the bulk, if not all, of these households rely on rain-fed agriculture.

## PART TWO – OVERVIEW AND DESCRIPTION

1. This first part of the MTR describes the program's objectives and major design features. Most readers of this document will, of course, already have a good (if not first hand) understanding of the program's functions. Nevertheless, it is still useful to introduce the DAP's main design features and consider how these relate to FFP's declared strategic objectives. As described already, Land O'Lakes is following a unique value chain approach to reducing food insecurity and it is especially important to understand how this model relates to the priorities established for Title II assistance. Following sections of this report then look at component performance issues and other process related topics in more detail.

### I. STRATEGIC OBJECTIVES

2. In May 2005, the Office of Food for Peace launched a new Strategic Plan for the Period 2006-2010.<sup>2</sup> This plan established a new single Strategic Objective (SO) that all Title II programs must now contribute to, that is ***Food insecurity in vulnerable populations reduced***. By framing its strategic objective in the context of *reducing* food insecurity (rather than increasing food security), FFP intentionally put the focus on populations who are already food insecure or who are vulnerable to food insecurity. As the FFP strategy paper explains, this is a significant departure from the previous FFP framework, which included separate objectives for emergency and non-emergency development programs. Now every Title II program, including multi-year development activities like the Land O'Lakes DAP, is guided by the same single strategic objective.

3. In implementing this mandate, the FFP strategy specifically calls for multi-year programs that improve the capacity of vulnerable peoples to prevent and cope with future emergencies. The strategy still recognizes food availability, food access, and food utilization as the three main determinants of food security (see box), but has been reframed to emphasize more clearly that long-term development activities are needed to prevent emergency situations from occurring. In addition to crisis management, therefore, the FFP strategy states that Title II assistance should also to be used for investments in education, skills development, public infrastructure, and social capital that help vulnerable communities cope with different types of shock. The Land O'Lakes program has been designed specifically to focus on these long-term dimensions of reduced food insecurity.

#### **Box 1: USAID Definition of Food Security.**

USAID defines food security as, "when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. Three distinct variables are essential to the attainment of food security:

- 1) Food Availability:** sufficient quantities of appropriate, necessary types of food from domestic production, commercial imports or donors other than USAID are consistently available to the individuals or are within reasonable proximity to them or are within their reach;
- 2) Food Access:** individuals have adequate incomes or other resources to purchase or barter to obtain levels of appropriate food needed to maintain consumption of an adequate diet/nutrition level;
- 3) Food Utilization:** food is properly used, proper food processing and storage techniques are employed, adequate knowledge of nutrition and child care techniques exist and is applied, and adequate health and sanitation services exist.

(USAID Policy Determination, Definition of Food Security, April 13, 1992).

<sup>2</sup> FFP (2005).

4. **Reducing food insecurity in Zambia.** In the Zambian context, the challenge of reducing food insecurity most usually means helping communities to cope better with drought and annual household food gaps. Less than 12% of the country's total estimated irrigation capacity is currently being utilized and the most frequent cause of food deprivation is the failure of rain-fed crops on smallholder farms.<sup>3</sup> This is especially true in Southern and Western Provinces, which are the driest parts of the country. Although these regions still receive an average of 800 to 1,000mm of rainfall per year over a 5-6 month period, the pattern is uneven and some years can be especially dry. Moreover, because virtually all Zambian farmers grow maize as their staple food, variability in rainfall is particularly dangerous and exposes a great many household to the risk of food deprivation. Other causes of food insecurity in Zambia relate to the high unemployment rates following the restructuring of the country's mining sector and other generally adverse economic conditions that are mirrored in the high rural and urban poverty rates.

5. Taken together, these strategic and practical considerations suggest that the main objective for an income-based program like the DAP is to prevent vulnerable communities from requiring food assistance in the future during the next drought or other economic crisis and, indeed to eliminate the annual food gap that they experience prior to the harvest period. This may not be achieved this year or next as new participants need time to develop their dairy system, but the long-term strategic focus is clear – that is to build a sustainable platform that helps keep vulnerable individuals from lapsing into renewed food insecurity. From FFP's perspective, all program activities undertaken by Land O'Lakes must contribute to this single strategic objective.

6. **Land O'Lakes strategic approach.** To achieve this result, the Land O'Lakes approach is to focus on the access element of food security. As LOL/Z's own Food Security Strategy Paper states, the DAP will focus specifically on two Intermediate Results (IRs) set out in the FFP strategic framework document as follows:

- **IR 2.2** – Livelihood capacities protected and enhanced
- **IR 2.4** – Community capacity to influence factors that affect food security increased

7. These two IR indicators do a good job of putting put the focus squarely where it needs to be for an income-based access program such as the DAP. Through its value chain approach, Land O'Lakes specifically seeks to address food security at four levels, including: (i) accurate targeting of beneficiaries that meet the Title II "food insecurity" criteria; (ii) broadening the communities' asset bases by investing in various aspects of their lives that increase productivity and incomes; (iii) use of dairy production as a coping mechanism against food insecurity; and (iv) promotion of improved marketing systems for other crops that lead to further improvements in income and reduced risk.<sup>4</sup>

8. This approach is entirely compatible with the FFP strategy and is well captured by the two sub-IR result indicators Land O'Lakes says it is focused on. Interestingly, one other sub-IR indicator in the FFP framework that could have been included in the Land O'Lakes framework is IR 2.3 – *Community resiliency protected and enhanced*. Dairy production, in fact, can be particularly beneficial to food insecure communities since milk production naturally peaks during the rainy season when green fodder is readily available but other food stocks are at their lowest. There is therefore an inherent link between dairy development and

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<sup>3</sup> GRZ (2003).

<sup>4</sup> LOL (2004).

resiliency to seasonal variations in food availability that could also have been highlighted in LOL's own strategic framework as highly relevant result.

9. Although LOL is following a unique value chain approach that seeks to address the food access element of food security through income improvements and market participation, the highest level reporting requirements remain focused on discrete changes in food consumption, the same as all other Title II programs. More specifically, LOL has agreed to report its progress to FFP by changes in the months of inadequate household food provisioning (MIHFP) and though household and individual dietary diversity index scores (HDDI and IDDI respectively) for targeted beneficiaries. The first two indicators are proxy measures for improved income and expenditure on food; the last indicator is a measure of individual nutrition.

10. One critical observation of the MTR is that these reporting requirements, while necessary from a strict food security perspective and mandated by FFP, have at times distracted attention by FFP and LOL managers from other equally important process results. Meaningful changes in these very high level food security indicators are at best long-term outcomes, especially for a dairy project where production and marketing skills naturally take time to develop. Moreover, because the DAP is targeting individuals who are not as food insecure as beneficiaries experiencing that are unable to participate in livelihood activities due to a deeper level of deprivation, these people's incremental expenditure on food may be more difficult to detect through a food consumption based proxy measures. Nonetheless, beneficiaries are not high potential dairy producers generally targeted by dairy industry development programs. Land O'Lakes can (and certainly should), help FFP to collect the data it needs to verify the connection between income-based activities and reduced food insecurity, but this should not cause less importance to be given to other more easily verifiable indicators that are needed for routine monitoring and also help tell the story of what the Land O'Lakes is doing and has achieved so far.

## II. Activity Overview

11. As described, Land O'Lakes is taking a unique value chain approach to implementation of the FFP food security mandate. Like all Title II programs, the main objective of the DAP is to reduce food insecurity among vulnerable populations. Unlike most programs, however, LOL/Z is not carrying out any sort of food distribution or other relief activity currently associated with Title II assistance. Instead, 100% of the Title II food aid provided by FFP is being monetized to support smallholder dairy production and expansion of a warehouse receipt-based marketing program.

12. These value chain activities are meant to lead to increases in farmer income through dairy production and other changes in crop marketing that, in turn, help ensure better access to food and greater resiliency to shock. To ensure that men and women participate in project activities and benefit on an equitable basis, the DAP is making a deliberate effort to reach poor rural women who are often the most vulnerable and food insecure. The program seeks to address other crosscutting challenges as well and

### **Box 2: Agriculture Value Chains.**

Although many definitions are applied, value chains essentially represent enterprises in which different producers and marketing companies work within their respective businesses to pursue one or more end-markets. Value chain participants sometimes cooperate to improve the overall competitiveness of the final product, but may also be completely unaware of the linkages between their operation and other upstream or downstream participants. Value chains therefore encompass all of the factors of production including land, labor, capital, technology, and inputs as well as all economic activities including input supply, production, transformation, handling, transport, marketing, and distribution necessary to create, sell, and deliver a product to a certain destination.

gives particular emphasis to environmental sustainability in training messages as a priority area for smallholder dairy.

13. **Dairy development.** As a multi-year dairy development program, the DAP's main focus is to help vulnerable farmers participate in market-oriented milk production. Towards this end, the DAP works directly with producer groups whose members meet established criteria for Title II assistance, but at the same time are also capable of managing the extra costs and demands of dairy production. Accordingly, the main target group actually reached by the program can best be described as the "*vulnerable but viable*" or, put another way, people who experience annual periods of food insecurity during the harvest, are vulnerable to periods of drought, yet who have some assets to call upon that enable them to participate in productive livelihood activities. Nonetheless, beneficiaries are not high potential dairy producers that are generally targeted in programs aiming to develop the overall dairy industry. Field services begin with training of these individuals and other rural residents in all aspects of dairy management, including animal health and nutrition, pasture development, animal reproduction, milk handling, and milk quality.

14. After these topics have been adequately covered, qualifying participants who remain committed to the program and demonstrate they are capable of caring for an exotic dairy animal are provided an in-calf heifer. This animal is expected to give birth in about two to six months after which milk production and marketing begins. According to the current design, all female calves are then meant to be passed-on to another member of the farmer's group when they are about 1-year old. This approach is meant to extend the DAP's benefits to a second generation of Title II beneficiaries and instill a sense of ownership among first generation recipients as they repay their "heifer loan".

15. Other activities that directly involve the main target group include the provision of artificial insemination (AI) services and development of rural milk collection centers (MCCs). Investments in these areas are considered particularly important by Land O'Lakes as priorities for long-term sustainability. Without access to improved genetics for animal reproduction, for example, the offspring of livestock being distributed now will regress to a low-yielding, traditional-type animal after just two new generations or in about nine years.

16. Likewise, the entire incomes approach of the Land O'Lakes program requires that farmers have adequate access to stable and remunerative markets for their milk. In some areas, farmer owned and operated MCCs have been working very successfully for many years and little new investment or other support is required. In other locations, however, LOL/Z has had to get involved with farmer groups from the ground up to build completely new collection facilities.

17. Beyond these immediate field-level activities, Land O'Lakes is also supporting other improvements in the domestic dairy chain that are meant to add value to local production and open new market opportunities for smallholder farmers. These activities include working with dairy processors to identify and design new products and marketing strategies, development of a Seal of Quality program based on international hygiene standards, and undertaking of various promotions campaigns to increase dairy consumption nationwide. The DAP is also providing support for the nascent Zambia Dairy Processors Association (ZDPA) to grow into an effective advocate for the processing industry.

18. **Warehouse receipts.** Because small dairy farmers are involved in crop production as well, Land O'Lakes is also providing support through a sub-grant for the expansion of a warehouse receipt program. Individual smallholders in Zambia have almost no bargaining power when marketing their crops and usually end up selling for a very low price (sometimes even at a loss) simply to earn whatever small amount they can to meet their immediate cash

needs. There is no doubt this poor marketing situation is an important underlying cause of Zambia's food insecurity problem.

19. The DAP, therefore, seeks to improve on the situation through its support to the Zambia Agriculture Commodity Agency (ZACA). Under the ZACA system, certified warehouses issue transferable receipts as evidence that that specific quantities of a crop have been deposited and that the deposits meet established minimum quality standards. Farmers can then trade these receipts or use them as collateral to obtain credit. Under the terms of a sub-grant, ZACA is meant to provide training to smallholder farmers to increase their awareness of warehouse receipt marketing opportunities and work with warehouse operators in new areas to build stronger connections with vulnerable populations. By focusing on the business aspects of crop marketing as well as primary dairy production, LOL/Z not only expects the DAP to have a direct impact on the income of participating households through dairy, but also to open the way for other market-based activities to become a sustainable route to reduced food insecurity.

20. **Geographic coverage.** During the first two and a half years, the DAP has been operational in five districts in Southern Province that were most severely hit by previous droughts including the drought in 2004-05. These districts include Mazabuka, Monze, Choma, Kalomo and Kazungula, all of which were placed on high food security alert until the last harvest in May 2006. The people of Southern Province are predominantly agro-pastoralists, but many have over the years lost their animals to various droughts and diseases that plagued the area during the 1990s when government suspended public dipping services as part of economic liberalization.

21. More recently the DAP has also established a new presence in three districts in the Copperbelt Province that have been severely affected by the loss of employment in the mining industry. In 2006, program activities were also extended to Chibombo District in Central Province and Chongwe District in Lusaka Province. Further expansion into Western and Eastern Provinces has also been proposed.

### **III. IMPLEMENTATION STRATEGY**

22. **Component structure.** The Land O'Lakes program is organized around five main components, each with interlinked activities that are implemented directly by LOL/Z and/or one of its subcontractors or sub-recipients. The Dairy Livestock Development and Warehouse Receipt Components are the main parts of the DAP intended to work directly with food insecure beneficiaries, but each other component is also considered important by Land O'Lakes to create new market opportunities as a platform for long-term reductions in food insecurity.

23. The program's five components are:

- Dairy Livestock Development
- Dairy Industry Development
- Promotional and Educational Campaigns
- Warehouse Receipt System
- Monetization

24. Apart from the monetization and warehouse receipt components, this structure is basically the same as Land O'Lakes initiated under the Zambia Dairy Enterprise Initiative (ZDEI). Similar to ZEDI, the current program supports various activities at each major stage of the production and marketing process. The DAP, however, has a specific food security

focus and is required to work with vulnerable populations. As Land O'Lakes transitions from the old program to the new, therefore, an important (and ongoing) challenge has been to adapt the mechanisms from the previous program to be more focused on FFP priorities (see box).

**Box 3: The Zambia Dairy Enterprise Initiative.**

The Zambia Dairy Enterprise Initiative (ZDEI) is the predecessor program to the DAP and became operational in 2001 under USAID's Dairy Directive. The main objectives of ZDEI were (i) the increased supply and improved quality of raw milk; (ii) the transfer of technology in dairy processing and packaging; and (iii) the increased consumption of dairy products. Activities undertaken by this program focused on the provision of farmer training, development of new milk collection centers to provide a primary market outlet, building of linkages between MCCs and formal sector processors, and product promotions work to build long-term demand and encourage market expansion. Many of these same activities continue today under the current Title II program except that ZDEI specifically targeted better-off farmers who already have a commercial outlook.

25. In this case, while there is no doubt that the main focus now is on vulnerable smallholders (most of whom have been or are being trained as first time dairy farmers), the design also puts considerable emphasis on other dairy development activities. As the program was designed and accepted by Food for Peace, these farmers must be also integrated into the formal sector economy in order for dairy production to be a stable source of income and route to improved food access and better nutritional standing. This integration requires access to reliable markets, which in turn is dependent upon consumer demand in the more developed urban markets. The dairy industry and dairy promotions work seek to address these aspects of value chain improvement respectively.

26. The warehouse receipts component is equally focused on developing a completely new area of agriculture enterprise that requires support beyond the level of working only with individuals who are vulnerable to food insecurity. The question of how much the DAP should be working at these other levels is certainly open to debate, but there can be no denying that the development of a warehouse receipt program requires working beyond the level of just touching food insecure individuals and communities.

27. **Implementing partners.** At the field level, program activities are being implemented directly by LOL/Z and various sub-contractors and sub-recipients associated with the program. More specifically, sub-recipients are given sub-awards with an implicit development function to improve the organization's capacity to take over the role of service provider after Title II programming is complete; subcontractors, on the other hand, are hired on a commercial basis to provide specific services. The selected sub-recipients for this program are the Zambia Dairy Processors Association (ZDPA), Golden Valley Agriculture Research Trust (GART), and ZACA. Contractors, currently working with the program include the Conservation Farming Unit (CFU), Heifer Project International (HPI), Miles and Associates (Miles), and World Wide Sires (WWS).

28. When designing the program, the original intention was for Land O'Lakes to undertake relatively few field activities and work mainly through sub-contractors and sub-recipients. This plan is still in place, but for various reasons, LOL/Z has ended up taking a much more active role at the field level than originally intended. In one case, an agreement could not be reached with the Zambia Agriculture Technical Assistance Center (ZATAC) which was slated to do primary marketing work with MCCs. Because a sub-contract could not be reached, LOL/Z has had to step in and take-over that responsibility. Similarly, agreement is still pending with GART on establishment of a breeding herd and farmer

training facilities, and LOL/Z has made alternative arrangements to move forward with these services while discussions are still underway.

29. An overview of the DAP's implementation plan by component and major activity is provided in the table below. Sub-recipients are highlighted in bold to indicate the different nature of their association with the DAP than an ordinary service provider. The use of parentheses around GART indicates that a formal sub-grant has not yet been agreed to, so field activities by this organization have not yet commenced. A more comprehensive review of the performance of each sub-contractor and sub-recipient is provided in Part Three of the MTR as part of the main implementation review.

**Table 2: Program Components and Implementation Plan**

Component	Main Activities	Implementers
<b>Dairy and Livestock Development</b>	<ul style="list-style-type: none"> <li>• Group selection &amp; follow-up</li> <li>• Farmer training &amp; extension</li> <li>• Livestock distribution</li> <li>• Veterinary support &amp; training</li> <li>• AI &amp; other breeding services</li> <li>• Quality assurance</li> </ul>	LOL LOL, CFU, Heifer, WWS, <b>(GART)</b> LOL, Heifer LOL, WWS, Heifer, <b>(GART)</b> LOL, WWS, Heifer, <b>(GART)</b> LOL
<b>Dairy Industry Development</b>	<ul style="list-style-type: none"> <li>• Market linkages (work with MCCs)</li> <li>• Seal of Quality Program</li> <li>• Public advocacy</li> </ul>	LOL LOL, <b>ZDPA</b> LOL, <b>ZDPA</b>
<b>Dairy Product Promotions</b>	<ul style="list-style-type: none"> <li>• Promotions campaign</li> <li>• Youth life-skills development</li> </ul>	LOL, <b>ZDPA</b> Miles & Associates
<b>Warehouse Receipts</b>	<ul style="list-style-type: none"> <li>• Warehouse certification &amp;</li> <li>• Farmer training</li> </ul>	<b>ZACA</b> <b>ZACA</b>
<b>Monetization</b>	<ul style="list-style-type: none"> <li>• Monetization of P.L. 480 food aid</li> </ul>	LOL

**Note:** Sub-recipients designated in bold; agreement with GART has not yet been finalized.

30. **Gender strategy.** According to Land O'Lakes, the overarching objective of the program's gender strategy is to ensure that men and women participate in project activities and benefits on an equitable basis by creating the necessary enabling environment. The DAP's specific gender objectives are to: (i) to ensure equitable participation by men and women in program activities; (ii) to guarantee equitable access to productive resources for both men and women; (iii) to create an enabling climate for women to play an effective and broad role in all program activities. The program thus make a deliberate effort to ensure that program services reach a significant number of poor rural women and improve the food situation of women who are heads of households and rural women in general. Specifically, the following considerations will be made:

- Ensure a minimum of 30% 'active' female representation in all the farmer associations that the program works with;
- Where possible, the program works with farmer associations that are predominantly female.

31. **HIV/AIDS.** Land O'Lakes also recognizes that the HIV/AIDS pandemic has become increasingly linked with issues of food and nutrition. On the one hand, malnutrition and food insecurity may force households to adopt activities that increase their risk to HIV while on the other; HIV/AIDS may worsen food insecurity. Land O'Lakes endeavors to make its food

security program activities responsive to the HIV/AIDS environment by addressing the negative synergies that link HIV/AIDS and food security. Specifically, the program:

- **Target HIV/AIDS affected households.** The program recognizes that female headed households and households with high dependency ratios are usually a result of an AIDS related death. Such households often need protected or increased access to means of production. The program thus categorizes such households as vulnerable and makes deliberate efforts to target them as program beneficiaries as long as they are willing and capable of participating in dairy activities.
- **HIV/AIDS awareness.** Efforts are being made to increase awareness to bring about attitudinal change through the use of a combination of prevention and mitigation measures to help reduce the spread of the disease and lessen its impact. This is generally being done through incorporation of HIV/AIDS prevention education as a crosscutting theme in farmer training and other outreach activities, including the youth life skills program.

32. **Environment.** Environmental sustainability is taken into account in all program interventions. Land O'Lakes promotes environmentally responsible and economically beneficial practices to producer groups. LOL, through its implementing partners HPI and CFU provide training and support to include semi zero grazing, and pasture management and ensure that environmentally friendly training will be incorporated in the activities conducted by extension agents. Milk Collection Centers and individual farmers are also trained in safe use of chemicals used in dairy production. LOL submits to USAID, an annual Environmental Status Report detailing the activities and monitoring conducted during each fiscal year.

33. **Financing and budget.** As a Title II program, the DAP's budget is not framed in any kind of dollar amount or other firm financial obligation from USAID. Rather, the commitment from the Office of Food for Peace is to provide a total of around 27,500 Mt of Title II food aid in the form of hard winter wheat over the DAP's five-year life. 100% of this food aid is to be monetized by sale to local millers with the net proceeds used to finance program activities. Thus far, Food for Peace has made 18,500 Mt of food aid available to Land O'Lakes and has indicated it expects to provide a further 4,500 Mt per year for the next two years until the end of the DAP. The monetization record to this point is summarized in the table below

**Table 3: Proceeds from Monetization of Title II Food Aid  
(Land O'Lakes DAP only)**

Year	Quantity (Mt)	Gross Sales (USD)	Net Proceeds (USD)	Pro-rated Price (USD/Mt)
2004	7,000	2,237,550	2,146,034	320
2005	7,000	2,243,390	2,038,580	320
2006	4,500	1,697,501	<i>Pending</i>	377
<b>Total to date</b>	<b>18,500</b>	<b>6,178,441</b>	<b>&lt; 5,882,115</b>	<b>Avg = 339</b>

34. Looking to the second half of the program, it appears that LOL can expect gross proceeds (of between USD 1.35 and USD 1.8 million per year. The final amount available for program activities, of course, will not be known until the monetization is complete. Based on past prices, however, and assuming the full consignment of 4,500mt of food aid is made available each year, the total cash value of support throughout the life of the DAP should be somewhere in the range of USD 8.4 to 9.2 million.

35. The monetization process was not a major area of investigation for the MTR, but naturally works according to all USG rules and regulations including the requirement to complete a Bellmon Analysis before the final obligation of Title II resources. By all accounts, the monetization procedures have worked well and Land O'Lakes is achieving good economies of scale with the commodities it handles. No complaints were heard. To the contrary, LOL appears to have developed a very efficient monetization office that is also handling commodity on behalf of other FFP contractors participating in the C-SAFE program including Catholic Relief Services (CRS), CARE International, and World Vision.

36. The types of activities and program costs being financed with these resources is summarized in the next table. As shown, over half of total resources are being used program activities at the field level, including support directed through the various sub-agreements mentioned above. Even transport and travel costs can be said to benefit the Title II target group directly since these expenses are incurred mainly during field visits to the program area. As noted in the introduction, the MTR's scope of work did not call for a detailed assessment of the program's budget or expenditure patterns. The information below, however, is still useful as a broad indicator of operational priorities and cost of the development process being pursued.

**Table 4: Summary of Main Program Expenditures by Fiscal Year**

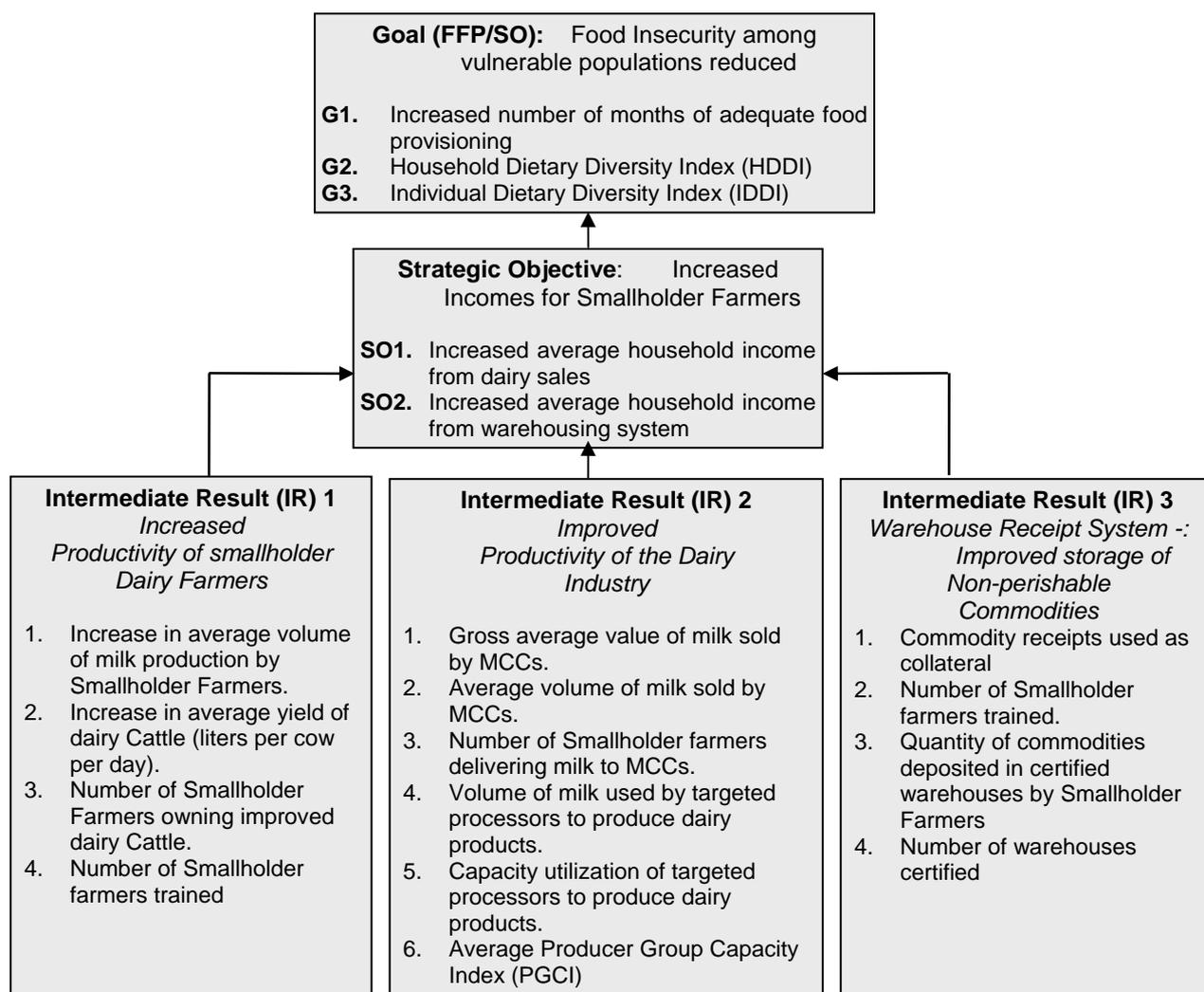
	USD		Percent	
	2004-05	2005-06	2004-05	2005-06
<b>A. Program Activities</b>				
Livestock	423,914	385,403	23%	13%
Training materials	68,569	41,486	4%	1%
Promotion expenses	76,640	82,396	4%	3%
Dairy equipemnt	210,654	313,688	12%	10%
Subagreements	92,442	811,286	5%	27%
<b>Subtotal program activities</b>	<b>872,218</b>	<b>1,634,259</b>	<b>48%</b>	<b>54%</b>
<b>B. Local and International Transport</b>				
Vehicle costs	49,288	98,773	3%	3%
Other travel & transport	99,302	171,566	5%	6%
<b>Subtotal local and internatoinal tansport</b>	<b>148,590</b>	<b>270,339</b>	<b>8%</b>	<b>9%</b>
<b>C. Consultancies</b>	<b>198,292</b>	<b>154,745</b>	<b>11%</b>	<b>5%</b>
<b>D. Staff Costs &amp; Overheads</b>				
Staff salaries and benefits	304,424	737,570	17%	25%
Office rent and maintenance	32,569	51,026	2%	2%
Utilities	13,296	16,936	1%	1%
Communications	5,790	48,526	0%	2%
Equipment	45,015	16,276	2%	1%
<b>Subtotal overheads</b>	<b>401,094</b>	<b>870,335</b>	<b>22%</b>	<b>29%</b>
<b>E. Monetization Expenses</b>	<b>210,814</b>	<b>75,407</b>	<b>12%</b>	<b>3%</b>
<b>TOTAL</b>	<b>1,831,007</b>	<b>3,005,086</b>	<b>100%</b>	<b>100%</b>

**Note:** LOL data; fiscal year from 1 October to 30 September.

37. **Results framework.** Within the context of FFP's strategic framework, all program activities need to contribute to the ultimate strategic goal of reduced food insecurity for vulnerable populations. As described, the DAP's approach to achieving this ultimate strategic objective is to focus on the "access" element of food security through the development of new and more resilient income sources. Food utilization and food availability aspects of are also covered to a limited degree by the DAP activities, but are not the program's main focus.

38. The results framework for monitoring the program's achievements is summarized in the figure below. In this diagram, the FFP's own SO and goal level indicators are listed as the highest level, followed by the DAP's own SOs dealing with increased farmer income. Below this level, the framework lists three main intermediate results that are meant to contribute to the program's objectives including (i) increased productivity of smallholder dairy farmers; (ii) improved productivity of the dairy industry; and (iii) improved storage of non-perishable commodities. The numbered points under each of the main IRs are the specific indicators being tracked by Land O'Lakes. These are reported in LOL's Indicator Performance Tracking Tables (IPTT) as shown in Annex 4.

**Figure 1: Program Results Framework**



## **PART THREE – IMPLEMENTATION REVIEW**

1. Having set out the DAP's strategic objectives and main design features, Part Three of the MTR now looks in more detail at the performance of each component and contribution to FFP's goal of reduced food insecurity for vulnerable populations. To do this, the chapter is organized in six sections including one section for each of the four operational components (i.e. all components excluding monetization, which is quite straightforward and has already been discussed), one section that summarizes the performance of each subcontractor and sub-recipient, and a final section that looks at the M&E system.

2. Consistent with the MTR's focus on the development process, the objective of this Chapter is not to describe or evaluate all of the activities being undertaken in full detail. Rather, the approach is to try and concentrate on the main areas of development support and consider how these either do or do not contribute to reduced food insecurity for the Title II target group. How LOL and FFP interprets these observations is entirely a matter for follow-on discussion between these protagonists in the DAP. Again, the main objective of the MTR is to awareness of important strategic considerations from a fresh perspective.

3. Towards this end, it is worth noting again that the Land O'Lakes food security strategy states that the program seeks to address food insecurity four specific levels. These levels include: (i) accurate targeting of beneficiaries that meet the Title II "food insecurity" criteria; (ii) broadening the communities' asset bases by investing in various aspects of their lives that increase productivity and incomes; (iii) use of dairy production as a coping mechanism against food insecurity; and (iv) promotion of improved marketing systems for other crops that lead to further improvements in income and reduced risk. In reading the discussion that follows, it is important to always come back to these four points and consider whether the activities actually being implemented by LOL are truly effective in achieving these results.

### **I. DAIRY AND LIVESTOCK DEVELOPMENT**

4. **Overview.** The Dairy and Livestock Development component encompasses the main set of activities that directly involve the Title II target group on a day to day basis. Other components, of course, are also designed to serve the needs of food insecure smallholders, but the Dairy and Livestock Development Component is far the largest part of the program and the most important in terms of direct interaction with intended Title II beneficiaries.

5. The dairy and livestock development work focuses on activities at the farm level. As set out in the program's design document, the operational goal of the component is to increase smallholder dairy productivity and market access. The component covers all program activities beginning with the identification of suitable farmer groups with members that meet established criteria for Title II assistance in Zambia, and extends along the rest of the rural supply chain until the point of first sale.

6. Major activities under the Dairy and Livestock Development Component include the selection and training of vulnerable farmers and other group participants in the construction of animal

**Box 4: Main Activities of the Dairy and Livestock Development Component.**

- Identification of producer associations
- Training in various aspects of dairy production and management
- Provision of extension services
- Distribution of improved dairy breeds to qualifying beneficiaries
- Provision of artificial insemination services
- Quality assurance messages for raw milk supply
- Market linkages

shelters and calf pens, fodder production, forage conservation, animal health and nutrition, dipping requirements, milk quality and hygiene, milk marketing, and animal reproduction and breeding. Other training and group development activities covered by this component include establishment of health and nutrition clubs, training of community livestock assistants, and capacity improvement of GRZ veterinary officers and livestock extension staff. The DAP's livestock distribution and animal breeding work also falls under this component (see box).

7. Several subcontractors are working together with Land O'Lakes on the dairy and livestock development activities. These include Heifer Project International (HPI), which has strong presence in the Copperbelt and has been contracted to work with Land O'Lakes in that specific area; World Wide Sires (WWS), which is a US-based animal genetics cooperative that LOL/Z has asked to provide artificial insemination services; and the Conservation Farming Unit (CFU), which is a part of the Zambia National Farmers Union (ZNFU) and is involved to provide training integrated farming techniques and minimum tillage approaches to fodder production.

8. **Major achievements.** So far, the program has provided training to a little more than 2,000 farmers, organized into 70 farmer groups. As of August 31, a total of 540 heifers had been given out to 503 especially vulnerable households that successfully completed the training program and also made the necessary investments in animal shelters and fodder crops. Of the distributed animals, approximately 259 heifers have since given birth and are in full milk production as a dairy cow. By the end of the DAP, Land O'Lakes plans to distribute a total of at least 1,000 in-calf heifers to qualifying farmers.<sup>5</sup> This is in addition to another 100 heifers being given out under a parallel 1-year program funded by the Office of Foreign Disaster Assistance (OFDA). To this point, no pass-ons have taken place since the first calves are just now approaching the right age for this to occur.

9. Good progress has also been recorded with the training of community livestock assistants and AI technicians that are based in the rural areas where heifer recipients and other beneficiaries live. These investments in animal health and breeding are especially important to sustain the program after external support comes to an end. By targeting more and better-off farmers for training than are able to receive a heifer, Land O'Lakes hopes to extend the program's benefits to a wider set of farmers than just the very vulnerable. This is considered important to build the critical mass of new milk production in rural areas needed for vulnerable individuals to access stable market opportunities.

## **A. Beneficiary Selection**

10. As described in the LOL food security strategy paper, accurate targeting of beneficiaries is one of the first and most important objectives of the program. The program's approach to targeting is well set out in the document "Farmer Targeting and Selection

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<sup>5</sup> Land O'Lakes has so far proposed to reach more beneficiaries through the pass-on program which was agreed at the request of FFP both to reach more beneficiaries and to impress a sense of ownership for the new cattle on the recipients. One major recommendation of this MTR, however, is that the pass-on program be completely dropped or at least significantly revised. The pass on arrangement imposes a significant burden on first and second generation recipients and is likely to lead to the failure of some farmers because of the negative cash flow implications and other severe costs associated with this arrangement. As shown, farmers more than pay for the price of the heifer through other investments and it seems unusually harsh to make them pay again in the form of a girl calf which is their most valuable future asset of all. The question of how to increase direct beneficiaries should not be addressed through any type of pass-on arrangement, but requires more in depth consideration of other development options.

Process” developed in 2005 at the request of Food for Peace. Land O'Lakes has done a faithful job implementing this strategy and appears to be doing very commendable work reaching especially vulnerable households and other needy individuals who have the potential to benefit from dairy production.

11. **Program approach.** The selection process begins with geographic targeting and identification of farmer groups. By working with already established groups being assisted by C-SAFE or some other food security or project, LOL is able to improve the effectiveness of its targeting and increase synergies between its work and other FFP programs. The majority of program services at the field level are delivered through the farmer group structure, including training for all members regardless of whether they later qualify to receive a heifer as part of the livestock distribution or not. In fact, Land O'Lakes actively targets about 10% of heifer recipients who should not be especially vulnerable. This helps both as a strategy to enhance group cohesion and for pulling other, less well-off members along.

12. The group selection criteria developed by Land O'Lakes are summarized in the accompanying text box. As shown, the selection process focuses both on food security issues and on the members' capacity to manage a dairy animal. Other crosscutting issues including active participation of women in the farmer group, and availability of water are also taken into account as matters of strategic importance.

13. The next stage in the targeting process is to identify individual farmers within the selected groups who should be eligible to receive an in-calf heifer. As noted, training is still provided for all members, but the selection of especially vulnerable individuals is still critical to the program to ensure maximum contribution to FFP strategic objectives.

**Box 5: Group Selection Criteria**

- At least 70% of members fall below targets for food security established by the program (i.e. less than 6 months adequate staple food provisioning).
- Established group / association of at least 20 farmers, already working with another development agency.
- Proven commitment to development through regular meetings and active participation in development activities.
- Trainable and showing high adoption of technical messages
- Access to land.
- At least 30% female representation in group, both at participation and decision making levels.
- Located within district where LOL program is working.
- Located within 2 hours walking distance of the nearest MCC.
- Willingness to deliver salable milk to a MCC.
- Willingness to become a cooperative, if not already one.
- Willingness to participate in a dairy development project (including the construction of cow facilities and implement pasture establishment.
- Availability of clean and reliable sources of water.

14. At the individual level, LOL's design structure calls for a household questionnaire to be administered to the members of each group. Information from the survey is then used to determine each household's vulnerability status and who should be slated to receive a heifer. Households with high dependency ratios, HIV/AIDS prevalence, and female-headed households are given priority since these are usually among the most poor and vulnerable to food insecurity. The capacity to care for a dairy cow, however, is also taken in to account since it would be almost pointless to provide these people a heifer if that animal cannot be maintained in good health and condition (see next box).

**Box 6: Farmer Selection Criteria**

- The farmer's household must be food insecure (have less than 6 months of adequate staple food provisioning).
- The farmer must be trainable and willing to adopt new dairy management technologies.
- The farmer should be willing to build livestock housing and other necessary facilities.
- The farmer must have access to land.
- The farmstead must be within 2 hours cycle from an existing or proposed MCC.
- The farmer should not currently own cattle, but may have previously owned cattle.
- The farmer must be a member of a group, association, or cooperative or be willing to join one.
- The farmer must have the basic resources required to participate in dairy (especially labor).
- The farmer's household must be within the LOL program area.
- The farmer must be willing to deliver milk to a MCC.
- The farmer must have easy access to clean and reliable water source.
- The farmer must be willing to access animal health care.

15. Throughout the training process and other group work, one-on-one site visits and verification checks are also carried out to determine each farmer's final eligibility to receive an in-calf heifer. This process includes looking at both the household's vulnerability status as well as their technical capacity to care for an exotic dairy animal. The final selection criteria being used by LOL are summarized in the table below.

**Table 5: Checklist of Final Criteria to Receive an In-calf Heifer**

<b>Program Targeting (food security criteria)</b>	<b>Technical Capacity (dairy management criteria)</b>
<p><b><i>Does the farmer meet all established food security selection criteria?</i></b></p> <ul style="list-style-type: none"> <li>• Does the household have less than 6 months adequate food provisioning?</li> <li>• Are there a high number of dependents and/or orphans?</li> <li>• Is the entire household involved in dairy activity?</li> <li>• Does the farmer keep other livestock?</li> </ul>	<p><b><i>Is the farmer technically able to care for an exotic dairy cow?</i></b></p> <ul style="list-style-type: none"> <li>• Is the farmer registered and paid up in the group?</li> <li>• Is the farmer active in the group?</li> <li>• Did the farmer establish and maintain any pastures?</li> <li>• Has the farmer conserved any feed for the animal?</li> <li>• Is water accessible throughout the year?</li> <li>• Does the farmer have cattle handling facilities (shelter, crush pen, calf pen, etc.)</li> <li>• Does the fully understand the importance of dipping?</li> <li>• Is the farmer willing to pass-on the first female calf?</li> <li>• Does the farmer own the land he or she is occupying?</li> </ul>

16. **Observations.** As noted, it appears that Land O'Lakes has done a commendable job of implementing its targeting strategy. The survey and selection process has been quite effective in reaching vulnerable households and LOL has been able to streamline this process by working with already established farmer groups. That said, the IPTT survey conducted alongside the MTR, revealed that old and new program participants experience an average of 3.92 and 3.27 months of inadequate household food provisioning per year respectively (see Annex 3). This is against an average value of 6.00 months that was reported at baseline. At least two important factors can be identified as contributing to this outcome.

17. First, is the very simple fact that the IPTT survey was carried out in a year after a good rainy season. As described, the main cause of food insecurity in rural Zambia is the failure of rain fed crops which was not a problem last year. During a drought year, the results would likely be very different and only then will the true success of the program be revealed in terms of whether or not Land O'Lakes has succeeded in targeting the neediest individuals and building a sustainable platform for new economic activity that prevents these people from requiring food assistance.

18. Second, and even more critical for program operations, is the undeniable fact dairy production is a technically demanding business. While there is ample evidence from the DAP and other Land O'Lakes' programs in different countries to show that smallholder farmers most definitely can succeed with a dairy enterprise, there is also much that can go wrong and many high costs that new farmers need to finance. Or put another way, farmers who meet the program's very demanding technical requirements might not also meet very demanding vulnerability criteria of having a full six months of inadequate food provisioning (especially in a year following good rains).

19. The table below looks at this question of up-front investment costs in more detail and shows that the high start-up costs are indeed an important challenge any program that seeks to involve very poor and vulnerable households in specialized dairy production. Although some savings on these estimates are possible by recycling household items as feeding and drinking troughs and so on, the data still show that a quite large cash and/or in-kind contribution is required to satisfy the technical requirements for dairy start-up. Most households in the LOL target group, for example, do not have bicycles so unless they are close enough to walk to a MCC to deliver their milk, this requirement alone can easily prevent many households from participating in the program.

**Table 6: Estimated Requirements for Dairy Start-up**

	ZMK	USD
<b>Dairy buildings and equipment</b>		
Cow shed (approximate cash costs)	350,000	100.0
Drinking troughs	25,000	7.1
Feeding troughs	20,000	5.7
Hand tools	50,000	14.3
Water cans	35,000	10.0
Milking equipment	210,000	60.0
<b>Pasture development</b>		
Rhodes grass seed (1 lima @ 10kg/ha)	17,500	5.0
Pigeon pea seed (0.5 lima @ 15kg/ha)	21,000	6.0
Velvet bean seed (6kg)	31,500	9.0
Sunhemp seed (6kg)	63,000	18.0
<b>Other equipment</b>		
Bicycle	450,000	128.6
<b>Total CAPITAL REQUIREMENT</b>	<b>1,273,000</b>	<b>363.7</b>

Excluding imputed value of family labor for training, cow shed construction, and pasture development.

20. To offset the start-up challenge, LOL is working to distribute milking equipment (consisting of stainless steel buckets and milk cans) on a loan basis from the MCCs in which the cost is meant to be deducted from the farmer's future payments. Even without this up-front cost, however, and assuming the farmer already has a bicycle, the total estimated financial commitment to receive a dairy heifer is still around ZMK 600,000 (about USD 175). Compared with Zambia's GNI per capita of USD 490 per year, an investment on this scale is

obviously quite a reach, especially for the type of very poor and vulnerable households targeted by Title II.

21. In practice, therefore, the LOL program has tended to focus on beneficiaries who can best be called “vulnerable but viable” rather than individuals who are unable to participate in productive livelihood activities due to a lack of assets and greater levels of food insecurity. Not only do new dairy farmers require a number of materials to get started, they also require sufficient labor and managerial skills to succeed with milking and milk marketing every day. The distribution of dairy heifers to people who are already sick with AIDS, for example, would be an almost completely unrealistic proposition without the full involvement of other family members.

22. **Other lessons.** Because program services are designed to support other individuals than just direct heifer recipients, an easy mistake to make when looking at the DAP is to only count beneficiaries by the numbers of livestock given out. This has been an all too frequent error during the first half of the DAP and is significant because the program in fact serves a much wider group of food insecure beneficiaries. As described, the program’s training activities target all farmer group members and the market development work also creates new opportunities for non-members the program will not otherwise have any direct contact with. Many of these secondary and tertiary beneficiaries are also vulnerable to food insecurity and so are highly relevant to FFP strategic priorities.

23. Based on the 2005 Vulnerability and Needs Assessment Report, for example, a total of nearly 400,000 individuals in Southern Province, or about 30% of the region’s total population, were found to be at risk of food insecurity and in need of cereal distribution. This was following the bad rains in 2004-2005. From this perspective, it is far more useful (and important to understanding the program’s true impact) to consider three levels of vulnerable beneficiaries including (i) direct heifer recipients who are singled out for highest level consideration; (ii) other group members who also own dairy animals or other traditional livestock and so benefit from the training and market development work; and (iii) non-group members who benefit from the market linkages and MCC support.

## **B. Farmer Training**

24. Following from beneficiary selection, the next major activity undertaken by the program is intensive training of intended heifer recipients and other farmer group members in dairy production. Most individuals being assisted at this level are, in fact, first time dairy farmers and the training work is one of the most important parts of the program for realization of Title II objectives among this most vulnerable group of beneficiaries. From LOL’s strategic food security perspective, this work relates precisely to the goal of broadening communities’ asset bases by investing in various aspects of their lives that increase productivity and incomes.

25. **Program approach.** Most training work is carried out directly by Land O'Lakes subject matter specialists. Typically, Lusaka-based staff will make 12 to 14 visits per group before the members are deemed ready to receive a dairy animal. Several subcontractors including HPI, CFU, and WWS are also heavily involved in the training work and the DAP is also supporting GRZ extension workers to make at least two visits per month as part of a plan to build closer ties with selected communities. Follow-up training is also scheduled with at least one visit per group per month by LOL specialists to check on progress and help individual farmers to solve technical problems that may have come up.

26. Various training methods are used including group lecture, practical demonstrations, and site visits for selected members to other dairy groups in different parts of Zambia. These

training sessions are usually carried out in the vernacular language with flip charts and other written materials in English. In addition to training for farmer groups, LOL is providing more in-depth training for community livestock specialists and GRZ veterinary officers and extension staff. These investments in local institutions and GRZ capacity are meant to promote the program's sustainability and help ensure participating farmers and other small dairy producers can get the advice they need within their own community after the DAP support comes to an end.

27. **Observations.** In assessing the training program, it should first be stated that the MTR did not make any attempt to look at the technical details of the training messages being given out. Land O'Lakes and its subcontractors are all recognized specialists in the fields they cover and no reason was found to question the merit of the program's curriculum. Instead, the most useful measure of success is to look at how well current heifer recipients and other participating dairy farmers are doing with their new enterprise. It is also useful to consider whether milk production is a sufficient measure of farmer success, which is effectively how LOL is reporting on farmer productivity according to the current performance monitoring plan (PMP).

28. Summary details of the most relevant farm-level indicators as recorded in the program's IPTT and most recent Quarterly Report are set out in the table below. As shown, the DAP has so far provided training for a cumulative total of 1,911 farmers, including 775 as reported in the latest version of the IPTT and a further 1,136 to give the of 1,911 reported in the last QR (IR 1.4). Based on this total and the number of heifers distributed to date (540 as of August 31), these data show that LOL has provide training to around three additional farmers for every one heifer recipient being assisted at the highest level. As discussed, the measurement of "beneficiaries" by the number of heifer recipients alone is an inaccurate and misleading way of looking at the program, especially given the total numbers of people who are at least *vulnerable* to food insecurity during a time of drought.

**Table 7: Selected IPTT Results Indicators for Increased Productivity on Smallholder Dairy Farms**

	Baseline	Year 1		Year 2		Yr. 3	Yr. 4	Yr. 5
		Target	Actual	Target	Actual	Target	Target	Target
<b>IR 1.1</b> Increase in average volume of milk produced by smallholder farmers (liters per farmer per year)	2,750	n.a.	n.a.	<b>2,888</b>	<b>3,038</b>	3,025	3,166	3,300
<b>IR 1.2</b> Increase in average yield of dairy cattle (liters per cow per day)	4	n.a.	n.a.	<b>6</b>	<b>4</b>	8	10	12
<b>IR 1.4</b> No of smallholder farmers trained	0	n.a.	n.a.	<b>600</b>	<b>775</b> (1,911)*	1,200	1,600	1,800

**Source:** LOL (2006 and 2006a). \* Training figure reported in June 2006 Quarterly Report (other data from most recent IPTT tables).

29. With respect to IRs 1.1 and 1.2, however, the data are less convincing and more difficult to interpret. Especially with respect to IR 1.2 where the baseline figure of 4 liters per

day is drawn from a GART survey before the DAP's inception, this figure is almost meaningless and does not show how much milk heifer recipients, other group members, and non-members were producing. A more useful approach would have been to establish a reasonable yield expectation for participating recipients and other farmers and then simply track their performance against this benchmark over the life of the program. Such a method would do a much better job of showing the effects of the program's training work and, with proper disaggregation and use of control groups, would be a far more effective way of tracking milk production by vulnerable households and other individuals who also benefit from program services.<sup>6</sup>

30. Likewise, with respect to indicator 1.1 the PMP's Indicator Reference Sheet explains that this number measures "milk produced by dairy farmers benefiting from the program", but is not specific on whether this means direct recipients or includes other secondary beneficiaries in the program area as well. In fact, if the number is for direct recipients only, then few of these individuals would have had any cattle at all before LOL assistance and so a baseline figure of zero should have been recorded. As a matter of technicality, LOL chose to use the figure of 2,750 liters per year based on the achievement of ZDEI, but as described already, this program targeted a different group of producers and had a different set of objectives. A more convincing approach would be to look at the incremental income that accrues to vulnerable households that receive a heifer, and possibly for other beneficiaries as well. Because the highest level LOL beneficiaries are starting from scratch, any new milk production by these individuals represents brand new income. Unfortunately, this is not being captured by the PMP.

31. Because of these limitations with the PMP data system, other more impressionistic findings on the success of the training work are needed to gauge the results of this part of the program.

32. In this case, the mid-term consultant's general impression is that the farm-level management situation is extremely mixed. Relatively few farmers have "failed" completely although the high mortality rate of almost 11% of distributed heifers is a serious concern.<sup>7</sup> Likewise, it seems that animal health and nutrition is generally lower than might realistically have been hoped for. Despite training in fodder production and silage making, for example, almost no farmer had any prior experience in this area and many producers are still struggling to find enough nutritious feed to give to their dairy animals, particularly during the dry season when green fodder is scarce. Farmers likewise have a poor understanding about the use of concentrate or mixed feeds. LOL is currently undertaking remedial action by

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<sup>6</sup> Specifically, the PMP Indicator Reference Sheet states that data will be disaggregated by gender, wet vs. dry season, breed, geographical areas, and farm size. These results, however, are not reported clearly in the program's indicator performance tracking tables (IPTT). Moreover, further disaggregations are needed by participants, non-participants, and even by vulnerability status to truly gauge the effectiveness of different types of assistance and impact of increased milk production on household income and vulnerability status. These types of divisions would, in fact, be far more useful and relevant to the DAP's strategic challenges than looking at fairly minute (and predictable) differences between breed, geographic area, and farm size.

<sup>7</sup> While concerning because of the very high investment being made in first time dairy farmers, this figure also needs to be put in the context of even higher mortality rates for traditional cattle and for dairy heifers that have been given out by HPI on other programs over the past many years. With respect to HPI's own program, for example, mortality rates of 25% to 30% are not unusual. The mortality figure of 10.5% for the DAP may be thus seen, at least in part, as an indicator of the success of the Land O'Lakes training work. Far more still needs to be done to improve on the situation and there is also a risk that the pass-on modality could de-motivate some farmers from taking good care of their animals (as is very likely to have happened in some cases for HPI).

distributing chaff cutters that will help the animals digest the fodder more efficiently, but this problem might have been avoided with more careful selection of farmers in areas where green fodder is normally always available and if direct recipients had been more proactive in conserving the grasses that are available as instructed during training.

33. With respect to animal mortality, 57 heifers of the 540 animals distributed so far have died. The most important reason is insufficient dipping or use of other acaracides to control tick-borne diseases. Farmers, of course, have many reasons for not following a good dipping regime (including lack of cash to pay for dipping services) and it would not be correct to link the mortality problem exclusively to any weakness in the training program. Rather, this is more an indication of the inherent challenge of promoting dairy production among especially poor and vulnerable individuals. The other main cause of animal mortality, for example, is birthing problems, which is completely beyond the control of most farmers, especially when high-quality veterinary care is not readily available. Unfortunately, for recipients whose heifer died through no fault of their own, these individuals are still left with the cost of the initial investment in cow shed construction and pasture development.

34. Again, these farm-level impressions are not to say that recipients and other group members are doing poorly with dairy production or have not absorbed the training messages. Some recipients are, in fact, doing extremely well and are already milking more than 12 liters per day, which is the life of project target. There is ample evidence from this DAP and other LOL programs to show that vulnerable smallholder farmers can indeed be very successful dairy producers. Equally, though, it must be admitted that dairy is a complex business with many risks along the way. This observation underscores the importance of continued training, farmer follow-up, and support. Especially for farmers that receive a heifer towards the end of the program, there is an important risk that these individuals may do less well since they will not have access to the same kind of continued support services early recipient have enjoyed. For this reason, it is important to get as many heifers out to the program's highest level beneficiaries as soon as possible while there is still time to provide adequate technical backstopping.

35. **Other lessons.** Also with respect to the training work is worth noting that the most training messages are geared toward market-oriented dairy production. Although this is entirely consistent with the value chain approach LOL is following, it is also important (particularly from the perspective of assisting vulnerable farmers to overcome their food security problem), to focus on other revenue streams as well including the nutritional value of milk for home consumption and potential benefit of using manure as fertilizer on small vegetable gardens or even on primary field crops. As discussed in more detail later on, and particularly with the financial analysis in Part Four, the cash income from milk only accounts for about half of the total revenue from dairy and much greater emphasis could be given to helping farmers capture the benefit of other revenues streams and to reporting the progress being made in these areas through the DAP's IPTT and other channels.

36. One other related observation from the training work is that many new farmers requested there should be some sort of refresher training. This was particularly true of dairy groups in the Copperbelt where there is not the same tradition of keeping livestock as in the south. One woman, in fact, explained that she mainly attended the training in the hope of receiving a cow and didn't pay particularly close attention because she wasn't sure the program would really deliver. Although the other group members were not quite so forthright about their reasons for attending the training as this lady, most members did agree there is a big difference between what they learned in class and current real life requirements of caring for their animal. Even in the south, smallholder farmers are almost totally unfamiliar with the basic requirements of modern dairy production and the need for repeater training and follow-up visits in all areas should not be underestimated.

37. To minimize this need for follow-up support over time, one very clear (and relatively easy to implement) recommendation from the MTR is for LOL to develop a set of very practical, simple, and easy to understand field handouts aimed specifically at the small farmers it targets. This kind of smallholder dairy field manual does not exist in Zambia and would be extremely useful, not only to improve the success of farmers being assisted now, but also as a matter of long-term sustainability and outreach. The precise format and amount of information to include obviously requires much more thought than would be appropriate for the MTR to look at, but at the very least it is recommended that these should be in the vernacular language and include as many pictures and diagrams as possible that are clear and easy to understand.<sup>8</sup>

### **C. Distribution of In-Calf Heifers**

38. After farmer selection and training, the next major step in the Land O'Lakes program cycle is the distribution of in-calf heifers to qualifying beneficiaries. This work is one of the most important parts of the program and is the central activity around which many other services revolve. In terms of the Land O'Lakes food security strategy, the distribution of exotic dairy animals is meant as a direct contribution to the broadening of communities' asset bases and also to the development of new coping mechanisms that help vulnerable people cope better with the risk of food insecurity. On reflection, this focus now seems too narrow and has led to missed opportunities to impact a wider community who can also benefit from investments in the training work, market development, and breeding services.

39. To this point, in fact, the success of the program and progress toward stated objectives have been measured by FFP and others largely by the number of heifers given out. While this is indeed one of the clearest and easiest to measure benchmarks of the DAP's success, it is also a mistake to look only at this one area of achievement. As described, LOL is involved with many other training activities and market development work that is also designed to improve the competitiveness of the dairy industry and create a sustainable place for direct recipients and other smallholder farmers to benefit from dairy production. Actual heifer recipients, therefore, are best thought of as the program's highest level of beneficiary, but there are also secondary and even tertiary beneficiaries at the farm level in the form of other group members who participate in training and non-members who enjoy better access to the formal market. Direct heifer recipients are likely to be more food insecure because of the rigorous selection process, but there is no doubt that the program touches a much larger group of vulnerable individuals than this small group.

40. **Progress to date.** As of August 31, a total of 540 dairy heifers had been given out to qualifying Title II beneficiaries. The complete record of the distribution so far is summarized in the tables below.

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<sup>8</sup> Because the DAP works in the Copperbelt, Central and Southern Provinces more than one set of manuals may be required, each in a different language.

**Table 8: Actual and Projected Distribution of In-Calf Heifers  
(as of August 31, 2006)**

	Actual to Date			Projected			Total for DAP
	Year 2	Year 3	Total	Year 3	Year 4	Year 5	
Southern Province	220	101	321	17			338
Copperbelt Province		122	122	20	100	75	317
Central Province		75	75	45	100	75	295
Lusaka Province	22		22	28			50
<b>Total distribution</b>	<b>242</b>	<b>298</b>	<b>540</b>	110	200	150	<b>1,000</b>

41. As shown no animals were given out in Year 1 since the DAP was still getting underway with group selection and farmer training. In Year 2, a total of 242 dairy heifers were given out and 298 have so far been given out in Year 3. An further 110 dairy animals are scheduled to be given out to already identified recipients by the end of this year and another 350 animals are scheduled to distributed in Years 4 and 5. Because of the need follow-up support during the establishment period, LOL has intentionally tried to weight the distribution towards the front and middle of the program's lifespan with relatively few animals being given out at the end, but this is also constrained by local availability of diary heifers since it is already quite a stretch to find the 400 or so animals scheduled to be given out this year.

42. The next table looks at distribution on a geographic basis. As shown, farmers in Southern Province have so far received the majority of dairy animals, but LOL now plans to focus on other areas in the time remaining to finish with a more even geographic distribution. At one stage it was proposed that the program should expand to cover other areas including parts of Western and Eastern Provinces. At this stage, however, it seems far more sensible to concentrate on areas where the program is already established than risk spreading the program too thin and incurring all of the additional costs and challenges further geographic expansion would entail.

**Table 9: Geographic Profile of Heifer Distribution**

	Actual to Date	Total Projection
Southern Province	59%	34%
Copperbelt Province	23%	32%
Central Province	14%	30%
Lusaka Province	4%	5%
<b>Total distribution</b>	<b>54%</b>	<b>100%</b>

43. In addition to the animals being given out under the DAP, LOL is also implementing a parallel program funded by the Office of Foreign Disaster Assistance (OFDA). Specifically, OFDA has provided funding for LOL to distribute an additional 100 dairy heifers to farmers in Southern Province. Taken, together this means that a grand total of at least 1,100 dairy heifers will be given out to vulnerable farmers by the end of the DAP with a slightly greater concentration in Southern Province than elsewhere. This pattern matches Zambia's food security problem quite well since farmers in the south are usually among the most vulnerable to drought and first to require emergency assistance in a time of crisis.

44. The next table looks at the state of the current herd. Of the 540 animals given out so far, roughly 259 had given birth as of August 31 and so are now in full milk production.<sup>9</sup> Of the 540 heifers, however, 57 animals have died, which is equivalent to a (rather high) 10.5% mortality rate. Two calves have also died. Tick borne disease to do inadequate use of acaricides and birthing problems are the main causes of livestock mortality. Some recipients in the first year received two heifers; all recipients in the second year have received just one.

**Table 10: Approximate Births and Mortality of Livestock**

	<b>Heifers Distributed (a)</b>	<b>Heifer/Cow Mortality (b)</b>	<b>Births to Date (c)</b>	<b>Calf Mortality (d)</b>	<b>Total LOL Herd (a-b)+(c-d)</b>
Southern Province	321	50	143	1	413
Copperbelt Province	122	1	36	1	156
Central Province	75	4	60	0	131
Lusaka Province	22	2	20	0	40
<b>Total to date</b>	<b>540</b>	<b>57</b>	<b>259</b>	<b>2</b>	<b>740</b>

45. The genetic composition of the dairy animals given out so far is as follows.

<b>Jersey cross</b>	<b>24%</b>	= 130 total
<b>Jersey (pure)</b>	<b>28%</b>	= 152 total
<b>Black &amp; White cross</b>	<b>40%</b>	= 215 total
<b>Black &amp; White (pure)</b>	<b>8%</b>	= 43 total

46. Cross-bred animals distributed through the LOL program are generally 75% pure and will produce a 3<sup>rd</sup> generation, "purebred" calf since they were all inseminated using AI. Importantly, however, 2<sup>nd</sup> generation crosses are normally more robust than a purebred animal and so are actually a better choice for smallholder farmers despite the lower yield potential compared with a purebred animal under ideal conditions. Similarly, black-and-white dairy cows have a higher yield potential than Jersey cows, but are more sensitive to management and can easily produce less milk if animal health and nutrition are not given proper attention.

47. **The pass-on modality.** According to program design, all female calves born to heifer recipients are meant to be passed-on to another group member at about 1-year old thereby extending the program's benefits to a new group of vulnerable individuals and instilling a sense of ownership among the first generation recipients as they repay their "heifer loan". To this point, no pass-ons have taken place since the first calves are just now approaching the right age for this to take place.

48. Although the importance of instilling ownership should not be underestimated as a factor for long-term success, careful examination of this modality gives good reason to question whether the pass-on system is appropriate from a food security perspective. In the first place, repaying the value of the "heifer loan" with the first female calf can be a very significant cost for a small farmer. Not only does this vulnerable individual have to feed the calf for a full year before giving it away, but as shown in more detail by the financial analysis in Part Four, annualized revenue from cull cow and calf sales account for almost 1/3 of total cash income from a recommended 1-cow dairy system. As a system to help vulnerable

<sup>9</sup> A dairy cow only produces milk after the animal has given birth.

people, therefore, it seems inappropriate to take away such an important asset just as the farmer is getting settled with the new enterprise. Dairy production is much more profitable and financially viable at the 2-cow level and the DAP should mainly be concerned with helping its highest level beneficiaries advance to that point as quickly as possible. Finally, from the original recipient's perspective, the very real possibility that the rest of the calves will be male must also be recognized.

49. From the perspective of the second generation beneficiary, there is also good reason to argue that the receipt of a pass-on calf is not a very good deal and that some households could even better-off not entering dairy production under these conditions. The table below tries to make this point more clearly by looking at the cash costs first and second generation recipients incur between the time of receiving the animal and first cash sales with the start of milk production. Specifically, whereas a first generation recipient normally has to wait a fairly short two to six months until the heifer gives birth and milk production begins, a second generation recipient must wait at least 21 months before receiving any income from milk. On top of the initial investment costs for dairy start-up described above, therefore, a second generation recipient can expect to spend a further ZMK 721,000 (USD 206) on animal feed, veterinary care, and artificial insemination before any revenue is produced.

**Table 11: Additional Cash Costs until Milk Production**

	1st Generation Recipient*		2nd Generation Recipient**	
	ZMK	USD	ZMK	USD
<b>Stockfeed</b>				
Hay from pasture	-	-	-	-
<b>Animal Health</b>				
Vet subscription (ZMK 5,000/week)	64,500	18.4	451,500	129.0
Emergency call-out (ZMK 80,000 visit)***	20,000	5.7	140,000	40.0
Acaracides (ZMK 740/dip @ 4 dips/month)	8,880	2.5	62,160	17.8
De-worming (2 doses per year)	6,300	1.8	22,050	6.3
Blanthrax (2 doses per year @ ZMK 550/dose)			1,650	0.5
Rift valley fever (2 doses per year @ ZMK 800/dose)			2,400	0.7
Lumpy skin (2 doses per year @ ZMK 650/dose)			1,950	0.6
<b>Animal Husbandry</b>				
AI service (2.5 straws average)			40,000	11.4
<b>Total CASH REQUIREMENT</b>	<b>99,680</b>	<b>28.5</b>	<b>721,710</b>	<b>206.2</b>

Excluding imputed value of family labor for pasture management, animal care, and cow shed maintenance.

\* Costs based on three month average wait until calving.

\*\* Pass-on female calf at 12 months old; insemination of calf at 24 months (12 months since pass-on); birth and first milking at 33 months old (21 months since pass-on).

\*\*\* Estimate one emergency call-out per year.

50. As a method for reducing food insecurity, therefore, the pass-on modality has many problems and high costs both for first and second generation recipients. By requiring the first generation recipient to give up their first female calf, this vulnerable beneficiary will just take longer to reach the point where dairy truly becomes a solid platform for income improvement and resiliency to shock. Likewise, considering that it will be at least three years since the birth of a first generation calf until the second generation (pass-on) recipient enjoys any income from dairy, the very real probability of there being some major drought or other food crisis between now and then must be recognized. Under the current pass-on plan, there will likely be second generation recipients in the project area who are not only struggling to overcome the effects of the next drought when it occurs, but who are now also faced with the challenge of feeding a hungry, but still immature dairy heifer. Finally, because the DAP will be winding down (or perhaps even finished) when many of the anticipated pass-ons take place, second generation farmers also will not have the same kind of technical training and support

that could help them manage this cost better and incorporate dairy production in the household livelihood system.

51. For these reasons, it is strongly recommended that LOL and other program stakeholders should revisit the pass-on modality as soon as possible to come up with an alternative approach. Many of calves born in the project's second year are just now approaching the right age to be passed-on and this matter should be treated as a top priority. While other approaches will also have certain drawbacks, some possibilities that may be worth considering would be to require the farmer to repay the heifer loan by donating one or two male calves to the farmer group instead and/or to repay the loan with the second female calf instead of the first. Part of the challenge of rearranging the pass-on modality however, is to involve the second generation recipients in dairy production much more quickly than the current approach allows. On a budgeting level, therefore, LOL may need to make some cuts from other (less essential) activities in order to expedite the heifer distribution and increase the number of animals given out directly over the life of the program.

52. **Other livestock development.** One further observation about the livestock development work is that this has so far been framed in the quite narrow perspective of distributing improved animals to primary beneficiaries. In large part, this is because of the specific emphasis on very vulnerable individuals per the terms of the FFP strategy. As described, however, roughly 1/3 of the total population in Southern Province were found to require food assistance during the last drought and so can broadly be considered vulnerable to food insecurity. This is obviously far more individuals than can possibly be served by the heifer distribution program and suggests an imperative for LOL should be to look at other methods of improving the genetic composition of the indigenous herd to benefit a wider part of the overall Title II target group.

53. As discussed below, far more needs to be done to increase the demand for artificial insemination services as a strategy to extend the program's outreach to a wider group of beneficiaries. Likewise, because tensions have sometimes occurred within farmer groups as some individuals are singled out for special treatment; other less-intensive forms of assistance might also be pursued to help non-recipients also acquire improved dairy livestock. The program has done very little, for example, to build bridges with rural financial institutions or other donor projects that might be able to help some of these less-vulnerable (but still food insecure individuals) to enter into dairy production. While there is always a trade-off between what can be accomplished with fixed resources and time, such investments could actually be quite important to help the main target group of most vulnerable individuals since it is only with broad expansion of the dairy sector and smallholder production in particular that these individuals are likely to find a secure place in the market.

#### **D. Milk Production and Marketing**

54. **Current and future production.** As the distributed heifers give birth, the next major stage in the program cycle is for the farmer to begin milking and milk marketing. Based on 259 DAP cows in lactation and an achievable yield of 11 liters per day, program beneficiaries could now be producing up to 2,850 liters of milk per day with a gross cash value of ZMK 2.85million (USD 815) or around K11,000 (USD 3.14) per household per day. Over a 270-day lactation period, this is equivalent to a total gross income of ZMK 769.5 million per year (USD 219,850) if all beneficiary milk were sold for cash.

55. As more heifers give birth, these numbers will obviously increase. Based on current mortality rates and realistic yield assumptions, the heifers being distributed by the DAP

should eventually produce around 2.3 million liters of new liters of milk per year. If all this milk were sold for cash through a MCC, this new production would provide participating households a total incremental income around USD 657,000 year (or around USD 730 per household based 900 active farmers after 10% drop-outs due to animal mortality and other factors).

56. In practice, of course, not all milk reaches the formal economy and an important part of understanding the program's impact is to look at the different channels through which milk and other dairy products obtain their value. As described in more detail with the financial analysis in Part Four, farmers at a basic management level, in fact, only sell around 40% of their total milk for cash after management losses, milk fed to the calf, and milk consumed at home. Farmers at the recommended management level sell around 65% of their milk to a MCC, and farmers at the advanced level are able to around 75% through a formal cash channel. Moreover, farmers also obtain significant income from other revenue streams than just milk that are extremely important from the food security perspective and to the overall financial viability of 1 and 2-cow dairy (see box).

**Box 7: Other Income Sources from Dairy.**

As discussed in Part Four, participating farmers have the potential to earn up to about ZMK 1.68 million (USD 480) per year from cull cow and calf sales on an annualized basis when the system is mature (and after current pass-on obligations are settled). A one-cow dairy system also produces around 8 tons of manure per year, which has the nutritional value of about 8 bags of compound fertilizer and so is enough to fertilize at least 1ha of maize or other staple food crop. In imputed cash terms, 8 mt of manure used as fertilizer has a value around ZMK 800,000 (USD 228).

57. For these reasons, it is a mistake to focus too much attention on milk production and cash marketing alone. Especially for the vulnerable households the DAP is seeking to help, there are many other important revenue streams that must be counted. Indeed, from the food security perspective, milk consumed at home actually has a higher value than milk sold for cash and so must not be overlooked in the program's IPTT tables and other results reports. The beneficiary survey found that *84% of households reported that children under 12 consumed milk on a consistent basis*, but the current IPTT does not capture this type of result. Equally, the potential impact of using manure as fertilizer could be one of the programs most important results areas with direct contribution on household food security. Although farmers in Southern Province have a long tradition of keeping cattle, these animals have mostly been allowed to graze freely so there has never been the opportunity of collecting manure in one place before like new dairy farmers currently enjoy.

58. Unfortunately, these other revenue streams have mostly been overlooked in LOL's recurrent results reports. The DAP's results framework, for example, does not include any specific reference to these other income streams and mainly seeks to measure progress toward FFP's food security objectives in terms of gross milk production and cash sales by MCCs rather than by participating farmers. To the extent that individual data is recorded, this is done in the form of a large database from information provided by MCCs, but there is no subsequent analysis of how much of total milk production a farmer is selling for cash, what the profitability of those cash sales are, and how the farmer derives other revenue from keeping milk at home.

59. **Establishment of MCCs.** With respect to formal milk marketing, the channel being developed by LOL is to develop new and existing MCCs as a kind of hub around which participating heifer recipients and other program beneficiaries are organized. This work is discussed in more detail in the section on Dairy Industry Development as the responsible component for this part of the DAP's work. For now, however, it useful to note that most

primary market development work at the field level is being carried out through the same farmer group structures being targeted training and heifer distribution. This is less true in Southern Province where there are already a number of existing MCCs established by previous donor programs that offer market linkages, but in the new program areas, participating heifer recipients and other farmer group members have been working to build new MCCs literally from the ground up.

60. As a strategy for measuring farmer commitment and increasing local ownership of the dairy project, the involvement of producer group members in MCC development has many advantages. Viewed another way, however, dairy farmers only really require a secure and remunerative place to sell their milk and there is an important risk that extensive involvement in MCC development could distract attention from the more important task of managing the dairy animal to the best standard possible and tending to other farm activities. Farmers in developed countries, of course, are only rarely involved with the development of new marketing systems and leave that job to other specialists and entrepreneurs.

61. **Uses of milk income.** Before moving on to other parts of the discussion, including a review of MCC milk marketing performance in the next component, it is presently worth noting how the heifer recipients are spending the income from milk sales. As shown by the data below from the mid-term survey, medicine for animals and school fees are the most frequently cited areas of expenditure. Groceries and the purchase of non-staple and staple food are the next most frequently cited areas of expenditure, followed by investments in agriculture inputs.

**Table 12: Number of Households in Old Program Areas Reporting Use of Dairy Income by Different Uses**

	No of farmers	% of total
Medicine for animals	279	25%
Education / school fees	255	23%
Groceries	187	17%
Purchase of non-staple food	113	10%
Purchase of staple food	77	7%
Agriculture inputs	72	6%
Other	50	4%
Clothing	45	4%
Household goods	19	2%
Farm implements	17	2%
Savings	8	1%
Travel	8	1%
Marriage	0	0%
<b>TOTAL</b>	<b>1130</b>	<b>100%</b>

62. These data from the LOL field survey help to show the type of things participating households spend their dairy income on, but do not show how much income is being spent on each item or whether dairy is, in fact, a profitable enterprise. This is particularly true with respect to the purchase of medicine for animals, which is better thought of as an enterprise cost than a something new farmers can afford as a result of dairy production. Again, more detailed information on the costs and profitability of dairy, including an analysis of all the different revenue streams, is necessary to begin to understand whether and how well this model works as reduced food insecurity for vulnerable populations.

## **E. Animal Health and Nutrition**

63. Over the long-term, one of the main challenges of promoting dairy development as a model for food security improvement is to ensure that beneficiary livestock are maintained in good health and nutrition (see box). Towards this end, Land O'Lakes essentially follows a three-pronged approach beginning with farmer training in veterinary and nutritional requirements of improved dairy livestock, practical implementation as farmers establish pasture as one of the requirements to receive a dairy heifer, and follow-up through continued field visits and training of GRZ extension staff and community livestock workers. Training and extension messages focus in particular on the use of natural fodder and improved pasture crops like velvet beans, pigeon peas, and sun hemp. CFU is providing training in minimum tillage approaches to fodder production and fodder conservation.

### **Box 8: The Role of Animal Nutrition**

One of the biggest limitations in development of a smallholder dairy industry in Zambia is the challenge of getting farmers to grow fodder while they have been relying on communal grazing for their animals in the last many thousands of years. But dairy production is impossible unless feeding solutions are found for the dry season which lasts up to half the year. The other complication is that the half-year or so growing season available is often mainly devoted to food crops production.

*Trip Report by LOL Regional Advisor, April 2006.*

64. Although an analysis of animal health issues from a strict veterinary perspective was not really a focus of this review, the overall impression is that the distributed herd is in mixed health. Some farmers are doing very (very) well with their new heifers and are milking well beyond a normal yield expectation due the excellent attention to animal health and nutrition. The enthusiasm of participating farmer for the program is actually quite overwhelming and most households are putting enormous energy toward the care of their dairy animal. Every recipient met seemed to have a good appreciation for the value of the animal and recognized the importance of caring for the livestock as the key to success.

65. That said, there is often a large gap between LOL recommended practices, farmer understanding of these recommendations, and what is actually being carried out. Despite farmer enthusiasm, it appears that many animals are not receiving a sufficiently nutritious diet and many farmers are struggling to produce and cut enough fodder to achieve targeted yields. Training on fodder production and conservation should be therefore be intensified to include more follow-up sessions and repeat messages on the importance of maintaining a good feeding regime. This is particularly important because poor nutrition makes heat detection difficult and so also compromises the effectiveness of the program's artificial insemination work. Preventative veterinary care is sometimes also not given adequate attention as indicated by the rather high 10.5% mortality rate due to tick-born diseases.

66. Because LOL results reports and recurrent monitoring data focus on milk production and sales at aggregated level, the M&E system is not particularly effective at revealing much about the health of the current herd or how recipient farmers and other DAP beneficiaries are managing with the new dairy enterprise. A more systematic approach to tracking the outbreak of diseases and monitoring individual milk yields as one of the best barometers of animal nutrition would help the program focus more clearly on the development process being supported. Without a clear focus on the condition of the dairy enterprise at the household level, it is all too easy to lose sight of how the DAP is trying to promote reduced food insecurity and what aspects of that approach are working which ones are not.

67. **Training of GRZ agriculture and livestock specialists.** With respect to the support being provided to GRZ extension workers, the LOL approach is to provide training of trainer sessions for District Agriculture Coordinating Officers (DACOs), District Veterinary Officers (DVOs), and other Livestock Extension Staff. LOL is also providing training for a new group

of Community Livestock Workers (CLWs) who live in the rural areas being targeted and have the potential and interest in being trained to provide on-the-spot animal health care advice. These investments have been necessitated by the total ineffectiveness of the Government's veterinary system.

68. This focus on support for local institutions and development of a new cadre of CLWs is therefore at the core of LOL's exit strategy. Veterinary professionals employed by LOL are currently providing most of the practical advice participating farmers receive and there is a natural concern for what will happen after the funding for this work comes to an end. LOL's animal health care provisioning strategy therefore is designed to allow the CLWs to augment GRZ veterinary assistants both under the direct supervision by the DVOs and DACOs.

69. As a strategy for supporting program sustainability, there is no doubt that these efforts are well placed. LOL is right to be concerned about farmer access to timely and appropriate extension advice and veterinary support after the program comes to an end. The strategy of developing CLWs seems especially appropriate since these people are already embedded in the beneficiary communities and so do not have the usual transport problems that otherwise plague GRZ extension services. Whether or not these efforts will be sufficient or effective over time, however, has yet to be seen. Without follow-up training and continued efforts to build support for the CLW program over the long-run, there is an important risk that the program could atrophy in a short time putting farmers back at square one. This is not to say there is anything wrong in inadequate about LOL's approach, just that institutional development of this sort is usually a long-term undertaking that often requires a commitment beyond the life of a short five-year project.

70. Indeed, this challenge points to an important limitation of dairy development in a place like Zambia where there is no real tradition of smallholder production. In addition to investing in rural institutions, LOL has also found itself in a position of needing to build new milk collection centers, providing support for processor improvements, and undertaking various promotion campaigns all of which divert resources that might otherwise have been focused more specifically on activities that directly benefit the vulnerable individuals FFP is interested to reach. The same wide-ranging approach to value chain development would not have been necessary (at least not to the same extent) in other countries where local institutions are already more developed and better-g geared to the needs of smallholder dairy production.

## **F. Reproduction and Breeding**

71. One final and very important work area under the Dairy and Livestock Development Component is the promotion of artificial insemination (AI) services. The use of genetically pure bull would accomplish the same goal as AI, but one way or another it is important to inseminate exotic dairy animals with good genetic material in order maintain dairy production at a high level over the long-run. Genetic improvement can also benefit non-recipient farmers through cross-breeding of traditional cows as a clear route to yield improvement and increased market participation.

72. **Overview.** To this point, progress with the AI component has been mixed. Although the DAP has met the first challenge of building a basic infrastructure that would allow further expansion of AI services, actual pregnancies remain low throughout the program area. Around 1,000 farmers and 30 AI technicians have so far participated in sensitization meetings and training sessions, but much more needs to be done to involve non-recipient farmers and extend the program's outreach to a wider community. This is important not only from the food security perspective to help other farmers with livestock who are also vulnerable to food insecurity, but also as a fundamental prerequisite for continued

participation of heifer recipients in market-oriented dairy production. As of June 2006, a total of 417 pregnancies to AI have been recorded and around 667 actual inseminations had been carried out.

73. LOL firmly recognizes the importance of AI expansion and is committed to working toward this goal. Thus far, the DAP's AI work has mainly been carried out by the US-based livestock genetics cooperative, World Wide Sires (WWS), which has been engaged on a sub-contract basis to develop private breeding services organized around milk collection centers in targeted districts. As set out in the subcontract agreement, WWS is to provide farmer training, inseminator training, and training of AI assistants. WWS is also responsible for coordinating the distribution of liquid nitrogen and semen supplies to the MCCs where these stocks are maintained and is meant to appoint "field monitors" made up of community members from the smallholder groups, and skilled pregnancy testers, who will meet regularly with WWS to give the required feedback.

74. Within this framework, WWS has so far provided all operational MCCs in the program area a set of storage flasks, transport flasks, and field flasks for carrying the liquid nitrogen and semen. The total cost of this equipment is estimated around ZMK 26.8 million (USD 7,660) per MCC.<sup>10</sup> Participating heifer recipients and other beneficiary farmers have been trained in heat detection and know to contact the AI technician directly or through the MCC when their animal is ready for service. The technician is then meant to collect the semen from the MCC storage flask, carry it by bicycle in a field flask to the farmstead, and finally perform the insemination. The window for this to take place is no longer than 18 to 24 hours. Some MCCs operate a different system and charge more than these amounts, but the first insemination is usually charged to the farmer at ZMK 20,000 (USD 5.71), the second (repeat) insemination at ZMK 15,000 (USD 4.28); and the third insemination at ZMK 10,000 (USD 2.86) until the animal is pregnant. This cost is usually deducted from the farmer's milk sales and half of the fee is provided to the technician for their work.

75. LOL's ultimate goal for the AI program is to leave behind a sustainable business that is efficient in delivering timely and competitively priced insemination services. By involving WWS as a private genetics cooperative, it was specifically hoped that backing from the DAP would be enough to kick-start the development process and leverage additional financial contributions from WWS who would see this as a business opportunity worthy of investing its own resources. To this point, however, that has not taken place and WWS has, in fact, signaled little to no interest in investing in smallholder AI services as a commercial enterprise.

76. The reasons for this are not difficult to understand. As discussed below, each AI hub needs to turnover an estimated 100 to 500 straws per month to make this business financially attractive at the prices now being charged to farmers. Current uptake is only around 20 straws per month per MCC in the best of cases and it has yet to be shown that anything like the kind of targets that need to be reached for commercial development are actually achievable. Especially because of the very high overhead cost of maintaining all the flasks that have been given out, the type of economies of scale needed to cover this investment may never be achieved. From this perspective, it is little surprise that WWS has been slow to take up the "investment opportunity" offered by LOL.

77. While it is perhaps also disappointing that WWS (in its role a program subcontractor) has not been more forthcoming with its own business model proposals, these very simple business facts clearly show that much more rudimentary development support is required

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<sup>10</sup> See Annex 1 for details.

before reaching the point where any private investor would be much interested in this opportunity. Especially because the DAP has called on WWS to organize AI services around community run milk collection facilities in which committee members set the pricing policy and made responsible for collecting farmer payments, it is no wonder that WWS (or any other private firm) has not been more aggressive in pursuing the potential of AI expansion on these lines.

78. **Progress to date.** As noted, program work in the AI sector has so far focused on the technical aspects of AI development including farmer training in heat detection, awareness building of the genetic benefits of AI, training of AI technicians, distribution of AI equipment, pregnancy testing, technical determination of heat problems, counting of successful inseminations, procurement of liquid nitrogen, and distribution of all required supplies to participating MCCs. Because heat detection is compromised by poor animal nutrition, LOL recommended that WWS group the cattle from one area together for oestrus synchronization. This work has also consumed a large part of the time and cash resources available to WWS under the sub-agreement. Thus far, there have been 98 calves born out of the program's AI work.

79. With respect to training and technical awareness building, the table below shows that the DAP is making better than expected progress toward established goals. WWS's main training activities are carried out through extensive visits to program areas for activities that include (i) one to one visits to all heifer recipients to identify their problems and provide appropriate advice; (ii) veterinary reproductive examination of cows following growing reports of cows not cycling; (iii) oestrus synchronization to better coordinate the delivery of AI services; and (iv) initial assessment of inseminator performance and early pregnancy testing. Local vet assistants (VAs) were invited to join the field team in each area in order to familiarize them with the program and to provide training with pregnancy testing, but only one VA from Kalomo has so far taken up this opportunity.

**Table 13: AI Training and Capacity Building Activities**

	Year 1	Year 2		
		Target	Actual	% of Target
<b>Technicians</b>				
Farmers trained as inseminators	23	10	9	90%
Inseminators trained in refresher course	n/a	30	30	100%
Capacity building events at MCC-level	37	40	96	240%
<b>Farmers</b>				
Farmers attending field training	300	300	998	332%
Farmers sensitized in new areas	0	100	584	584%
Farmers participating in exchange visits	79	60	74	123%
<b>Miscellaneous</b>				
Capacity building of assistants			18	
Farmer training manuals distributed			870	

80. The next table summarizes progress in terms cattle receiving AI, resulting pregnancies, and farmer outreach. Overall, the data show that good progress has been made with growth and development, but that the number of inseminations and actual pregnancies resulting from AI fell below Year 2 targets at the end of June. Because this reporting date more or less coincided with the end of the main AI season, the final targets for Year 2 are unlikely to be met. Several people within LOL, in fact, commented on the "general

decline” of the AI work following the initial success and enthusiasm generated by the initial training and distribution of AI equipment in Year 1.

**Table 14: Output Indicators for the AI Program**

	Year 1	Year 2			
		Target	Actual	% of Target	% Growth
<b>Cattle receiving AI</b>					
Cattle inseminated	225	650	442	68%	96%
Cattle due to be inseminated	n/a	n/a	347	n/a	n/a
<b>Pregnancies</b>					
Cattle pregnant to AI	132	325	285	88%	116%
% of cattle inseminated pregnant to AI	59%	50%	65%	129%	9.3%
<b>Outreach</b>					
Farmers participating in AI program	117	220	320	146%	174%

81. With respect to the output indicators, it is also worth noting that around 1.6 semen straws (inseminations) are being used per pregnancy. This is a very impressive success rate given the conditions on smallholder farms and is a testament to the very high quality technical advice being provided. Far more inseminations and pregnancies, however, are still need to sustain the program and over time and a more realistic success rate if the program were to launch any kind of major expansion drive would probably be closer to two to three straws per pregnancy.

82. Thus far LOL’s plan to improve the program’s output and recapture the momentum from Year 1 has focused on the following key recommendations made by the Land O'Lakes regional breeding specialist in June 2006.

- Devise a mechanism in which inseminators work as independently as possible from the MCCs to avoid being pulled down by the cooperative politics financial management difficulties.
- Emphasize to farmers that animals are unlikely to cycle if they are in poor body condition, and perhaps talk specifically about body condition scoring and mention the condition scores within which animals can cycle and should be served.
- Emphasize the importance of mineral supplementation more clearly in the training as a key to successful AI development.
- Starting from May/June, farmers should bring forward all their empty animals at specified areas, to get he animals synchronized for heat using hormones and then undertake some kind of mass insemination of the participating animals.

83. **Observations.** As with much of the rest of the AI program, these recommendations focus largely on the technical aspects of AI development and LOL has not yet looked in any significant depth at the business challenges and opportunities for AI expansion. While there has been general discussion of the need for greater commercial orientation of the AI program, for example, this has focused more on the shortcomings of WWS as a potential investor than any kind of systematic examination of the real challenges and opportunities this entails. Signing up a new sub-contractor or other private partner would almost certainly not be a successful model unless a sound business plan for building a sustainable AI service can be developed and set in motion first.

84. The current business model, if indeed it can be called that, is based around the MCC. In the initial program design MCCs were seen as the obvious focal point for AI development since this is where farmers sell their milk and where the cost of AI services could easily be deducted. Two years into the DAP, however, and it is now becoming apparent that far too much responsibility is being put on most nascent and otherwise struggling collection centers. Some established MCCs like the one at Magoye have shown that they are more than capable of managing an AI system, but there are still several good reasons to question whether this institutional arrangement is right for sustainable AI development. Apart from the limited business skills of most MCC managers and risk of being dragged down by cooperative politics, individual collection facilities are likely to have far too high fixed costs to operate a nitrogen hub and field flask system efficiently.

85. As shown below, until the number of cattle being served by AI grows by at least 400% to 600% per hub, the high price of liquid nitrogen and other fixed operating costs associated with this technology are likely to price the service well beyond the capacity of a poor 1-cow farmer to afford. Currently, most farmers pay between ZMK 10,000 to ZMK 20,000 (USD 2.86 – 5.72) per straw, but without the program's subsidy, the real break-even price at the current turnover of 5 to 20 straws per month works out to around ZMK 100,000 to ZMK 250,000 (USD 28.67 – 71.42). Even if monthly turnover increases under the best case to 1,000 straws per month, the true commercial price to the farmer is about double what they are paying now.<sup>11</sup>

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<sup>11</sup> Further calculations based on discounted liquid nitrogen prices are presented in Annex 1. WWS has obtained a discount from BOC Gas, but this seems likely to be withdrawn within the next year.

**Table 15: Cost Analysis of AI Services Using Commercial Prices for Liquid Nitrogen**

Main assumptions	Straws per month:						
	5	20	100	500	1,000		
	Liquid N per month (kg):						
	30	40	40	45	50		
	Unit Cost	Unit					
<b>Monthly operating costs (ZMK '000)</b>							
AI straws	25.0	each	125.0	500.0	2,500.0	12,500.0	25,000.0
Technician's fee	10.0	trip	50.0	200.0	1,000.0	5,000.0	10,000.0
Disposables	1.0	visit	5.0	20.0	100.0	500.0	1,000.0
Liquid N (commercial price)	27.0	kg	810.0	1,080.0	1,080.0	1,215.0	1,350.0
<b>Total variable costs</b>			<b>990.0</b>	<b>1,800.0</b>	<b>4,680.0</b>	<b>19,215.0</b>	<b>37,350.0</b>
Monthly depreciation	290.2	fixed	290.2	290.2	290.2	290.2	290.2
<b>Total monthly operating costs</b>			<b>1,280.2</b>	<b>2,090.2</b>	<b>4,970.2</b>	<b>19,505.2</b>	<b>37,640.2</b>
<b>Cost per straw (ZMK '000)</b>							
Straw, fee & disposables			36.0	36.0	36.0	36.0	36.0
Liquid N			162.0	54.0	10.8	2.4	1.4
Depreciation			58.0	14.5	2.9	0.6	0.3
<b>Total cost per straw</b>			<b>256.0</b>	<b>104.5</b>	<b>49.7</b>	<b>39.0</b>	<b>37.6</b>
<b>Monthly operating costs (USD)</b>							
AI straws	7.14	each	35.7	142.9	714.3	3,571.4	7,142.9
Technician's visit	2.86	trip	14.3	57.1	285.7	1,428.6	2,857.1
Disposables	0.29	visit	1.4	5.7	28.6	142.9	285.7
Liquid N (commercial price)	7.71	kg	231.4	308.6	308.6	347.1	385.7
<b>Total variable costs</b>			<b>282.9</b>	<b>514.3</b>	<b>1,337.1</b>	<b>5,490.0</b>	<b>10,671.4</b>
Monthly depreciation	82.92	fixed	82.9	82.9	82.9	82.9	82.9
<b>Total monthly operating costs</b>			<b>365.8</b>	<b>597.2</b>	<b>1,420.1</b>	<b>5,572.9</b>	<b>10,754.4</b>
<b>Cost per straw (USD)</b>							
Straw, fee & disposables			10.3	10.3	10.3	10.3	10.3
Liquid N			46.3	15.4	3.1	0.7	0.4
Depreciation			16.6	4.1	0.8	0.2	0.1
<b>Total cost per straw</b>			<b>73.2</b>	<b>29.9</b>	<b>14.2</b>	<b>11.1</b>	<b>10.8</b>

86. To help interpret these data it is useful to note that unlike other countries in East Africa where LOL has been more successful in building new AI services, the rural population in Zambia is far more dispersed and difficult to reach. Considering that most MCCs in Zambia only receive milk deliveries from 100 or so farmers (and that the new MCCs in Central Province and the Copperbelt will likely serve fewer farmers) it is very clear that the service can never be financially sustainable at current prices. In East Africa, the idea of a bicycle based AI technician works well because of the relatively high population densities; in Zambia by contrast it is not unusual for the bicycle technician to travel more than 80km round trip to serve just one cow.

87. **Recommendations.** On the one hand, the discussion of the AI work so far provides good reason to question whether the DAP should even be working for the development of a sustainable AI service at all. Perhaps the DAP would be better simply to contract for a kind of massive insemination campaign that first of all promotes the technology among as wide a group as possible, and secondly provides heavily subsidized services to all interested farmers that meet a very basic checklist of eligibility criteria. This would certainly be one effective way to boost smallholder dairy production throughout the region on a short-term basis.

88. While such an approach is not altogether unattractive, this would, however, only go part of the way to addressing Zambia's real development need which is for smallholder farmers (and particularly first generation heifer recipients) in commercially productive areas to have reliable access to improved genetics at affordable prices. The DAP's work in the AI

sector, therefore, needs to be viewed in this long-term development context rather than as addressing any immediate food security need of vulnerable people. The goal, and eventual food security outcome over generations of dairy cows are intended to be the same, but cannot be measured within the life of the DAP, especially not by indicators such as HDDI, IDDI, and MIHFP, which are meaningless in the short-run for an AI program because the next generation of calves will only mature into productive dairy cows after the DAP comes to an end.

89. For this reason it is useful to sketch out some of the basics of what a sustainable AI system might look like.

- There should be far fewer nitrogen hubs to minimize monthly depreciation on fixed assets. This would also minimize the time spent on troubleshooting at each MCC compared with current arrangements where WWS has had to work within the cooperative structure.
- By implication, there needs to be new systems for communications between farmers and AI technicians to ensure the service is provided in a timely manner. This may not always be achievable with the current reliance on bicycle technicians.
- There should be very aggressive social marketing campaign for AI services in order to extend the benefit of improved genetics to a far wider target group than is currently being reached. This is important to get the monthly turnover of straws up to a more sustainable level and would help LOL reach a far wider group of potential dairy farmers needed for real growth in smallholder dairy production.
- LOL should not prescribe methods of business development, but instead work with commercial partner that is willing to invest in smallholder AI services and assist that investor with the types of highly specialized business planning and technical advice they require.

90. In considering the way forward, it is important to stress the potential benefit from a food security perspective of extending the AI program to a wider target group than immediate heifer recipients. The next therefore looks the incremental milk that comes about from genetic improvement for farmers with a typical and improved feeding regime. As shown, farmers with traditional cattle can also benefit significantly from AI and there is a clear opportunity for LOL to target these potential beneficiaries through AI and less intensive support for new dairy development. As a strategy to improve the program's cost effectiveness per beneficiary, an aggressive program to involve traditional farmers in the AI program would likely be far more cost effective compared with the current focus on the distribution of 2<sup>nd</sup> and 3<sup>rd</sup> generation exotic dairy heifers to especially vulnerable individuals.

**Table 16: Yield Expectations for Different Types of Livestock and Feeding Programs**

	Typical Feed			Improved Feed		
	Lactation Period (days)	Average liters per day	Total Milk Production (liters)	Lactation Period (days)	Average liters per day	Total Milk Production (liters)
<b>Jersey cross</b>						
Traditional cow (0% Jersey)	180	2	360	220	4	880
1st generation cross (50% Jersey)	190	5	950	230	10	2,300
2nd generation cross (75% Jersey)	220	7	1,540	270	11	2,970
3rd generation cross (100% Jersey)	230	10	2,300	290	18	5,220
<b>Black &amp; White cross</b>						
Traditional cow (0% B&W)	180	2	360	220	5	1,100
1st generation cross (50% B&W)	190	8	1,520	220	12	2,640
2nd generation cross (75% B&W)	220	10	2,200	270	15	4,050
3rd generation cross (100% B&W)	230	10	2,300	290	20	5,800

91. Finally, and especially with respect to improving the genetics of the traditional herd, another option LOL should consider is the possibility of using improved bulls instead of AI. As a matter of sustainability, this might actually be a more attractive option as long as each bull can be maintained in good health and arrangements are made to circulate these improved sires among all waiting heifers and cows. Before making any final decision on how to proceed with the breeding program, LOL needs look in more detail at all of its options and compare the costs and benefits of using natural bulls compared with further investments in AI. There are probably also good opportunities to combine these approaches, perhaps by implementing some type of massive insemination campaign as described and then backing that investment for the future by establishing an easier to manage service around the use of improved bulls.

## **II. DAIRY INDUSTRY DEVELOPMENT**

92. The second component of the DAP picks up where the Dairy Livestock Development Component leaves off and is specifically focused on achieving a stable market for smallholder producers being assisted at the farm level. To do this, LOL is working with participating farmer cooperatives to design and construct new collection facilities, to provide advice and training for MCC operators on quality control, to install new cooling tanks and milk analysis equipment, and to distribute stainless steel milk cans and buckets on loan from the MCC to participating heifer recipients. LOL is also providing demand-driven technical assistance to around 15 dairy processors that currently buy (or have the potential to buy) raw milk from the MCCs including the development of a Seal of Quality program to reassure consumers and give a boost to domestic dairy consumption (see box).

**Box 9: Main Activities of the Dairy Industry Development Component.**

- Support for establishment of new MCCs.
- Distribution of equipment to MCCs, sourcing of equipment for processors.
- Product and quality development work with processors.
- Support for ZDPA
- Seal of Quality program

93. Most activities under this component are being implemented directly by LOL technical staff. The main external partner in the dairy industry work is the Zambia Dairy Processors Association (ZDPA), which is being supported through a sub-grant to develop new capacity for industry representation and outreach to processors. While the ZDPA is not involved at the MCC level, all assistance being provided at the processor level is at least notionally channeled through the ZDPA and the ability to access LOL technical assistance this way has been an important factor behind the

Association's recent expansion. Likewise, the Seal of Quality program is being launched through the ZDPA as strategy for helping Zambian processors compete more effectively with imports and (by extension) is intended to ensure a future stable market for smallholder producers.

94. Because the Dairy Industry Component is focused on two distinct levels, it useful to review each of these levels in turn beginning with the support provided to MCCs and then the work being done with processors. Of these, the work with MCCs is give top priority both with respect to staff time and financial commitment.

### **A. MCC Level Support**

95. The main focus of the Dairy Industry Component is on primary milk collection. This means working with farmer cooperatives to establish and mange milk collection facilities for chilling and bulking the farmers' milk before onward sale to a commercial processor. LOL is currently working with a total of 11 already established MCCs in Southern and Lusaka Provinces, and is helping to establish 4 new MCCs in Central Province and the Copperbelt (see map). In addition to providing detailed plans and oversight for the construction of new MCCs, LOL has been working very closely with existing centers to improve their capabilities, both in terms of installing new cooling tanks and other equipment for capacity improvement, but also to develop new quality control systems that are needed to provide smallholder farmers a secure place in the formal economy.

96. **Progress to date.** As recorded in the Land O'Lakes Quarterly Report for June 2006, the volumes of milk sold by the 10 operational MCCs at the time were as follows.

**Table 17: Gross Volume of Milk Sold by Each MCC (liters of raw milk)**

<b>MCC</b>	<b>Q2-2005</b>	<b>Q2-2006</b>	<b>% Change</b>
Choma	49,368	59,545	21%
Kalomo	14,887	16,434	10%
Kazangula	8,974	6,459	(28%)
Magoye	124,510	127,003	2%
Monze	95,826	73,032	(24%)
Nakasangwe	0	1,040	n.a.
Ntheme	0	16,407	n.a.
Palabana	54,457	80,894	49%
Sikaunzwe	12,181	68	(99%)
Zimba	0	6,431	n.a.
<b>TOTAL</b>	<b>360,203</b>	<b>387,313</b>	<b>8%</b>
<b>AVERAGE</b>	<b>51,457</b>	<b>38,731</b>	<b>(24%)</b>

97. As shown, total turnover by all MCCs grew by 8% compared the same period in 2005, but the average turnover per MCC decreased by 24%. Four of the MCCs that were operating in Q2-2005 had an increase in turnover and three MCCs had a decrease. Growth in milk deliveries to Palabana was very impressive and Choma also recorded very good growth. Monze likewise has a very large turnover, but is beset with deep management problems, which are at least partly reflected by the 24% decrease in turnover. Kazangula and Sikaunzwe are similarly in a difficult position, mainly because climatic conditions in the areas are not especially suited to dairy. Magoye is far the largest and best established MCC.

98. One important limitation of the data reported by LOL is that current M&E system does not conveniently show the number of farmers delivering milk to each MCC. Gross volumes, therefore, are only a very rough indication of how the Title II investments in MCC development actually benefit individual farmers and what is happening to total milk production in each catchment area. This is particularly true when gross volumes are reported as an average figure, which is what LOL does for IR 2.2 in its Results Framework. As indicated above, the use of an average figure shows nothing about the performance trends of individual MCCs and is misleading way to look at the actual facts of market development.

99. In actual fact, a total of around 770 farmers regularly deliver milk to participating MCCs. Magoye is far the largest MCC and sometimes accepts deliveries from as many as 300 farmers per day during peak production, but this goes down to only about 220 regular farmers per day during the dry season. Most other MCCs have between 50 and 100 farmers who regularly deliver milk, although the numbers again vary greatly from the wet to the dry season.

100. IR 2.3 in the LOL results framework reports the total number of farmers delivering milk, but is only presented as a single figure without further analysis of individual MCC performance and number of deliveries by heifer recipients and other secondary and tertiary beneficiaries. Without more detailed information on these lines, the data reported by LOL show very little about the DAP's progress toward sustainable market development and impact on vulnerable households in particular.

101. The next table looks at gross average value of milk sold by participating MCCs.

**Table 18: Gross Income of Each MCC (USD equivalent per quarter)**

<b>MCC</b>	<b>Q2-2005</b>	<b>Q2-2006</b>	<b>% Change</b>
Choma	16,904	18,889	12%
Kalomo	5,418	6,550	21%
Kazangula	2,926	3,565	22%
Magoye	34,360	35,561	3%
Monze	25,940	20,662	(20%)
Nakasangwe	0	226	n.a
Ntheme	0	3,547	n.a
Palabana	18,050	24,140	34%
Sikaunzwe	3,927	28	(99%)
Zimba	0	2,020	n.a
<b>TOTAL</b>	<b>107,570</b>	<b>115,118</b>	<b>7%</b>
<b>AVERAGE</b>	<b>15,367</b>	<b>11,512</b>	<b>(25%)</b>

102. Similar to the gross volume figures quoted above, these data beg nearly as many questions as they answer. By looking only at gross income, the main limitation in this case is that the LOL results data do not show anything about the underlying profitability of each MCC or how the gross income is being used. Monze, for example, now has the third largest turnover, but in actual fact has been hemorrhaging money for years due to poor management decisions and corruption by high-ranking committee members. In order to monitor the progress of each MCC toward the ultimate goal of providing a stable market outlet for vulnerable dairy farmers, different and more detailed information is needed. This should include information on the profitability of each center, monthly or quarterly operating balances, and progress toward debt collection on equipment loans.

103. Currently, few MCCs are doing an effective job tracking this information and are probably not capable of providing LOL the information it needs to improve the M&E system along the recommended lines without help and training. During field visits undertaken for the MTR, for example, few committee members (with the notable exception of Magoye) were able to provide any specific (or even general) information on the center's profit and loss situation and current cost structure. Many MCCs also had totally unrealistic business expectations and talked about establishing all kinds of revolving funds to help their members and even the introduction of specialty cheese manufacturing rather than first concentrating on the basics of running an efficient milk collection system that guarantees timely payments to farmers.

104. It therefore appears that LOL needs to give far more attention to the fundamentals of business management in future MCC support and should not speak to these groups about complicated plans for revolving funds or other such long-term possibilities. Many farmers are currently under the impression, for example, that if their cow dies through no fault of their own, the co-op (or MCC as the two terms are often used interchangeably) will buy them a new one. Few if any co-ops actually have this capacity, however, and this also distracts attention from the fact that vulnerable farmers primarily need from the co-op or MCC is a reliable market outlet. This prime objective should not be complicated by lumping all sorts of other development concerns (including the establishment food security clubs and nutrition committees) under the MCC or farmer's co-op umbrella. These institutions and especially the MCCs must be seen as commercial enterprises first and foremost.

105. In this respect, it is worth noting that most of the work being done by LOL at the MCC level so far has focused on the technical aspects of milk hygiene and quality control. Management issues are being addressed, but mainly on a case-by-case basis through individual troubleshooting of specific problems and mediation of disputes between committee members. Without a more systematic and strategic approach to the business aspects of MCC development, including training in cooperative principles and limitations, these types of problems are likely to bog the program down and forestall the emergence of the type of new market outlets vulnerable individuals really require. Systematic record keeping, preparation of monthly balance sheets, analysis of farmer debt collection, and other fundamentals of market development should all be covered in more rigorous detail as matters of critical importance to the first time dairy farmers who rely on the MCC for cash income to sustain the dairy system. The table below summarizes other key results of the MCC development work and shows the types of equipment being installed and current capacity utilization.<sup>12</sup>

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<sup>12</sup> As with all capacity utilization figures in dairy, these estimates vary greatly between the wet and dry season along with the fluctuation in milk yields.

**Table 19: Summary of Material Support and Capacity Utilization of MCCs**

MCC Name (Location)	Farm-Level Equipment (paid by Title II)	MCC-Level Equipment (paid by Title II)	Approximate Value of "Title II" Equipment (USD)	Equipment in Place Before Title II (type and capacity)	Approximate Capacity Utilization (% of total capacity or liters per day/week/month throughout the year)
<b>Sikaunzwe</b>	Milk cans & buckets		735	2400 liter cooling tank	23% collection every 3 days
<b>Kazungula</b>	nil	nil		2400 liter cooling tank, cans, buckets etc	26.25% collected every 3 days
<b>Zimba</b>	nil	nil		1500 liter cooling tank, cans buckets etc	ZATAC tank
<b>Kalomo</b>	Milk cans & buckets	1,500 liter cooling tank	14,590	nil	69% if collected every 3 days
<b>Choma</b>	Milk cans & buckets		4,595	2400 liter cooling tank, cans, buckets etc	67.5% collected every 3 days
<b>Monze</b>	Milk cans & buckets		19,090	2400 liter cooling tank, cans, buckets etc	94.5% collected every 2 days
<b>Nteme</b>	Milk cans & buckets	1,500 liter cooling tank	16,370	nil	37.3% collected every 4 days
<b>Nakasangwe</b>	Milk cans & buckets		15,700	1500 liter IBT tank, cans, buckets etc	49.3% collected every 4 days
<b>Magoye</b>	Milk cans & buckets	3,000 liter cooling tank	25,000	1500 liter cooling tank, cans, buckets etc	80% collected every 2 days
<b>Pelusa (sattelite of Magoye)</b>	nil	1,500 liter cooling tank	11,523	nil	53% collected every 2 days
<b>Palabana</b>	Milk cans & buckets		1,400	2 x 1500 liter cooling tanks,cans,buckets,etc	64% collected every 2 days
<b>Chibombo</b>	Milk cans & buckets	500 liter cooling tank	7,287	nil	under construction
<b>Fizengi</b>	Milk cans & buckets		3,000	nil	under construction
<b>Mutenda</b>	Awaiting stock	Awaiting stock	n/a	nil	under construction
<b>Masopo</b>	Awaiting stock	Awaiting stock	n/a	nil	under construction

106. **Observations.** The overall impression of the work being done with milk collection centers is that LOL is making good progress with technical training on quality control, milk analysis, and simple record keeping of daily volumes and gross turnovers, but this work does not yet address many of the underlying challenges of cooperative development in Zambia. The importance of the quality control and technical capacity work must not be underestimated as prerequisites for market participation by vulnerable farmers, but these efforts only go part of the way to building the type of stable and remunerative markets for surplus milk these individuals need. Land O'Lakes has been very successful on the technical front, but other important aspects of market development are either being left behind or compromised by complicated plans to introduce revolving funds and other activities that a normal milk marketing company has little interest in.

107. In the first place, by centering the MCC development on farmer cooperative structures, LOL is implicitly taking a much more complicated route to sustainable

development than by working with purely commercial entrepreneurs. Farmer cooperatives can be a very efficient, profitable, and attractive way to organize dairy marketing (as Land O'Lakes own experience as a commercial entity in the United States bears out), but this is also a delicate task that requires special treatment and different types of support than are currently being provided. In this context, a strong case could perhaps be made for working with private entrepreneurs at the milk collection level rather than assume the burden of addressing all the additional complications farmer co-op development necessarily entails.

108. Partly because of its obligations to FFP to focus on vulnerable beneficiaries at the farm level, many important issues of cooperative development are not being given adequate attention. Zambia, in fact, has a long and difficult history with co-op development and these institutions are variably seen by different individuals as a social safety net, marketing group, source of employment, source of free food handouts and per diem allowances when committee meetings are held, procurement specialists of stock feed and other inputs at discount prices, credit providers, place to hold nutrition meetings, and any number of other development functions ranging from environmental sensitization to awareness building on HIV/AIDS. While all of these may be worthy functions, market development in actual fact requires a very clear focus on the final objective and it seems that most participating MCCs do not have this clarity of vision.

109. An independent consultant working with Land O'Lakes at the same time as MTR on a separate assignment to look at the opportunities to establishing revolving funds within the MCCs reached similar conclusions (see box). Taken together, it therefore appears the DAP would also do well to provide increased training and sensitization for MCC on the basic principles of business cooperative development. There is an extensive body of literature on this and it is important for participating farmers (or at least MCC managers) to understand very well exactly what a cooperative is and is not. Some of these basic principles are set out in more detail in Annex 2.

**Box 10: The Challenge of Cooperative Development**

The cooperatives in the project area represent singly, and as a group, a set of complex interlocking social and commercial systems. Improving their performance therefore requires addressing a series of issues more or less simultaneously; management, production, and the network of relationships among the members, and between the members and the co-op are all parts of the larger puzzle that is to be solved. Unless and until some of these basic conditions are addressed, none of these groups can afford the luxury of thinking about any sort of revolving fund, nor would such a fund be successful, absent the essential foundation of trust, and trustworthiness, in the co-op and its management. *Trip Report by William Allmart, Farmer to Farmer Volunteer. August 2006*

110. In an effort to improve on this situation, LOL has so far identified several alternatives to the traditional cooperative management approach, including the possibility of involving independent managers that have been specifically trained in MCC management, but are external to the community/family membership structure. Further, LOL also expects to initiate ventures with independently managed and owned MCC's that will buy milk from smallholder producers within communities. These may be within newly established production areas or may displace poorly managed cooperatives with MCC's. These options each seem very appropriate, and would perhaps do a better job of delivering the type of secure market outlet small farmers need most. Otherwise, the risk of community-based structures is that the challenge of managing a MCC can easily overwhelm the local group and burden vulnerable individuals with far more responsibility than they need or can manage effectively.

## **B. Processor Level Support**

111. At the processor level, LOL is also providing technical support with quality control, basic business planning, and new product development. This type of assistance is an integral part of the LOL value chain approach to dairy development in other countries and is being justified for this Title II program in Zambia because of the overall need to improve the competitiveness of the Zambian dairy sector as one requirement for long-term market growth and continued participation by vulnerable farmers.

112. Notionally, LOL's processor-level support is being channeled through the ZDPA; the DAP is working with a total of 15 processors, of which around 10 are particularly active. Thus far, LOL has helped to catalyze at least USD 100,000 in new investments by these firms. This estimate is based on new equipment purchases and investments in other building and plant improvements. As a matter of policy, LOL will help these firms to source the equipment they need, but does not provide any other material or financial support. Assistance for the processors is limited to technical advice.

113. **Observations.** Although the processor work has sometimes come up for criticism by FFP for not "touching" the main Title II target group, the overall impression from the MTR is that the processor work actually had a very clear impact on food insecure individuals. While this probably can't be measured in the short-term by MIHFP, HDDI, IDDI or any of the other standard food security indicators typically used by FFP, the processor work has been extremely successful in building new market linkages with smallholder groups that are needed for long-term success. As described in the introduction, Zambia is a net dairy importer and the best way to increase the competitiveness of local dairy production is to improve on the price and/or quality of local supplies. By convincing small and medium dairy processors to install milk analyzing equipment alone, LOL has been able to take a very significant step towards this objective both by reducing wastage in the marketing system and by guaranteeing quality milk is used to produce the type of products that can compete with imports at the highest end of the domestic market.

114. Even more important from the Title II perspective, the support being provided to dairy processors has enabled LOL to build direct market relations between the smallholder groups the DAP is targeting and the assisted firms. At least three processors have so far established, or are in the process of establishing, direct market linkages with participating farmer groups. One cheese manufacturer in Lusaka, for example, now buys exclusively from the MCC at Palabana and another processor has agreed to buy all of the milk supplied by the new group now being assisted in Chibombo. Likewise, in the Copperbelt, a medium size ice cream and yoghurt manufacturer has indicated its clear intention to buy milk from the new dairy groups in this region as soon as production begins. One additional processor is similarly working with other smallholder farmer groups near Lusaka that are outside the main program area.

115. Milk from other collection centers from Choma to Lusaka are mainly being delivering to Parmalat, which is Zambia's largest dairy processor, but is sometimes an unreliable buyer because it fluctuates between times of having a daily milk surplus and deficit depending on production by commercial farmers and seasonal variation in the smallholder sector. Farmers south of Choma are in a more difficult position because the one commercial buyer in that milk shed is especially unreliable and goes through periods of virtual shut-down when dairy production decreases during the dry season. For these reasons, investments in direct market linkages between farmer groups and commercial processors becomes even more important and is most definitely something the DAP needs to give high consideration to. Even large scale processors, can (and perhaps should) become involved in program activities if this provides more secure linkages for the fledgling MCCs.

116. Would the new market linkages described above have developed without LOL's processor-level support? This hypothetical question is, of course, difficult to answer with certainty, but it is worth noting that each of the medium-scale processors specifically commented that they were worried about the quality of smallholder milk and would have been reluctant to buy from these farmers without first working on their own process improvements with LOL. Very simply, this experience helped establish a foundation of trust that later enabled LOL to introduce these companies to the individual farmer groups and MCCs the DAP is primarily supporting. Of the firms that are now buying from smallholder farmers, each said they are very impressed and surprised by the quality. It turns out that smallholder milk is often superior to commercial milk due to the individual being able to pay closer attention to their production system.

117. **Implications and recommendations.** From this experience, it appears that LOL would do well in its processor work to focus even more on building closer market linkages between participating MCCs and the processors it is assisting. In fact, as a strategy for ensuring vulnerable smallholder's have a secure place in the market, this work is likely to be far more beneficial than any type of general product promotion campaigns also being undertaken by the DAP. As a net dairy importer, the problem in Zambia is not so much that the local population is not consuming enough milk products (although per capita consumption is low compared with regional neighbors), but the inability of domestic producers to compete effectively with imports. The processor work addresses this constraint in two direct ways: first, by helping processors to design new production systems that are easier to manage and more dependable, and second by creating new market linkages with suppliers of high quality raw materials. Any type of general product promotions campaign, by comparison will be much less focused on the real competitiveness constraints to smallholder involvement in modern dairy production.

118. While the processing work apparently can be justified from a food security perspective, the program's M&E system other results reports once again are not doing an adequate job of capturing these outcomes. As set out in the program's results framework, the processor level work is being measured simply by the volumes of milk used by targeted processors (IR 2.4) and capacity utilization of targeted processors (IR 2.5). Unfortunately, neither of these indicators is specifically focused on the uptake of milk by smallholder farmers, which should be the real goal of the LOL program.

119. Sector growth measured by increased demand and total turnover by assisted processing firms, in fact, is not even the main challenge of a food security program such as this one. Especially in a milk deficit country like Zambia, the real challenge of market development is to build stable linkages between smallholder collection centers and formal sector processors. Progress should be monitored much more carefully and explicitly in these terms. Such a focus would enable LOL to tell the program's story more clearly and enable program managers to direct Title II resources to activities that support the specific goal of reducing food insecurity for vulnerable populations more effectively.

### **III. DAIRY PRODUCT PROMOTIONS**

120. The final dairy-centered component of the DAP is focused on long-term market demand. Although the money spent on dairy promotions is relatively small compared with other program activities, work in this area is still considered important by LOL to ensure a long-term place in the market for vulnerable farmers. While the promotions work does not directly involve Title II beneficiaries, therefore, this component is still meant to contribute

**Box 11: Main Activities of the Dairy Product Promotions Component.**

- Dairy promotion campaigns
- Youth life-skills program

to improved smallholder incomes and reduced food insecurity over the long-run. With this objective in mind, the DAP has funded a general product promotions campaign and is supporting a youth life-skills program that (among other things) disseminates messages on the importance of dairy consumption for better health and nutrition (see box).

121. As the official voice of the national dairy industry, the ZDPA is the main implementing partner of this component. Product promotions in fact, has been designed as one of the main aspects of LOL's capacity building work with the ZDPA as a sub-recipient. The youth life-skills work is being implemented through a sub-contract with the international NGO, Miles and Associates also in collaboration with ZDPA.

## **A. Media Campaign**

122. **Progress to date.** A media campaign titled "More to Milk" was launched in August of 2005 that ran for three months before being withdrawn at the request of the Zambia Competition Commission. The campaign was a fairly straightforward media program that sought to increase consumer awareness of the nutritional benefits of milk and other dairy products compared with soft drinks, juice, and other types of fast food. Although completely truthful with the information it presented, manufacturers in the other food sectors were quick to complain of "unfair practices" that eventually led to the formal request for the ZDPA to withdraw the campaign. This was done voluntarily after three months when the media program was basically set to expire in any case. Since then, no new media campaign has been launched except for the youth life-skills program described below.

123. **Observations.** Unfortunately, the LOL M&E system does not include any specific indicator that looks at domestic dairy demand or consumption and the effectiveness of the media campaign can only be assessed in these terms. As a measurement of impact on food insecure individuals, however, even growth in domestic demand is not a good indication of success since the only challenge that really matters is to ensure that vulnerable farmers who deliver milk to an MCC always have access to this market and are paid a competitive price. Overall demand trends are of far less significance (at least in the short- to medium-term) for an individual one or two cow farmer.

124. To make this point more clearly, it worth recalling from the dairy background section that the total domestic consumption of milk is estimated to be around 250 – 300 million liters per year. Total domestic production is around 150 – 190 million liters annually and total deliveries by participating MCCs is less than 1.6 million liters per year. When the full 1,000 heifers being distributed by LOL mature into a productive dairy cow (and assuming 0% mortality), total annual yield from these animals will not be more 2.5 million liters at best, which is less than 2% of total domestic production and only about 0.8% of total consumption.<sup>13</sup>

125. For a Title II program that needs to justify its investments by the direct impact on vulnerable individuals, therefore, the case for supporting general dairy promotions work simply is not there. Even putting aside any questions about the effectiveness of media promotions in achieving market growth, the immediate relevance to the Title II target group is far from clear since there are few indications that 2.5 million liters of new milk won't find a

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<sup>13</sup> As noted, all Zambian agriculture statistics need to be treated with considerable caution. In discussing the draft MTR report with LOL/Z, counter evidence was provided to suggest that Zambia's milk deficit is only around 4.5 to maybe 10 million liters of milk per year. If this estimate is correct, then the conclusions on the product promotions work may need to be rethought.

place in the domestic market as long the participating MCCs are functioning efficiently.<sup>14</sup> The fact that per capita dairy consumption in Zambia is low compared with neighboring countries has almost nothing to do with rural market development and it would be far better to focus on addressing the day to day market challenges individual farmers and MCCs face. Zambia does have seasonal gluts of milk during the rains, but the best way to address this issue is still to build solid relations with the MCCs so that they become the first choice of supply rather than the second or third. Total market demand has relatively little to do with this issue.

126. That said the most convincing case for product promotions work has to do with the development of the ZDPA itself as a viable representative body. As a sub-recipient of the DAP, LOL has a responsibility to help build the capacity of the ZDPA and the undertaking of promotional and educational programs are rightly be seen as an important function of such an organization. Members of ZDPA are, in fact, strongly in favor the promotions work although this has yet to be backed with any financial commitment from ZDPA members, which could perhaps be a requirement of future LOL support for new product promotions.

127. **Other lessons.** Taken together, one lesson for the future is that a more relevant institutional development challenge for the DAP may have been to focus on building an association of dairy *producers* instead. The discussion of problems the MCCs are facing in particular suggests there could be some useful benefits from supporting an association at the collection level that would be more relevant to food insecure individuals than a high-level processors group. These points are not to dismiss the relevance of the ZDPA and importance of processor representation to long-term sector growth, and there probably are opportunities to undertake activities through the ZDPA that would catalyze meaningful market growth and new opportunities at the farm level. The Seal of Quality activity, for example, is relevant for long-term market development, but then again, a more focused approach for Title II might have been to launch a “proudly smallholder” campaign instead.

## **B. Youth Life-skills**

128. The NGO, Miles and Associates has also been contracted to undertake market development work through an innovative program that targets future dairy consumers with training in youth life-skills and sport. The program is specifically working with over 25,000 school children in Lusaka and the Copperbelt to promote dairy consumption as a foundation for healthy life. This is done by organizing youth basketball leagues and other after school activities. There is relatively little to say about this program since the main conclusion of the MTR about the importance of market development work for the Title II target group has already been made. The youth-life skills program is certainly an attractive, development-oriented approach to building long-term market demand, but is probably not of any immediate, critical importance to vulnerable first time dairy farmers.

129. Despite the question of relevance to immediate Title II concerns, it be however most unfortunate to withdraw support from the youth life-skills program in haste. While the organization of youth basketball tournaments as vehicle for disseminating messages on the benefits of future dairy consumption is not immediately beneficial to first time dairy farmers, Miles and Associates is clearly doing fabulous work that has a direct impact on the self-confidence and motivation of Zambian youth to continue with their studies and career

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<sup>14</sup> Again, this conclusion depends on the size of Zambia's total milk deficit. Counter evidence was made available to the mid-term consultant very late in the preparation of this report to suggest that the milk deficit is much smaller than originally thought. This has obvious and important implications for the relevance of the dairy promotions work. If the total deficit is indeed quite small (compared to the expected increase in smallholder production as a result of DAP assistance) then new and continued investments in product promotions become much more important for the Title II target group.

development. Zambia in fact needs far more of this type of activity and it would be a shame to bring this work to any kind of early close. The program does help to build long-term market demand for dairy by targeting future dairy consumers and ultimately, this is beneficial to large and small dairy farmers.

130. From this perspective, the best objective for the DAP is probably to work with Miles to develop some sort of sustainability plan that curtails Title II support as much as possible and is focused on building new sources of funding to allow the program to continue after the Title II activity comes to an end. In fact, LOL has already made good progress on this front by helping Miles to secure funding from Standard Chartered Bank. Much more, however, remains to be done to develop new funding sources, including the possibility of obtaining funding from ZDPA members who are the primary beneficiaries of the product promotions work.

#### **IV. WAREHOUSE RECEIPTS**

131. The final operational component of the DAP is the warehouse receipt program. In design and practice, this part of the DAP has been following a completely separate approach to food security improvement than the dairy development work discussed so far. The warehouse receipt component is also being implemented exclusively on a sub-grant basis and is therefore at least partially intended to improve the capacity of the Zambia Agriculture Commodity Agency (ZACA) to extend its outreach to smallholder farmers. By helping smallholder farmers participate in the warehouse marketing program LOL is expecting these producers to obtain better prices for their crops and eventually to have improved access to credit from using warehouse deposits as collateral.

132. **Overview.** Smallholder farmers in Zambia tend to market the bulk of their crop in the immediate post-harvest period, their decisions to sell being dictated by the need for cash rather than whether or not prevailing prices are remunerative. They cannot sell in the relatively more formal market due to bulking constraints and quality variability, which leads to their crop being significantly discounted. Quality analysis is usually by sight and is highly subjective and disadvantageous to most growers. The small itinerant traders, who dominate the trade in the smallholder crop, are unable to absorb the substantial surplus on the market during the harvest season, resulting in very low prices at harvest, often below costs of production, thus reducing incentives for smallholders to invest in productivity-enhancing inputs from commercial sources. Small-scale farmers are also unable to defer sale for better prices because of lack of access to credit to meet household consumption needs.

133. The Zambian Agricultural Commodity Agency, administers a warehouse receipt system that enables farmers, traders, and processors to deposit stocks of non-perishable agricultural commodities with certified private sector run commercial warehouses. These warehouses issue transferable warehouse receipts as evidence that named persons have deposited stated quantities of named commodities of stated quality at specified warehouse locations. The warehouses ensure the safe keeping of the depositors' commodities and guarantee delivery against the issued warehouse receipts.

134. ZACA certifies warehouse operators, warehouses, and warehouse staff to run warehouses, store, weigh, and grade commodities according to set criteria. The certification criteria include provision of all risks insurance cover and performance bonds, in the form and wording prescribed by ZACA. ZACA also supervises the operations of these warehouses by a system of unannounced periodic inspection visits, during which all aspects of the warehouse operations are examined, and, where necessary, corrective measures are instructed. The system is adapted for use by small and large-scale farmers, farmer

cooperatives and registered associations, traders and processors. It is currently able to accommodate groundnuts, maize, sorghum, soybeans, sunflower and wheat.<sup>15</sup> Efforts are planned to include seed and fertilizer, the stakeholders may demand later expanding to other commodities. The decision to include any commodity is purely demand driven.

135. Enabling smallholder farmers' access the warehouse receipt system will help reduce the marketing problems they face and make it possible for them to earn more for their crop because the system will:

- Make it possible for farmer groups to bulk their crop into economic lot sizes that can be sold further down the marketing chain to processors.
- Provide a means which grain can assure quality and quantity, thereby reducing the scope for cheating on quality and weights.
- Allow warehouse operators to guarantee of delivery of grain of certain quality and quantity; thereby enabling smallholders participate in modern agricultural commodity markets, including selling through a commodity exchange when it develops.
- Ensure that storage occurs in well-run warehouses, thus reducing post-harvest losses, which can be quite high at the smallholder level.

136. In addition to Land O'Lakes, ZACA has, since 2005, been collaborating, in a USAID funded Global Development Alliance, with a number of organisations in implementing the warehouse receipt scheme. These include, Zambia National Farmers Union (ZNFU), Bankers Association of Zambia (BAZ), Insurers Association of Zambia (IAZ), Millers Association of Zambia (MAZ), Co-operative League of the United States of America (CLUSA), etc. The program maintains an arms length relationship with the Ministry of Agriculture & Cooperatives (MACO) and has remained a private sector driven initiative. ZACA also received funding from IFAD (working through the SHEMP program), and the Natural Resources Institute (NRI) of the University of Greenwich, United Kingdom, as financing agencies. It is planned that ZACA should raise its operating capital through a system of user fees for services rendered, but, in the meantime, depend on donor funding to build the necessary certified space and deposit volumes to generate enough revenue to cover its operating costs.

137. **Progress to date.** As described, this component seeks to create new and more secure opportunities for small farmers to market their annual crops. In practice, the warehouse marketing work is being treated as a stand-alone activity implemented entirely by ZACA. Land O'Lakes is not involved at all in the day-to-day running of the warehouse receipt component and is mainly providing funding for a warehouse examiner, driver, and other material costs in order to extend the ZACA program to new areas. Specific objectives set out for ZACA under the DAP include:

- Training for 5,000 smallholder farmers to promote program expansion.
- Increase in quantity of commodities deposited in certified warehouses by smallholder farmers to 20,000mt.
- Inspection of warehouses and training of warehouse operators.
- Warehouse audits to provide enforcement of ZACA regulations.

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<sup>15</sup> Of these, maize, sorghum, and sunflower are the most important to smallholder farmers in the DAP program area. Groundnuts are also an important smallholder crop, but are mainly grown on a semi-commercial basis only by smallholder farmers in Eastern Province.

- Training of banks and other financial institutions in the use of warehouse receipts as collateral

138. Currently there is in excess of 100,000mt of certified warehouse space in areas covered by the Land O'Lakes. Overall capacity utilization is now around 65% including deposits from commercial, emergent, and smallholder farmers. As of 31 March total deposits stood at 65,000 mt including 21,000 mt of receipted deposits around 1,000 mt receipted deposits by smallholder and emergent farmers. More recently, as of mid-September, smallholder deposits increased to around 7,000 mt, and subsequent reports talk of smallholder deposits in the range of 13,000 mt. With support from the DAP, ZACA has certified an additional six warehouses and purchased aflatoxin grading equipment needed for warehouse deposits in Eastern Province.

139. Despite this generally good progress, smallholder farmers still account for less than 5% of total deposits and there remains enormous scope to increase participation in the warehouse receipt program. It also appears that ZACA has been less aggressive with smallholder training and sensitization than LOL might have hoped. As the last ZACA quarterly report states: "owing to the appreciation of the Kwacha ZACA discontinued the wide access training and awareness programs to concentrate on targeted sessions for depositors around certified warehouses". Although this targeted approach may be a more effective in the long-run, other activities (including the purchase of aflatoxin grading equipment) were not discontinued because of the exchange rate appreciation. Similarly, eight follow up visits were made to smallholder depots in Southern and Central provinces to assess the small farmer crop and their readiness for the marketing and financing challenges, but these meetings were not coordinated to cover the same groups and areas where LOL is also working on dairy development.

140. **Observations.** Taken together, these facts and design considerations lead to the conclusion that the ZACA program is a relevant activity for a Title II program, but perhaps not an ideal fit with the current DAP. Certainly the development objectives in terms of helping small farmers to obtain better prices for primary field crops can have a direct impact on food security, first by providing farmers a better price, and second by helping them to save more food commodities at home for family consumption. While these are important advantages from the Title II perspective, ZACA is already receiving considerable support from other donors and funding organizations so it is not clear what value the DAP actually adds, especially without fairly intensive management to ensure the ZACA program remains (or becomes) focused on specific activities that complement the main dairy development work.

141. On the one hand, there certainly are potential synergies between the warehouse receipt and dairy development work. As one farmer in the Copperbelt explained, her co-op used market maize on behalf of all the members, but has since given up on that activity because the group is now focused on dairy. With closer integration of the ZACA program, this group could have at least been made aware of the warehouse receipt program and inspectors could follow-up to try and ensure there is at least one certified warehouse near to that group. On the other hand, this would require considerably more coordination between ZACA and LOL on a day-to-day basis and the DAP's agenda is already quite full.

142. As worthy of a cause as support for the warehouse receipt program is, therefore, it also seems that the current Land O'Lakes program could do better to focus more exclusively on the development of smallholder dairy. This is already a complicated enough task without introducing another set of agriculture development goals as part of the plan for food security improvement. Like dairy production, smallholder participation in a warehouse receipt marketing program is another highly innovative area of agriculture and therefore a complicated way to achieve results. Apart from the operational challenges of establishing

such a program, it is also difficult show direct linkages between the Title II investments in warehouse marketing and expected food security outcomes.

143. **Recommendations.** In terms of clear recommendations, therefore, it would seem that LOL should consider reducing and/or refocusing its involvement in the warehouse receipt program, at least on a gradual basis. Several other donors are already supporting ZACA and (unlike the work with Miles), even a significant cut in LOL funding would be unlikely to have any major negative consequences for the overall progress being made.

144. Of course, if possible, any changes should also be done in a way to helps to realize even more synergies between warehouse marketing and dairy development work. Rather than fund a general “warehouse inspector” and driver, for example, as the DAP is now doing, a very simple change would be for LOL to fund a “smallholder facilitator” who is specifically tasked with involving dairy groups and other rural associations in the warehouse marketing program. LOL should also be careful to ensure that DAP funds are not used for general purchases like aflatoxin grading equipment, which is of little or no direct benefit to DAP’s main target group.

145. Finally, like many other parts of the LOL results framework, it is worth noting that the intermediate results indicators for the warehouse receipt component provide a poor picture actual change in food security and fail to look at important development processes that actually contribute to this outcome. Specifically, the IPTT tables have been designed to monitor the ZACA’s progress by (i) increases in commodity receipts used as collateral; (ii) number of smallholder farmers trained; (iii) increases in quantities of commodity deposited in certified warehouses by smallholder farmers; and (iv) number of certified warehouses (IRs 3.1 to 3.4 respectively). Although this information is certainly relevant, the only way to begin to judge the food security impact on small farmers is to look at total sales of smallholder commodities in these areas and changes in the relative percent passing through the warehouse receipt system. Some indication of the vulnerability status of participating households and incremental benefit to household income would also help. Unlike the dairy development work, no particular attempt made to ensure that the smallholder farmers being reached are in fact vulnerable or whether participating farmers are getting any more income as a result of depositing their commodity in the warehouse program than they were before.

146. Because ZACA is focused on the cause of improving the rural marketing situation for smallholder and large-scale farmers in general, final goal level indicators of food security outcomes are therefore difficult to track. Very simply, without time series data on the vulnerability status of households that do and do not participate in the warehouse receipt program, or at least more detailed information on the type of farmers that are depositing commodity with the ZACA warehouses, LOL will find it very difficult to demonstrate any clear or verifiable food security impact at all. The logic of how the program contributes to this outcome is simple enough, but as with many other parts of the DAP, is much more difficult to demonstrate with hard, verifiable indicators.

## **V. SUBCONTRACTOR AND SUB-RECIPIENT CONTRIBUTIONS**

147. Having considered the main performance issues with each of the DAP’s four operational components, this section now takes a closer look the contribution of individual subcontractors and sub-recipients to program implementation. Originally, LOL had expected to carry out most program through sub-agreements and these external players are still major contributors to day-to-day operations of the DAP.

148. For this review, it is first important to note that Land O'Lakes is working with two types of program partners in which there is a fundamental distinction between a

subcontractor and sub-recipient. As explained in the discussion of implementation strategy, sub-recipients are given sub-awards with an implicit development function to improve the organization's capacity to take over the role of service provider after Title II programming is complete; subcontractors, on the other hand, are hired purely on a commercial basis to provide specific services. The selected sub-recipients for this program are the Zambia Dairy Processors Association (ZDPA), Golden Valley Agriculture Research Trust (GART), and Zambia Agriculture Commodity Agency (ZACA). Sub-contractors, Subcontractors currently working with Land O'Lakes include the Conservation Farming Unit (CFU), Heifer Project International (HPI), Miles and Associates (Miles), and World Wide Sires (WWS).

149. For this part of the MTR, the approach taken was to list major objectives and performance issues for each program partner in a standard matrix. The points covered are therefore by no means comprehensive and need to be read in the context of the rest of the discussion in this report. Mainly, it is hoped this type of quick summary will help focus attention on key issues and thereby stimulate productive discussions between LOL and its program partners on how to consolidate the gains made so far and improve on shortcoming where possible.

#### **A. Subcontractors**

150. In alphabetical order, the four subcontractors working with LOL are:

- Conservation Farming Unit
- Heifer Project International
- Miles and Associates
- World Wide Sires

151. **Conservation Farming Unit (CFU).** The CFU is has been contracted to provide farmer training in pasture establishment using minimum tillage and other labor saving, environmentally sustainable techniques. As discussed, improvements in this area are essential to maintain good animal health and nutrition for high milk yields. Indications are that some farmers have been struggling to provide a good enough diet for their animals and this should be looked into drawing on the expertise of the CFU and other local fodder crop experts to improve on the situation.

**Table 20: Summary of Subcontractor Performance Issues:  
Conservation Farming Unit (CFU)**

<b>Name of subcontractor</b>	Conservation Farming Unit
<b>Type of organization</b>	Local NGO (affiliated with ZNFU)
<b>Value of subcontract(s)</b>	\$60,000 from LOL for 1 year (renewal not expected)
<b>Areas of responsibility</b>	Training in dry land pasture management
<b>Main deliverables</b>	<ul style="list-style-type: none"> <li>• 15 trained “practical demonstrators” in selected farming communities.</li> <li>• Farmer field days, farmer exchange visits, practical training activities.</li> <li>• Improved capacity of extension staff to further educate farmers and encourage adoption of fodder conservation techniques.</li> <li>• Baseline survey of forage production.</li> <li>• Establishment of seed multiplication plots for forage, and pasture crops.</li> </ul>
<b>Major achievements to date</b>	<ul style="list-style-type: none"> <li>• Training of 14 demonstrators</li> <li>• Demonstration plots established</li> <li>• Field days attended by 172 farmers (including 76 women) and 9 extension staff.</li> <li>• Farmer and extension officer exchange visits (35 total participants including 5 extension staff).</li> </ul>
<b>Observations</b>	<ul style="list-style-type: none"> <li>• Contracted because of expertise training in CF techniques, but generally not committed to smallholder dairy development.</li> <li>• One demonstrator dropped out and could not be replaced due to late start.</li> <li>• Good progress with training and field days, but outreach still seems limited.</li> <li>• Detailed training mainly focused on developing skills for “practical demonstrators” rather than outreach to individual heifer recipients, other farmer group members, and interested non-members.</li> <li>• CFU not expecting to participate in DAP after current contract.</li> <li>• Baseline survey delayed due to late funding.</li> </ul>
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• Develop training manuals for extension staff and simple handouts for farmers (fund with unspent budget for baseline survey if needed).</li> <li>• Be sure to include training in manure conservation for use as fertilizer; aggressively disseminate this message to all heifer recipients and other farmer group members.</li> <li>• Involve CFU in farmer selection process to determine potential for dry land fodder production.</li> </ul>

152. **Heifer Project International.** HPI is a faith-based international NGO with over 20 years experience in Zambia with the distribution of in-calf heifers and other livestock to poor farmers. HPI has an especially strong presence in the Copperbelt and was engaged by LOL specifically to help expand the program in that area. The HPI model also served as the basis for the DAP's current pass-on modality for female calves to second generation beneficiaries.

**Table 21: Summary of Subcontractor Performance Issues:  
Heifer Project International (HPI)**

<b>Name of subcontractor</b>	Heifer Project International
<b>Type of organization</b>	International NGO
<b>Value of subcontract(s)</b>	\$133,000 for 1 year (renewal expected until end of DAP)
<b>Areas of responsibility</b>	Farmer training and support in Copperbelt
<b>Main deliverables</b>	<ul style="list-style-type: none"> <li>• Identify potentially successful dairy producers in the Copperbelt and recommend such farmers for the provision of dairy cattle.</li> <li>• Train members of dairy producer groups and associations in livestock production and management.</li> <li>• Distribute at least 150 dairy animals in each of the pre-identified target areas.</li> <li>• Train MACO livestock extension agents and veterinarians in animal health and disease control, genetics, etc.</li> <li>• Provide training in artificial insemination and contract artificial insemination services</li> </ul>
<b>Major achievements to date</b>	<ul style="list-style-type: none"> <li>• Farmer selection and training in the Copperbelt</li> <li>• Distribution of 122 heifers in the Copperbelt</li> <li>• Support for establishment of new MCCs in the Copperbelt</li> </ul>
<b>Observations</b>	<ul style="list-style-type: none"> <li>• HPI very well in-tune with the DAP's food security objectives, but less market oriented than LOL.</li> <li>• Generally smooth and harmonious operations; well coordinated with LOL.</li> <li>• Pass-on modality based on HPI experience</li> </ul>
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• Work closely with LOL on content of proposed training manuals and farmer handouts.</li> <li>• Consult HPI on detailed issues around the pass-on modality to identify other approaches (or variations) that are better suited for the current DAP.</li> </ul>

153. **Miles and Associates.** Miles and Associates have been engaged to implement a youth life-skills program to build the future demand for dairy products. This activity seems to be an awkward fit with the DAP's narrow focus on assisting vulnerable populations within the strict Title II mandate, but it is equally clear that Miles is doing fabulous work reaching future dairy consumers with important health information in an framework tailored to the life concerns of urban youth. The best option, therefore, seems to identify new funding sources that will allow the Miles program to continue. Land O'Lakes has already assisted Miles in this respect by obtaining a USD 65,000 grant from Standard Chartered Bank, but this is still only equal to about 50% of the total annual budget.

154. One particularly attractive option for future funding therefore would be to turn to the dairy processors who are benefiting from the dairy messages of the life-skills program. At basketball tournaments and other events, for example, banners are often used with the ZDPA logo, so private dairy companies should also be asked for donations to include their name. As an "official sponsor" these companies could then be allowed to give out samples at organized events as a marketing activity. ZDPA would have a clear role organizing these sponsors and this could be a very useful replacement for the type of media campaign tried by ZDPA earlier on.

**Table 22: Summary of Subcontractor Performance Issues:  
Miles and Associates**

<b>Name of subcontractor</b>	Miles and Associates
<b>Type of organization</b>	International NGO
<b>Value of subcontract(s)</b>	\$264,000 over 2 years (renewal expected until end of DAP at gradually diminishing levels)
<b>Areas of responsibility</b>	Youth life-skills development & dairy promotions
<b>Main deliverables</b>	<ul style="list-style-type: none"> <li>• Implementation of a multi-year plan for life-skills development in at least 20 schools in Lusaka and the Copperbelt.</li> <li>• Training modules for urban students in health and nutrition and HIV/AIDS awareness.</li> <li>• Organization of school and/or community youth basketball teams for boys and girls.</li> </ul>
<b>Major achievements to date</b>	<ul style="list-style-type: none"> <li>• Outreach to +25,000 students (ages 13-19) through life-skills training and basketball.</li> <li>• Increased profile of dairy sector in the national media.</li> <li>• Matching funds leveraged from Standard Chartered Bank.</li> </ul>
<b>Observations</b>	<ul style="list-style-type: none"> <li>• Program designed to building long-term market demand through an innovative (and highly successful!) approach that targets future dairy consumers.</li> <li>• Provides an obvious channel for addressing HIV/AIDS and other life skill-issues.</li> <li>• Limited awareness by sub-contractor of Title II objectives.</li> <li>• Long-term market development work not immediately important to Title II beneficiaries or FFP strategic objectives.</li> </ul>
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• Significantly curtail DAP funding as quickly as possible (being careful not to kill the program).</li> <li>• Seek for alternative funding through Dairy Directive.</li> <li>• Get buy-in from ZDPA members and other potential benefactors.</li> </ul>

155. **World Wide Sires.** WWS is responsible for artificial insemination and breeding. The program is being implemented part-time by an independent veterinarian who works as the local WWS agent.

**Table 23: Summary of Subcontractor Performance Issues:  
World Wide Sires (WWS)**

<b>Name of subcontractor</b>	World Wide Sires
<b>Type of organization</b>	International genetics company (US-based farmers co-op)
<b>Value of subcontract(s)</b>	\$274,000 over first 2 years (renewal expected for at least 1 year, but on a diminished scale)
<b>Areas of responsibility</b>	Development (and provision) of AI services
<b>Main deliverables</b>	<ul style="list-style-type: none"> <li>• Farmer training and awareness building of AI through field days and exchange visits.</li> <li>• Training of 1 or more AI technicians within each farmer group.</li> <li>• Training of “breeding consultants” who will manage AI services as a self-sustaining business before the end of the DAP.</li> </ul>
<b>Major achievements to date</b>	<ul style="list-style-type: none"> <li>• Storage and field flasks distributed to all active MCCs.</li> <li>• 32 technicians trained; 30 technicians trained in refresher course.</li> <li>• Field days attended by more than 1,500 farmers and exchange visits for 74 participants.</li> <li>• 1-on-1 farmer field visits and heat detection exercises.</li> <li>• Approximately 667 inseminations to date (437 farmers) leading to 417 pregnancies and 98 AI calves born and well.</li> </ul>
<b>Observations</b>	<ul style="list-style-type: none"> <li>• Maintenance of high animal quality genetics is essential for the long-term success of the LOL program.</li> <li>• Animal cycling and heat detection compromised by poor nutrition and other factors (majority of livestock presented for heat detection with reproductive problems and poor ovarian activity).</li> <li>• LOL recommended grouping cattle in central location for heat synchronization (marginally successful, but only begins to address real challenge of building a sustainable AI business).</li> <li>• Main focus has been on technical output; only limited attention (by WWS and LOL) to the social and economic aspects of developing an improved breeding system.</li> <li>• Training manuals for AI technicians and farmers far too technical and long for practical use (and help with social marketing).</li> <li>• Not realistic to expect WWS to build a network of self-sustaining AI technicians within the life of the project (confusion between <i>development</i> and <i>provision</i> of AI services).</li> <li>• Must increase the turnover of straws well beyond targets set for the program for an AI business to be financially sustainable.</li> <li>• Poor communications between LOL and WWS are a major threat to the success of the AI program.</li> </ul>
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• LOL should launch an aggressive marketing campaign for AI that targets direct beneficiaries <u>and</u> other cattle owners.</li> <li>• Review and rationalize financial aspects of AI program including farmer charges and payments to AI technicians.</li> <li>• Consider new delivery mechanisms based around fewer nitrogen hubs</li> </ul>

## **B. Sub-recipients**

156. In alphabetical order, the two sub-recipients currently working with LOL are:

- Zambia Agriculture Commodity Agency
- Zambia Dairy Processors Association

157. The sub-recipient performance tables for these two local institutions are presented on the following pages.

158. **Golden Valley Agriculture Research Trust.** In addition to ZACA and ZDPA, Land O'Lakes has also has stated its intentions to work with the Golden Valley Agriculture Research Trust (GART) as a third sub-recipient. GART is Zambia's leading indigenous agriculture research institution, but is mainly focused on traditional food and cash crops and only has limited capacity in smallholder dairy.

159. At the time of preparing this MTR, the sub-agreement with GART was still under negotiation. It seems, in fact, that these discussions have not always progressed smoothly and there some significant outstanding differences in opinion about what Land O'Lakes should fund and level of support required. According to the latest draft of the sub-agreement, the sub-award to GART would have the following main objectives.

- (i) To improve the knowledge transfer and training of trainers.
- (ii) Provide farmers a source of genetically superior breeding stock within Zambia
- (iii) Build capacity of extension staff (MACO, GART, LOL, HPI) to adapt the current farming system into one to reduce risk and thus reduce food insecurity.

160. Specific deliverables in the current draft are imagined to include the following; the budget is projected to be around USD 115,000. The first two deliverables would consume about 90% of the total budget at USD 50,000 each.

- (i) 50 boran-type animals; 6 purebred jersey bulls; 10 purebred jersey females.
- (ii) Construction of training center including 2 accommodation blocks.
- (iii) Training of 2 GART staff in AI techniques and provision of two flasks and breeding boxes.
- (iv) Extension activities at MCC level.

161. Although the mid-term consultant was not brought in much on the discussions with GART, one overriding observation that applies to all subcontractors and sub-recipients is that LOL needs to exercise great caution to ensure each of funded activity is specifically relevant to the cause of reducing food insecurity for vulnerable people. Before agreeing to invest in any specialized breeding stock program with GART, LOL must first look at the overall AI and breeding program as discussed above. Similarly, with respect to the training center and accommodation blocks, LOL should expect GART to show why this is specifically relevant to vulnerable farmers. Sub-grants are meant to develop local capacity, but this must not be a reason simply to give money for non-essential or ongoing infrastructure improvements, which Zambia needs in abundance. Training facilities may be useful, but an equally important question LOL and GART should be asking is whether this is essential and if the DAP can afford such luxury given all the other pressing challenges.

162. **Zambia Agriculture Commodity Agency.** ZACA is implementing the warehouse receipt component as described in detail above. While ZACA is certainly doing very good work and the warehouse receipt model could be a useful tool for food security improvement, it is not clear that this activity adds much value to Land O'Lakes main focus on dairy development. Through more careful coordination and integration of participating farmer groups into the warehouse receipt program some better synergies might be realized, but an equally if not more persuasive case could also be made to significantly curtail DAP funding for this activity and just concentrating on the main business of dairy development. Because ZACA has a fairly widespread donor base, this move would perhaps not be such a problem for the warehouse receipt program, but must be considered carefully than this review has had the opportunity to do.

**Table 24: Summary of Sub-recipient Performance Issues:  
Zambia Agriculture Commodity Agency (ZACA)**

<b>Name of subcontractor</b>	Zambia Agriculture Commodity Agency
<b>Type of organization</b>	Local NGO
<b>Value of subcontract(s)</b>	\$152,000 over 2 years (renewal expected until end of DAP)
<b>Areas of responsibility</b>	Warehouse receipt program
<b>Main deliverables</b>	<ul style="list-style-type: none"> <li>• Training for 5,000 smallholder farmers to promote program expansion.</li> <li>• Increase in quantity of commodities deposited in certified warehouses by smallholder farmers to 20,000mt.</li> <li>• Inspection of warehouses and training of warehouse operators.</li> <li>• Warehouse audits to provide enforcement of ZACA regulations.</li> <li>• Training for banks and non-bank financial institutions in the use of warehouse receipts as collateral.</li> </ul>
<b>Major achievements to date</b>	<ul style="list-style-type: none"> <li>• +108,000 mt of certified storage space around project area; currently 7,000 mt deposits by small farmers.</li> <li>• Installation of wheat grading and aflatoxin testing equipment</li> <li>• Training of grain handlers</li> </ul>
<b>Observations</b>	<ul style="list-style-type: none"> <li>• Smallholders account for about 4.5% of certified warehouse deposits.</li> <li>• ZACA managers focused on long-term expansion and market development rather than providing specific services to Title II target group.</li> <li>• Training and awareness programs for small farmers delayed until later in 2006.</li> </ul>
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• Reorient SOW (and deliverables) to focus more clearly on provision of smallholder services – especially to farmer groups already participating in the DAP.</li> <li>• Improve monitoring to ensure DAP resources are used for Title II objectives.</li> <li>• Consider a significant reduction in support for ZACA so that more resources can be focused on the core business of dairy development.</li> </ul>

163. **Zambia Dairy Producers Association.** The sub-recipient performance sheet for the ZDPA is presented below. Membership of the ZDPA has increased over the last year, primarily as a place to discuss important trade and policy issues, including competition with illegal imports which is seen as a major threat to local producers.

**Table 25: Summary of Sub-recipient Performance Issues:  
Zambia Dairy Producers Association (ZDPA)**

<b>Name of subcontractor</b>	Zambia Dairy Processors Association
<b>Type of organization</b>	Industry association (nescient)
<b>Value of subcontract(s)</b>	\$164,000 over 2 years (renewal expected until end of DAP)
<b>Areas of responsibility</b>	Dairy industry development and promotions
<b>Main deliverables</b>	<ul style="list-style-type: none"> <li>• General association development (increased membership, quarterly newsletter, participation in regional dairy conference, technical seminars and regular meetings for members, etc.)</li> <li>• Dairy promotions campaign (and other communications and public outreach activities).</li> <li>• Support for Seal of Quality Program</li> </ul>
<b>Major achievements to date</b>	<ul style="list-style-type: none"> <li>• Expanding and increasingly active and cohesive membership.</li> <li>• Providing technical support to ZDPA members (with backing from LOL)</li> </ul>
<b>Observations</b>	<ul style="list-style-type: none"> <li>• ZDPA capacity for advocacy and outreach is very limited.</li> <li>• Major challenge is to become financially self-sustaining (ZDPA members currently contribute less than 7% of total budget)</li> <li>• Promotions work has not been renewed since withdraw of media campaign.</li> <li>• Seal of Quality Program (and ZDPA budget priorities) are being driven by LOL.</li> <li>• Currently focused on preparing to host Regional Dairy Conference in May 2007.</li> <li>• Smallholder issues and problems faced by MCCs are not a high priority for ZDPA.</li> </ul>
<b>Recommendations</b>	<ul style="list-style-type: none"> <li>• Develop long-term financial plan that includes links to new funding sources.</li> <li>• Focus on building specific services that are most relevant to ZDPA members.</li> <li>• Consider expanding membership to include MCCs (as long as services are relevant at this level and MCC representatives are willing to cover own costs).</li> <li>• Improve linkages with other USAID trade projects that could help increase ZDPA's voice for policy advocacy.</li> </ul>

## **VI. MONITORING AND RESULTS REPORTING**

164. The Land O'Lakes monitoring and evaluation system is based around the results framework shown in Part Two of this MTR (see Figure 1). Several issues associated with tracking the main IR results indicators have already been discussed as part of the analysis of each component. The program's IPTT tables are presented in Annex 4 and results of a field survey carried out by LOL at the same time as this MTR to update the IPTT indicators are presented in Annex 3.<sup>16</sup>

165. Rather than discuss specific survey results or other outcome indicators, therefore, the main report looks more thematically at the relevance of these data to the activities being undertaken and potential to tell the story about the specific impact LOL is having on reduced food insecurity for vulnerable populations. The discussion begins by looking at the program's highest level goal indicators, which are mandated by FFP (MIHFP, HDDI, and IDDI) and considers how effective these indicators are at measuring the types of food security outcomes that are actually being achieved. The report then takes a similar look at the IR indicators that make up the rest of the LOL results framework.

166. Next, the MTR looks at the reporting of "program highlights" as summarized in the most recent Land O'Lakes Quarterly Report. For this part of the review, the approach is to list each of the bullet points from the QR's executive summary and reflect on these issues with respect to the development processes being undertaken. Attention is given to identifying areas of impact that were not highlighted by Land O'Lakes and how these also contribute to long-term reductions of food insecurity, both for selected heifer recipients, and for members of the wider community. Finally, the discussion concludes with a few practical suggestions of how the M&E system might be improved.

### **A. Goal Level and Intermediate Result Indicators**

167. In reviewing the overall effectiveness of the DAP's M&E system, two main issues stand out. First, is that LOL has been struggling to measure goal level impact in very narrow food security terms defined for this program; and second, that many of the IR results indicators chosen for the DAP do not adequately help managers track the process of dairy development or show how this contributes to reduced food insecurity. In many ways, of course, these two issues go hand in hand. Considerable evidence was found during the review to show that the program is having (or certainly can have) a positive food security impact on selected beneficiaries, but the M&E system is cumbersome to report on and provides relatively little of the data needed to make this case and demonstrate the multidimensional contributions of dairy development can make to improved rural livelihoods and reduced food insecurity.

168. **Goal level food security indicators.** With respect to the goal level indicators, the problem of impact reporting has as much to do with the type of program FFP is supporting as it does with any lack of experience or learning curve issues for the implementation of an income-based food security program. In the first place, dairy development is by definition a long-term undertaking that requires considerable investment and recurrent support and

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<sup>16</sup> The mid-term survey was carried out completely separate from the MTR consultant's main work, which focused on the development process and underlying contribution of different activities to the type of food security outcomes LOL and FFP are hoping to measure. Although it was agreed at the outset that it is too early for the MTR to evaluate actual impact and the report should focus on the development process, the survey data are still important not only as benchmarks of where things are at this halfway stage, but also as a common reference point for discussing the way forward.

follow-up to maintain smallholder production at profitable levels until the system becomes self-sustaining.

169. Under these conditions, there is no doubt that dairy production makes a direct contribution to improved household food security in a number of important ways. First and foremost is the resiliency to shock and improved ability to cope with seasonal shortages of staple food crops. Many other benefits of dairy, however, are only realized over the long-term as farmers fulfill their pass-on obligation and eventually build-up from a 1-cow to a 2-cow or even a 3-cow production unit where the enterprise becomes much more profitable (see financial analysis in Part Four). Investments in artificial insemination likewise have a long time horizon since the new livestock won't become productive cows for several years. For these simple reasons, FFP mandated measures of food security impact such as MIHFP, HDDI, and IDDI will at best provide only a partial picture of the DAP's outcome within the life of the program.

170. Moreover, because the DAP actively targets people who are merely vulnerable to food insecurity, but otherwise capable of caring for a dairy animal, the marginal propensity of these people to spend new income on food will be lower than for someone who is already experiencing deeper deprivation. Because MIHFP and HDDI are used as proxy measures for increased income, but focus on food consumption alone, therefore, these indicators do not provide a clear picture of other household expenditures and long-term investments in education and farm implements that also contribute to reduced vulnerability. LOL is collecting some of this information on expenditure patterns through other parts of its field survey (see table above and Annex 3). Current indications, however, are that only 34% of farmers are spending dairy income on groceries other staple and non-staple foods. MIHFP, HDDI, and IDDI, therefore do not apparently show how the majority of program beneficiaries are spending their dairy income.

171. Another methodological problem with the use of MIHFP, HDDI, and IDDI as measures of program impact is that the results of investments in the warehouse receipt component do not show up at all. As described in Annex 3, the LOL survey only focused on old and new dairy program participants who are delivering milk to an MCC. No specific attempt was made to single out farmers who deposit a commodity in a certified warehouse. Equally, by focusing only on old and new heifer recipients that are delivering milk to an MCC, the data do not show how the program affects other non-recipients that also benefit from the market development work and processor linkages. Milk consumption at the household level will show up in the dietary diversity scores, but once again is only one small part of the total benefit a dairy system provides.

172. Over the long-run, changes in food security status certainly can be monitored by collecting adequate meal and dietary diversity information. In the short-run however, changes at this level are likely to be difficult to detect, not only because farmers spend their money on other things than food, but also because of the variable nature of the food security problem in the program area. The full food security impact of the DAP, therefore, will not be realized until there is some widespread food crisis in the program area. When that happens, evaluators will finally be able to take a truly meaningful look, first and foremost, at the share of program participants who require food aid and compare that figure with requirements in the general population, and secondly, at how sustainable smallholder dairy production really is under stressed conditions.

173. LOL certainly has a responsibility to help FFP collect survey data that can be used to measure the program's impact in precise food security terms, but it would not be correct to hold the DAP accountable for demonstrated progress against these specific outcomes at this stage. At least for now, it seems far more helpful to look income effects and marketing

margins associated with dairy and new opportunities for value-added processing to understand how the Land O'Lakes model works as method for achieving reduced food insecurity. Without this understanding, several important market processes and development opportunities are likely to be overlooked. Land O'Lakes certainly does have a responsibility to provide FFP the data it needs to evaluate its own strategy in discrete food security terms, but the Title II program is also interested in promoting sound development processes and this cannot be reported on by looking at meal provisioning and dietary diversity based indicators alone.

174. **Intermediate results indicators.** At the intermediate results level, the problem again is that the data being tracked provide only a partial indication of the program's food security impact and process through which dairy production, dairy marketing, and warehouse receipt development actually contribute to improved livelihoods for vulnerable individuals. The M&E system is also cumbersome and includes many levels of detail that are not really necessary to understanding the program's impact. To make these points more clearly, it is helpful to list each of the IR indicators and reflect on some of the specific strengths and limitations.

175. With respect to the DAP's Intermediate Result 1, **(IR1) – Increased Productivity of Smallholder Dairy Farmers**, the results framework lists the following sub-IRs. The DAP's PMP document generally calls for these indicators to be disaggregated by district, gender, and origin of the animals, but these distinctions are not yet captured in LOL's IPTT tables.

#### **1.1 – Increase in average volume of milk production by smallholder farmers**

This indicator is important, but overlooks other sources of revenue from dairy including manure that can be used to fertilizer food crops and revenue that is eventually generated from cull cow and calf sales. Without other IR indicators to capture these revenue streams as well, the focus on milk alone provides an incomplete picture of the DAP's true impact. Also, it would be more helpful to categorize farmers into terciles and show the % of farmers producing below the average, around the average, and above the average.

#### **1.2 – Increase in average yield of dairy cattle**

Again, this indicator is extremely important, but overlooks other revenue sources and is not a sufficient gauge of how well a farmer is doing with dairy production. The calculation of a single average yield figure also makes this indicator difficult to interpret. There also appear to be methodological problems with the selection of a baseline yield figure for this indicator and IR 1.1 as discussed above in the section on the Dairy Livestock Development Component.

#### **1.3 – Number of smallholder farmers owing improved dairy cows**

Again, this is a very important and direct indicator of what the program is doing. One important lesson from the experience so far, however, is that too much weight is being put on direct heifer recipients without also looking at the benefits for other program beneficiaries. This indicator is also designed mainly to count the number of farmers who participate in the livestock distribution part of the DAP and has not yet been adapted to include farmers who acquire improved dairy cows from artificial insemination or other breeding activities.

#### **1.4 Number of smallholder farmers trained**

This indicator goes some way to providing the more comprehensive picture of program impact than just the narrow focus on heifer recipients, but is not supported

by further indicators (or disaggregations) to show how recipients and non-recipients group members are managing in practice. The effectiveness of the training work is revealed to some extent by the average yield figure, but some further analysis of how well different farmers are doing is also important.

176. The next set of indicators looks at the program's impact at the milk collection and processing levels. **IR 2 – Improved Productivity of the Dairy Industry.** Again, the sub-indicators listed under this IR provide only an incomplete picture of the true development process.

### **2.1 – Gross average value of milk sold by MCCs**

Again, the problem with an average is that this type of figure masks important differences between MCCs. As discussed, some collection centers are doing very well with milk collections and others are not; and nearly all face important management challenges. Although more detailed results reports do provide information on gross sales by individual collection centers, this is still an incomplete indicator because gross sales say nothing about profitability, which is what really matters for long-term sustainability. The program needs to concentrate more on building a successful business model for rural MCCs in addition to the type of straightforward investments in quality control and capacity utilization now being undertaken.

### **2.2 – Average volume of milk sold by MCCs**

Again, this is an incomplete indicator of MCC development and does not show how individual MCCs are performing. Moreover, because the milk sold by MCCs includes milk delivered by heifer recipients and other farmers, this type of average is not a reliable indicator of market participation by farmers singled out for the DAP's highest level of consideration. None of the indicators, in fact, look specifically at milk sales by heifer recipients.

### **2.3 – Number of smallholder farmers delivering milk to MCCs**

Similarly, the difficulty with this indicator is that it does not distinguish between deliveries by heifer recipients, other group members, and non-group members. Only with this type of more disaggregated data, can LOL begin to show how its investments in market development benefit the primary target group and other vulnerable individuals in the program area.

### **2.4 – Volume of milk used by targeted processors to produce dairy products**

This indicator of processor level support misses the main objective for a food security program which is to build sustainable market linkages between dairy processors and vulnerable farmers. Rather than measure total volumes of milk used by the processing industry, it is far more important to look at the amount of smallholder milk use and/or the number of marketing agreements established with MCCs. This matters far more to individual food security than the general cause of sector expansion.

### **2.5 Capacity utilization of targeted processors to produce dairy products**

Similar to IR 2.4, the main problem with this indicator is that capacity utilization is only indirectly connected to the program's impact on the Title II target group. Again, for a food security program, it is far more important to look at the market linkages

between dairy processors and smallholder milk collection centers than aggregate capacity utilization figures. As a net milk importer, the main problem Zambian dairy processors face is that local production either cannot compete on price or quality. Capacity utilization is one part of becoming more competitive, but only indirectly related to challenge of reducing food insecurity for vulnerable farmers.

## **2.6 Average Producer Group Capacity Index (PGCI)**

This indicator is a little different than the rest and focuses on the institutional development of participating farmer co-ops and milk collection centers. The index specifically tries to capture aspects of each co-op's oversight and vision, management resources, financial resources, external resources, and food security capacity and is based on a weighted ranking system for each of these aspects. As discussed, the limited management capacity of rural MCCs is indeed a major challenge (and potentially serious threat to the long-term sustainability of program benefits), but it not convincing that this type of elaborate calculation of PGCI (let alone an *average* PGCI for multiple MCCs) is a worthwhile exercise. The management problems MCCs are facing are not difficult to identify and a far more direct and easy way to interpret MCC performance be to look at each co-op's underlying profitability and type of management decisions being made. PGCI does try to get at these factors, but seems an unnecessarily long and elaborate way to quantify what are otherwise plain and simple facts. Land O'Lakes surely has better things to do with Title II resources than undertake elaborate calculations of average PGCI. This indicator is of little practical interest and seems overly academic for this type of program.

177. The third set of IR indicators are meant to look at the impact of the warehouse receipt component: **IR 3 – Improved Storage of Nonperishable Commodities.**

### **3.1 Commodity receipts used as collateral**

This indicator focuses only one aspect of the warehouse receipt program and does not adequately show the impact on vulnerable farmers. LOL's PMP says this indicator will be disaggregated by geographical area, vulnerability groups, farmers size, gender, and warehouses, but these data either do not seem to have been collected or at least have not yet been fully analyzed.

### **3.2 Number of smallholder farmers trained**

Again, the number of farmers trained is only one part of the process and just one first step to actually integrating warehouse marketing as part of the farmer's production system. LOL's plan is for these data to be disaggregated by gender, geographical area, and type of improved practices, but this is not sufficient to show whether the farmers being trained are vulnerable or not and whether this specific target group is adopting the improved practices. As discussed above, there also seems to be room for closer coordination between the ZACA program and other aspects of LOL's dairy development work. A more useful progress indicator would be number of dairy development groups trained

### **3.3 Quantity of commodities deposited in certified warehouses by smallholder farmers.**

This indicator is meant to pick up where IR 3.2 leaves off by showing whether small farmers are actually adopting the improved marketing practices, but still does not show how many smallholder households are actually making deposits, what their

vulnerability status is, or whether the decision to use the warehouse program was a result of the training and sensitization work being undertaken. As defined in the DAP's PMP document, IR 3.3 is designed to focusing only on the total quantity of smallholder deposits with disaggregations by geographical area, warehouse, and type of commodity but says nothing about the type of "smallholder" (large, small, wealthy, poor) who is actually making the deposit in the first place.

### **3.4 Number of warehouses certified.**

This again is a very rough indicator for how the program benefits vulnerable smallholders. The main challenge of the DAP is not to support unspecified institutional development, but to help vulnerable individuals take advantage of the marketing channels being developed. Even if 50 new warehouses are certified, this is of little direct relevance to the Title II mandate unless vulnerable smallholders are actually making use of these new facilities.

178. Finally at the DAP's own SO level, the results framework says that the program will track increased average household income from dairy sales (SO1), and increased average household income from warehousing system (SO2). These indicators do, finally, start to put the emphasis where it needs to be to understand the type of effects the program is having, but again are based on averages and so are likely to be misleading.

## **B. Recurrent Results Reports**

179. The next part of the M&E review is to look at how LOL is reporting its program highlights to FFP. The review is therefore by no means a comprehensive assessment of LOL results reporting, but instead provides a useful way to look at some of the main achievements being reported by LOL and how these actually relate to the process of dairy development and opportunities for vulnerable smallholders to benefit from this enterprise.

180. Specifically, Land O'Lakes summarized its main achievements for the second quarter of 2006 in its Quarterly Report as follows. The MTR consultant's comments or other observations are given in bullet point form below.

### **An average of 697 liters per farmer was produced and delivered to the MCCs.**

- This estimate does not capture the value of milk consumed at home. Especially from a food security perspective, there at least needs to be a conceptual distinction between milk produced (and presumably used for food or fed to the calf) and milk delivered for cash sale.
- Over a 91 day quarter, this is equivalent to an average yield of 7.7 liters per day. It would be useful to show whether this is the amount of milk actually being delivered for sale and how this compares with total production. Based on the survey result that participating household consume between 2 and 4 liters of milk per day at home, this means the average yield of farmers delivering to MCCs could be as high as 11.7 liters. This is a very impressive result and, if these yields are actually achieved, should have been highlighted in the QR. Partly because the IPTT system focuses on milk sold to the MCC, however, the data being collected by LOL don't really allow this story to be told.
- The data also do not disaggregate between liters produced by participating and non-participating farmers. Especially in Southern Province, many other farmers are delivering milk to the MCCs, which clouds all data collected at that level. Household record keeping among beneficiaries, of course, is one way to take a

more detailed look at program impact, but even then records by non-participants are also relevant to understanding the big picture. Probably with a simple numbering system, MCCs could also do a better job of disaggregating data by heifer recipients, non-recipient group members, and non-group members.

**A total of 224 households received improved animals increasing the total number of smallholder farmers owning improved animals to 530.<sup>17</sup>**

- This is a very simple and important process indicator that is easy to report. Precisely because of this, however, there is a risk that too much weight can be put on this one aspect of what the DAP is doing (as appears to have happened throughout much of the first half of the program). As described, the program offers benefits to a far wider range of vulnerable individuals than immediate heifer recipients and the story of these beneficiaries also needs to be told.
- As the distributed animals mature and enter into milk production, future reports may need to say something more about how many calves have been born, how many cows are in full-production, how many animals have died and so on (like the summary table of herd size presented in this report).
- If possible, it would also be useful to report on the number and type of cows owned by all farmers delivering to an MCC. This information would be fairly easy to collect through an MCC survey (done either when the farmer is paid or delivers milk) and could be a useful way to enrich the LOL data set and open new ways for showing the impact on the wider community, including future investments in artificial insemination and breeding.

**A gross total of ZMK 486,293,368 (USD 105,716) was paid out to farmers by the MCCs giving an average of ZMK 789,6233 (USD 172) per farmer.**

- At this level, the results report does not distinguish between heifer recipients and non-recipients or between participating group members and non-members. Because the data are collected at the MCC level, this level of clarity may be difficult to achieve without more detailed farm-level data for different types of herds and herd sizes as noted above.
- When figures are presented like this in LOL reports, the readers (and writers) need to be clear that the calculation of “average payment per farmer” is not the actual amount paid to heifer recipients or even vulnerable households. Especially in Southern Province where there are many other smallholder farmers delivering milk to the MCCs, there are a great many other types of herds than the 1-cow improved model being promoted by Land O'Lakes that will all generate different types of income. LOL needs to have a much closer focus on the payments being made to vulnerable farmers.
- A useful exercise for LOL would be to prepare further indicative models of different dairy systems to show how these systems work as alternative livelihood models. Possibly, other types of dairy system are more beneficial from a food security perspective than the 1-cow high output model being promoted.

**The gross average income realized by the MCCs amounted to ZMK 66,233,361**

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<sup>17</sup> As of August 31, 2006, a total of 540 diary heifers had been given out.

- Gross income figures alone are most useful when looked at in a time series context to show growth from month to month, seasonal variations by quarter, and eventually as data are built up, by long-term year-on-year trends. One simple figure quoted like this says very little to nothing about what the progress being made towards the DAP's objectives at the MCC level (let alone at the level of individual MCCs where the real development challenges lie).
- It is far more important to look at the profitability and operating costs of each MCC. As described, some MCCs are doing very well; others are squeaking by or just getting established; and at least one is hemorrhaging money through the corruption of board members. These sorts of crosscutting issues are essential to consider from a management perspective and would be worth highlighting in future QRs and other results reports.

**The average volume of milk sold per MCC amounted to a total of 48,414 liters per quarter.**

- Like the gross average income figure, an average volume figure also says very little about the progress being made or development challenges faced at the individual MCC level.
- A gross volume figure also says nothing about milk deliveries by direct heifer recipients, non-recipient members, and non-members. Again, greater levels of disaggregation are needed to tell a more convincing story about the program's work at the marketing level and how it impacts different people (including people who are exposed to milder levels of food insecurity than beneficiaries who qualify to receive livestock)

**A total of 85 smallholder farmers started delivering milk to the MCCs for the first time during the Fiscal Year. This amounts to a total of 722 farmers who have so far at least delivered milk to the MCCs during the Fiscal Year.**

- Although not specified in the QR's highlight section, the number of 85 new farmers delivering milk to MCCs will mostly be farmers who received an in-calf heifer either from the DAP or OFDA program.
- The number of 722, farmers, however is the total number of smallholders delivering milk to participating MCCs and includes other farmers not directly participating in the Land O'Lakes program (apart from their involvement in the marketing system).
- Land O'Lakes would do well to calculate the total number of dairy producers that specifically benefit from the market linkages part of the program and compare this to the number of heifer recipients. It could be there are as many as 8 to 10 additional beneficiaries for every farmer that receives a dairy heifer and this figure would be worth highlighting.

**The volume of milk used by the 6 of the targeted processors amounted to 5.7 million liters during the quarter representing 19% capacity utilization. More milk was obviously processed by the other processors.**

- Again, the volume of milk used by the processing industry is of little immediate importance for a first time dairy farmer, who is only interested in market development issues at the local level.

- Volume and capacity utilization are important indicators of overall sector growth and competitiveness, but do not relate specifically to the work LOL is doing on quality control and smallholder linkages. Overall sector development is important for the future and competitiveness, but other challenges are more immediately relevant to vulnerable smallholders.

### **C. Recommendations**

181. As described, LOL is struggling with an M&E system that is both unwieldy in terms of the amount of data to collect, and unfocused in terms of zeroing in on the different benefits of dairy and contribution to reduced vulnerability to food insecurity. Considerable amounts of staff time and other program resources have been invested in tracking MIHFP, HDDI, and IDDI when these indicators in fact conceal many of the program's benefits. Likewise, the IR indicators being tracked by the IPTT are not sufficiently focused on the benefits of dairy that are already occurring, ways dairy helps farmers manage risk, and progress being made at the marketing level. Because Land O'Lakes and FFP are both new to the implementation of dairy development as a route to reduced food insecurity for vulnerable people, these difficulties are not unexpected, just something to be aware of and to try and improve upon.

182. Toward that end at least five very simple recommendations may be summarized as follows:

- Treat the calculation of MIHFP, HDDI, and IDDI as a long-term task and recognize the limitations of these indicators in describing the DAP's full food security outcome. The process for tracking these data should be simplified and made more routine, perhaps with simple monthly questionnaires small dairy farmers complete when being paid for their milk.
- Consider introducing other indicators at the goal level, and perhaps drop IDDI which is an awkward indicator for a dairy enterprise that usually requires the involvement of a complete household.
- Simplify and reevaluate the IR results indicators to focus more clearly on smallholder outcomes. Some of the current disaggregations are not helpful and other more important distinctions between heifer recipients, non-recipient group members, and non-members that could reveal significant differences in food security outcomes have been overlooked.
- Results reporting should focus more clearly on the financial viability of smallholder dairy production and frontline marketing centers. This requires a greater focus on the number of farmers producing at different management levels and profitability of rural MCCs. The financial models presented in the next section could be incorporated as part of such a system.
- Land O'Lakes must not let the need to report on discrete food security outcomes (per its Title II obligations) distract focus from the underlying costs and benefits of dairy production, which are far easier to measure in financial and economic terms than by food-based proxy measures of rural income. To do so could be at the peril of the project since important considerations that are immediately relevant to the development model Land O'Lakes is promoting can easily be overlooked.

183. In addition, Land O'Lakes might also do well to incorporate "with and without" project type comparisons as part of its M&E system. Such an approach is a fairly standard method

of evaluating economic growth and rural poverty programs and could certainly be adapted to help with food security monitoring.

184. An example of this type of comparison is given in the table below, which looks at incremental milk production likely to result from the DAP. The top part of the table calculates the total amount of milk produced by heifer recipients after mortality and assuming different numbers produce at the management levels shown. The bottom part of the table calculates the total amount of new milk produced for secondary beneficiaries participating in the AI program using completely hypothetical targets for the number of farmers (but fairly realistic yield expectations). As shown, the total incremental milk from heifer recipients based on the indicated assumptions works out to around 2.3 million liters per year. This milk could be given a proxy value for income and nutritional benefit (based on the shares sold and retained for home consumption) and applied across different farmers producing at each level to give a rough benefit of the benefit of milk.

185. To take this methodology a step further, the approach would be to develop a set of interlinked spreadsheet templates that calculate incremental costs and benefits from a variety of perspectives with major divisions by cash income from milk, imputed nutritional value of milk, imputed benefit of using manure as fertilizer, and value of future income from cull cow and calf sales. Incremental cash and imputed income, gross and net profits, and contribution of different income sources could then be worked out. Similar working models could be developed to monitor progress at the milk marketing level and stability of market linkages being established. The financial models presented in the next section could be incorporated as part of this type of system and help to illustrate the benefits of this approach to impact assessment on a long-term food security program.

**Table 26: Sample With and Without Project Comparison of Total Milk Production (in Liters) Using Simplified Data for Heifer Recipients and Indicative Assumptions for AI Beneficiaries**

	<u>Without Project</u>			<u>With Project</u>			<u>Increment</u>			<u>Farmers at Level</u>	<u>Total Incremental Milk</u>
	<u>Daily Yield</u>	<u>Lactation Period</u>	<u>Total Prod</u>	<u>Daily Yield</u>	<u>Lactation Period</u>	<u>Total Prod</u>	<u>Daily Yield</u>	<u>Lactation Period</u>	<u>Total Prod</u>		
<b>HEIFER RECIPIENTS</b>											
	<i>Households w/o cattle</i>			<i>1st Generation Cross</i>							
Typical feed	0	0	0	7	220	1,540	7	220	1,540	250	385,000
Improved feed	0	0	0	11	270	2,970	11	270	2,970	650	1,930,500
										<b>Subtotal from recipients</b>	<b>2,315,500</b>
<b>AI BENEFICIARIES</b>											
<u>Improve to 1st</u>	<i>Traditional</i>			<i>1st Generation Cross</i>							
Typical feed	2	180	360	5	190	950	3	10	590	1000	590,000
Improved feed	4	220	880	10	230	2,300	6	10	1,420	200	284,000
<u>Improve to 2nd</u>	<i>1st Generation Cross</i>			<i>2nd Generation Cross</i>							
Typical feed	5	190	950	7	220	1,540	2	30	590	300	177,000
Improved feed	10	230	2,300	11	270	2,970	1	40	670	100	67,000
<u>Improve to 3rd</u>	<i>2nd Generation Cross</i>			<i>3rd Generation Pure</i>							
Typical feed	7	220	1,540	10	230	2,300	3	10	760	300	228,000
Improved feed	11	270	2,970	18	290	5,220	7	20	2,250	100	225,000
										<b>Subtotal from AI</b>	<b>1,571,000</b>
										<b>TOTAL INCREMENTAL MILK</b>	<b>3,886,500</b>
										Recipient's milk as % of total	60%



## **PART FOUR – FINANCIAL ANALYSIS**

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1. Having completed the main review of each component, contribution of subcontractors and sub-recipients, and effectiveness of the monitoring and evaluation system, this part of the MTR presents the methodology and results of a financial analysis of smallholder dairy that was undertaken as part of the mid-term assessment. Although this approach is unusual for the review of a Title II program, it has been discussed that standard consumption, and nutrition based measures of food security do not seem to capture the full benefits of a dairy development project like this, at least not in the short run. It would therefore be an important mistake for program managers not to consider the underlying viability of the development model LOL is promoting as the first important step to achieving reduced food insecurity.

2. Full results of the financial analysis, information on all assumptions, and detailed spreadsheets used to derive the indicators discussed here are presented in Annex 1. The presentation here is mainly intended to stimulate discussion of alternative ways to measure the impact of a dairy program that could be used to complement more traditional consumption-based approaches that are used to evaluate Title II assistance. Because of other competing demands and time constraints, the discussion and type of models presented here are by no means exhaustive. Many other dairy systems could be modeled and different indicators calculated using this approach to impact assessment. Again, the main intention is to stimulate discussion of alternative methods to program evaluation that could be used to improve the existing M&E system and provide program managers more of the information they need to understand progress, constraints, and impact at the field level.

### **I. METHODOLOGY**

3. The methodology applied for the financial analysis was to look at three different levels of dairy production for farmers managing a one cow system. A further analysis of farmers with two dairy cows was also carried out. By looking at a range of indicative possibilities like this, the analysis helps to understand the benefits and costs that actually accrue to farmers participating in the Land O'Lakes program. This is essential for understanding the true impact of a livelihoods-based food access program; although FFP assistance is usually evaluated only in discrete food security terms, short-term measurements of MIHFP, HDDI, and IDDI do not adequately show what this type of program is achieving.

4. The analysis, therefore, is especially important for testing the validity of the Land O'Lakes income approach to food security improvement. If the system is not profitable, then some other model for rural income growth is needed. Or, if smallholder dairy is profitable (and LOL/Z is targeting the right beneficiaries), then the program can be said to have a direct food security impact. The new FFP strategy specifically recognizes income growth and economic diversification as important thrusts of the strategic program and the indicative models are highly relevant to tracking the program's impact and expected results. The analysis also helps to identify areas where farm-level and other types of process improvements could be made to maximize the potential benefits from dairy farming.

5. By looking at three different levels of smallholder production, the dairy budgets are purposefully not meant to be overly precise or statistically accurate. Rather, the approach is to look at a range of indicative possibilities that broadly reflect the most common types of smallholder management. Specifically, the three levels were defined as follows:

- At the **basic level** farmers mostly do not pay adequate attention to pasture management and only follow the simplest veterinary regime. This is not

unusual in the project area and generally reflects the type of management decisions very poor and vulnerable farmers might make if they are struggling for cash or have not received adequate support and follow-up.

- At the **recommended level** farmers mostly follow the full set of Land O'Lakes instructions and observe good management practices including adequate pasture development and good attention to veterinary requirements.
- Finally, at the **advanced level** farmers go beyond the LOL recommendations and start to follow truly improved commercial practices using technologies that are mostly available in the program area.

6. Consistent with the indicative approach the enterprise models are meant to reflect the type costs and returns to smallholder dairy farmers can expect to the best extent possible.<sup>18</sup> It must also be recognized, however, that the actual situation for individual producers can still vary greatly depending on individual circumstances, actual prices paid by MCCs, and seasonal weather patterns. Dairy yields are especially prone to large fluctuations throughout the year depending on rainfall and the availability of fresh fodder. Milk yields, for example, peak in the rainy season and are sometimes more than four liters higher per day than when it is dry.<sup>19</sup> Accordingly, the budgets do not show what an individual's monthly or daily income is per se, but have been evened out for an entire year based on longer total lactation periods and higher average daily yields at each management level.

7. **Areas for further analysis.** In interpreting the data it is also important to keep in mind than many other factors than modeled here affect the costs and profitability of smallholder dairy. The efficiency with which each MCC is managed for example has an especially important bearing on farmer payments and final profitability. It would be helpful for LOL to model some additional variations based on different marketing conditions to gain an even deeper understanding of the returns to investment and where project interventions at the MCC level could better be focused.

8. Unfortunately, time limitations and other competing demands prevented this level of more detailed analysis as part of the MTR. At least by illustrating the financial modeling approach it is hoped Land O'Lakes and others with a real interest in the program's impact might make use of the methods introduced here. An especially good area for further budget analysis, for example, would be to look at the expected costs and returns to dairy in a drought year when vulnerable participants are most likely to require food assistance. This would be one of the most direct ways of demonstrating the program's true potential as a sustainable model for reduced food insecurity. By estimating the number of farmers that are producing at each level, LOL also start to measure the program's true income effects (using an incremental, with and without project type comparison), which are the essential building blocks for reduced food insecurity in this type of access-based program.

## **II. SOURCES OF INCOME**

9. The first part of the financial analysis is to look at the various kinds of cash and imputed income that accrue from dairy. In addition to cash sales of milk, farmers also derive benefit from milk's nutritional value and have a potential to use manure in place of fertilizer on vegetable plots and even in the fields for staple food production. As the system matures,

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<sup>18</sup> Enterprise budgets are specifically based on discussions with LOL/Z program staff, veterinary experts, program beneficiaries, MCCs, and other known facts of the Zambian dairy situation.

<sup>19</sup> As noted elsewhere, this is especially important from a food security perspective since the rainy season is when household stocks of maize and other staple foods are at their lowest.

and current pass-on obligations are settled, farmers can also expect to earn revenue from cull-cow and calf sales.

### A. Milk Production and Sales

10. Total milk production is determined for each management level as shown in the table below. As farmers move further along the management continuum from basic to recommended, and eventually advanced management, both the number of liters per day and lactation period increase as a result of better animal health and nutrition. As shown, milk used for home consumption, milk fed to calves, and management losses must be subtracted from these gross yields to determine the total amount of milk available for cash sale.

**Table 27: Yield and Income Assumptions for Milk (1-cow dairy model)**

	BASIC		RECOMMENDED		ADVANCED	
<b>Gross yield (avg lt per animal per day during lactation):</b>	<b>7.00</b>		<b>11.00</b>		<b>14.00</b>	
Lactation period (days):	220		270		290	
Number of lactating cows:	1		1		1	
<b>Total milk production (liters per year):</b>	<b>1,540</b>		<b>2,970</b>		<b>4,060</b>	
Milk for home consumption (litres per day, total per year):	2.0	440	2.0	540	2.0	580
Milk fed to calf (avg litres per calf per day):	4.00		4.00		4.00	
Number of days calf drinks milk:	90		80		60	
Total consumption by calves (liters per year):	360		320		240	
Management losses (% total production, litres):	8%	123	6%	178	5%	203
<b>Milk available for sale (litres after losses, calf, home use):</b>	<b>617</b>		<b>1,932</b>		<b>3,037</b>	
Milk not sold or paid for (% of available milk, litres):	0%	-	0%	-	0%	-
<b>Total milk sold for cash (litres per year):</b>	<b>617</b>		<b>1,932</b>		<b>3,037</b>	
<b>Average cash price (ZMK per litre fresh milk):</b>	<b>1,050</b>		<b>1,000</b>		<b>1,100</b>	
Imputed price for home consumption (ZMK per litre):	2,000		2,000		2,000	

11. In interpreting these data, it is useful to note that farmers at the basic level use (and lose) an approximate 60% of the total milk produced on farm; only 40% of total milk ever reaches a milk collection center. At the recommended level, approximately 65% of total milk reaches a MCC and at the advanced level 75% of total milk reaches the formal market. As shown, this is not because of any so-called “increasing commercial orientation” of an advanced farmer, but merely the result of total production and competing on-farm demands for raw milk. Some benefit can be gained by reducing management losses, equivalent to a maximum of about 120 liters per year in a 1-cow system and the data suggest that LOL may do well to increase its training in this area.

12. With respect to the DAP’s food security mandate, however, what these figures primarily show is that the program has quite a lot to gain by emphasizing the home uses of milk rather than just focus on cash sales at the MCC. Land O'Lakes is already promoting the nutritional benefit of milk consumption at the farm level through various nutrition committees it has established and in farmer training sessions, but this value is not being captured in the program’s M&E system. The IPTT tables, for example, only track gross volume and value figures and it would be useful from a food security perspective to track this important revenue stream more closely as a separate line of household income.

## B. Total Cash and Imputed Revenue

13. The next step in the analysis is to calculate the total gross revenue that accrues from dairy including milk sold for cash, milk retained for home consumption, manure used as fertilizer, and long-term annualized income from cull cow and calf sales. For cash sales of milk, these calculations are based on the yield figures and average cash price shown above. For milk consumed at home, the calculations are based on the opportunity cost of buying milk in the local market. From the food security perspective, however, a case could be made for home consumed milk an even higher imputed value because of the nutritional benefit of this commodity.

14. With respect to manure, the value of this product was determined by multiplying the total manure production by its equivalent value if used as fertilizer. In this case CFU reports that one ton of manure has roughly the same nutrients as a 25kg bag of compound fertilizer, which currently sells for around ZMK 100,000 (USD 28.57) and is the price used for budget construction. From a strict food security perspective, however, a case could again be made for giving this manure an even higher value because of the benefit to food production and savings of cash from not having to buy fertilizer commercially. A one cow dairy system will produce a little more than 8 tons of manure per year. Traditional cows, of course, also produce manure, but this cannot usually be collected for fertilizer because these animals are allowed to graze freely, whereas a dairy cow must usually be kept in a kraal.

15. Long-term revenue from cull-cow and calf sales does not accrue until the system matures and a farmer's pass-on obligations have been fulfilled. Because these revenues only occur occasionally and depend on whether the farmer is selling a male or female calf, the approach taken was to derive the annual equivalent payment from all types of livestock sales to determine the present value.<sup>20</sup>

16. **Revenue without livestock sales.** First, the total gross revenue calculations for an immature dairy system without revenue cull cow and calf sales are shown below. This is typical of a farmer who has not yet fulfilled their pass-on obligation or otherwise have not reached the stage of having any livestock to sell.

**Table 28: Annual Revenues from Immature 1-Cow Dairy Unit  
(before pass-on, excluding stock sales)**

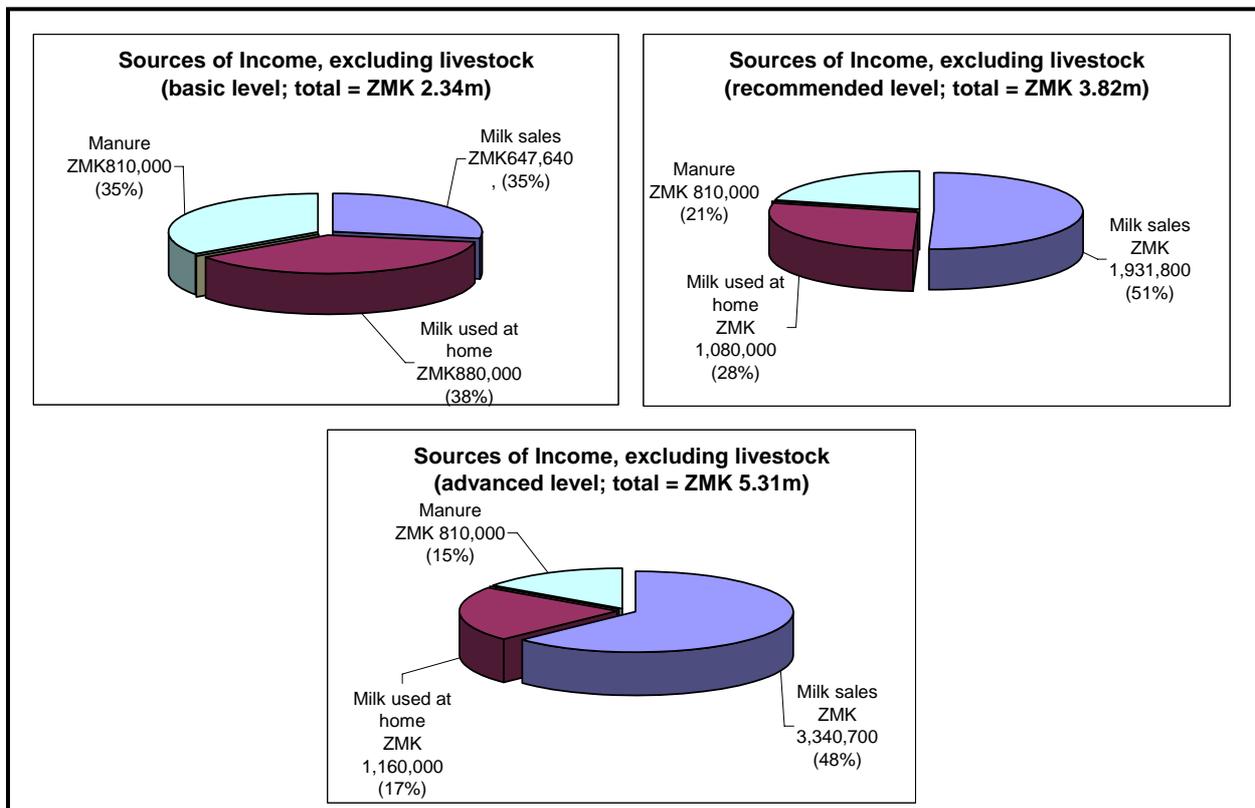
	BASIC		RECOMMENDED		ADVANCED	
	USD	ZMK '000	USD	ZMK '000	USD	ZMK '000
<b>Milk sales (total cash sales * cash price)</b>	<b>185</b>	<b>648</b>	<b>552</b>	<b>1,932</b>	<b>954</b>	<b>3,341</b>
Calf and cull-cow sales (occasional annual equivalent)	-	-	-	-	-	-
<b>Total equivalent cash revenue (all sources)</b>	<b>185</b>	<b>648</b>	<b>552</b>	<b>1,932</b>	<b>954</b>	<b>3,341</b>
Imputed value of milk for home consumption	251	880	309	1,080	331	1,160
Imputed value of manure	231	810	231	810	231	810
<b>Total cash and imputed revenue</b>	<b>668</b>	<b>2,338</b>	<b>1,092</b>	<b>3,822</b>	<b>1,517</b>	<b>5,311</b>
Total milk revenue (cash and imputed value)	436	1,528	861	3,012	1,286	4,501

<sup>20</sup> Annual equivalent value of occasional revenue = expected revenue in current prices \* annual equivalent revenue factor (AERF).  $AERF = i / ((1+i)^n - 1)$  where  $i$  = real interest on savings;  $n$  = number of years between receipt of revenue.

17. The sources of dairy revenue for farmers producing at the recommended level are presented graphically in the first set of pie charts that follow. As shown, cash income from milk accounts less than half of total revenue at the basic level, but becomes much more important as farmers progress from basic, to recommended, and eventually advanced management. Total revenue, of course, also increases (i.e. the pies become bigger) as farmers move from one management level to the next.

18. From the food security perspective, these data suggest that training and other extension messages focused on the home uses of milk and benefit of using manure as fertilizer, may be more relevant to very poor and vulnerable farmers than any immediate or exclusive emphasis on market participation. The cash income from milk is still important even at the basic level (since farmers need this money to pay for essential dairy inputs), but the importance of these other revenue streams also must not be overlooked. Training in the use of manure as fertilizer could be especially beneficial and is something LOL would do well to address more intensively in future training work.

**Figure 2: Sources of Revenue from Dairy for Immature Production Unit without Cull Cow or Calf Sales**



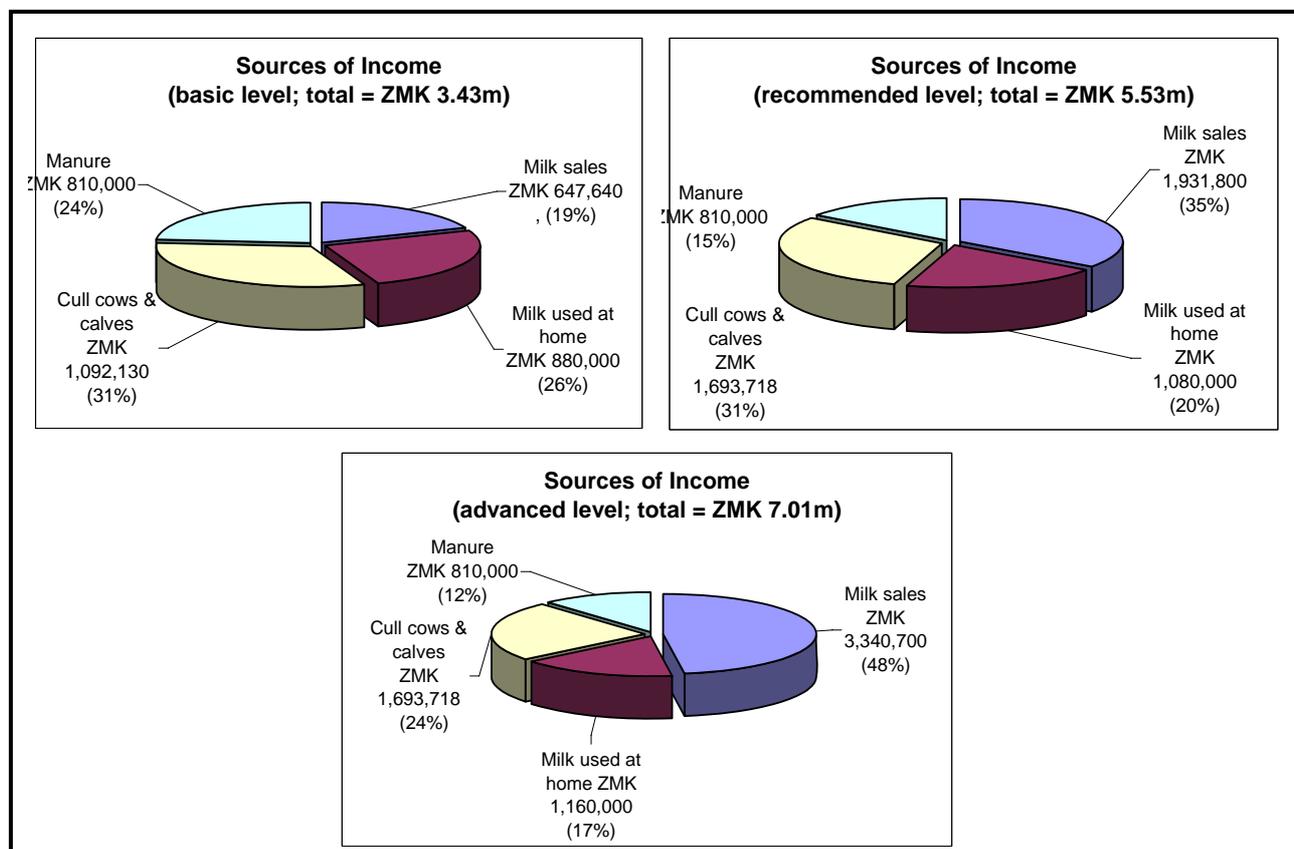
19. **Revenue with livestock sales.** The next table calculates farmer gross revenue with the addition of cull-cow and calf sales. As noted, the approach taken for determining this value was to derive the annual equivalent payment from all types of livestock sales to determine the present value (see Annex 1 for details).

**Table 29: Annual Revenues from Mature 1-Cow Dairy Unit  
(after pass-on, including stock sales)**

	BASIC		RECOMMENDED		ADVANCED	
	USD	ZMK '000	USD	ZMK '000	USD	ZMK '000
<b>Milk sales (total cash sales * cash price)</b>	<b>185</b>	<b>648</b>	<b>552</b>	<b>1,932</b>	<b>954</b>	<b>3,341</b>
Calf and cull-cow sales (occasional annual equivalent)	312	1,092	484	1,694	484	1,694
<b>Total equivalent cash revenue (all sources)</b>	<b>497</b>	<b>1,740</b>	<b>1,036</b>	<b>3,626</b>	<b>1,438</b>	<b>5,034</b>
Imputed value of milk for home consumption	251	880	309	1,080	331	1,160
Imputed value of manure	231	810	231	810	231	810
<b>Total cash and imputed revenue</b>	<b>749</b>	<b>3,430</b>	<b>1,344</b>	<b>5,516</b>	<b>1,770</b>	<b>7,004</b>
Total milk revenue (cash and imputed value)	436	1,528	861	3,012	1,286	4,501

20. The pie charts again summarize these revenue calculations in graphic form and show that cash income from milk is only a small share of the total income stream for a mature dairy unit. Even at the advanced level, cash income from milk only accounts for about 48% of total revenue. The income from cull-cow and calf sales is particularly important. This is one reason why the MTR has recommended that LOL should find an alternative to the pass-on modality so that farmers can start to produce at these levels as quickly as possible. As shown, total income increases by some 25% to 30% when farmers are free of their pass-on obligation and are able to earn income from selling surplus dairy animals. Attention should be given to developing the livestock market as one of the prerequisites for truly sustainable and profitable dairy production

**Figure 3: Sources of Revenue from Dairy for Mature Production Unit with  
Cull Cow and Calf Sales**



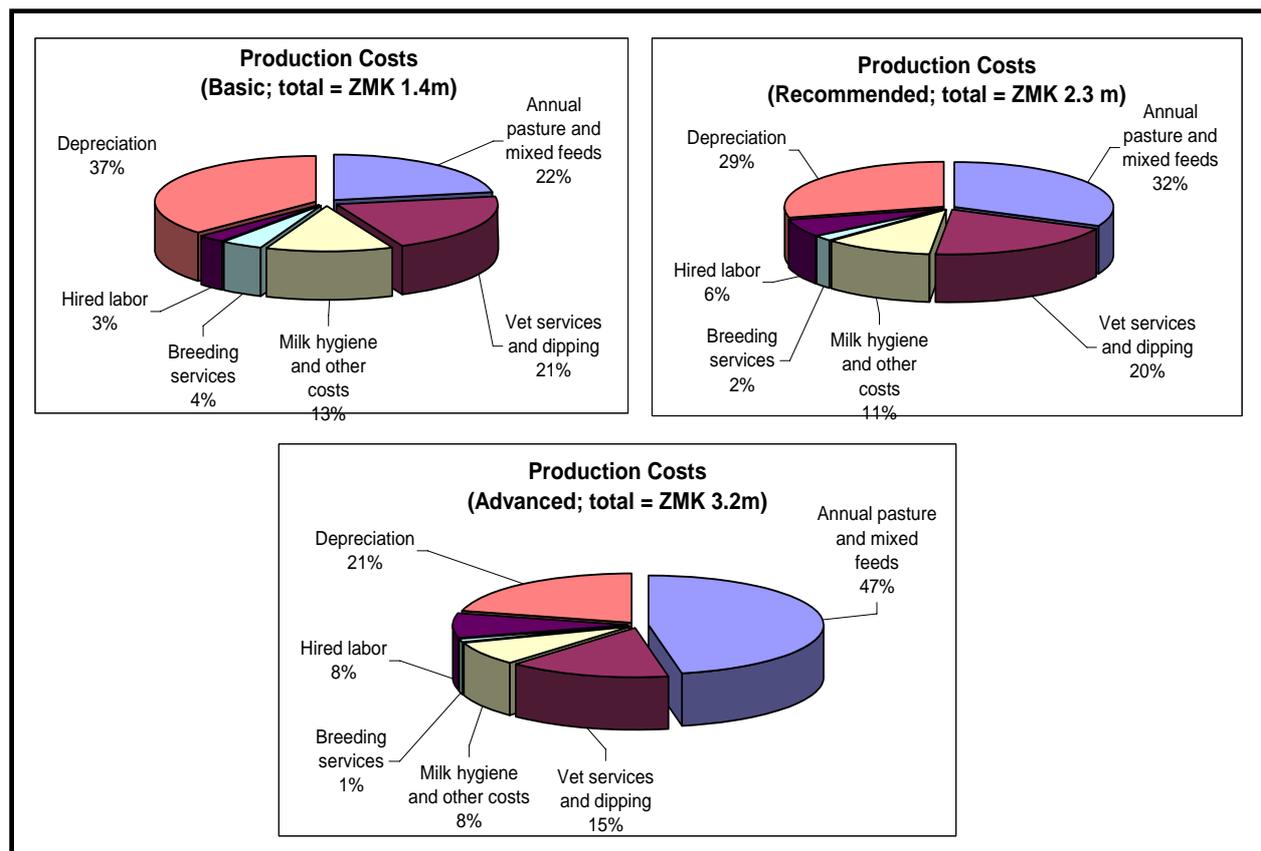
### III. PRODUCTION COSTS

21. The next part of the financial analysis was to summarize annual production costs for a 1-cow dairy unit at each management level. Details of this analysis are presented below and summarized graphically in the following pie charts.

**Table 30: Annual Production Costs for 1-Cow Dairy**

	BASIC		RECOMMENDED		ADVANCED	
	USD	ZMK '000	USD	ZMK '000	USD	ZMK '000
Annual pasture and mixed feeds	87.86	308	207.61	727	423.87	1,484
Vet services, annual vaccinations and dipping	82.83	290	128.33	449	134.15	470
Milk hygiene and miscellaneous costs	50.00	175	71.43	250	71.43	250
Breeding services	17.14	60	12.86	45	10.00	35
Hired labor	10.71	38	42.14	148	72.14	253
<b>Total Variable Costs</b>	<b>248.54</b>	<b>870</b>	<b>462.37</b>	<b>1,618</b>	<b>711.59</b>	<b>2,491</b>
Depreciation (livestock, buildings, equip, pasture)	145.16	508	187.01	655	190.90	668
<b>Total Production Costs</b>	<b>393.70</b>	<b>1,378</b>	<b>649.38</b>	<b>2,273</b>	<b>902.49</b>	<b>3,159</b>

**Table 4: Break-down of Production Costs for 1-cow Dairy**



22. **Variable costs.** Annual production costs including annual pasture and mixed feeds, veterinary supplies, milk hygiene, breeding services, and hired labor account for about 60% to 80% of total production costs as shown. Although the analysis for the MTR did not look specifically at the share of cash and non-cash costs, the data do still show that dairy can be

an expensive undertaking with total costs of around ZMK 116,000 (USD 33.33) per month at the basic level, ZMK 192,000 (USD 54.76) per month at the recommended level, and ZMK 266,500 (USD 76.14) per month at the advanced level.

23. Although dairy provides regular monthly payments during lactation, these high costs can also be difficult for poor farmers to afford. As shown, production at the recommended level is more than 60% more expensive compared with basic management and vulnerable farmers may naturally struggle to produce at this level. Stock feed and veterinary costs account for the majority of farmer costs at each management level and measures that help to reduce these costs in particular would likely go a long way to improving the benefits of smallholder dairy, especially for vulnerable individuals.

24. **Depreciation.** The annual depreciation cost of long-term investment items including calf pens, fencing, preventative vaccinations, establishment of perennial forage crops, animal handling equipment, milk cans, and livestock purchases with a useful life spread over more than one year have been estimated for each production system. Briefly, the approach taken was to determine the so-called *capital recovery cost* of all fixed investments required by each dairy system. Specifically, this cost is the annual payment that will repay the cost of a fixed input over its useful life and provide an economic rate of return on the investment. This approach has the advantage over the simple division of an input's value by its useful life as it accounts for the fact that if the farmer did not purchase the input, the money could have been invested in some other on- or off-farm enterprise.<sup>21</sup>

#### **IV. FARMER PROFITABILITY**

25. The next part of the financial analysis is to calculate cash and total profits from the revenue and cost data presented above. Because dairy production generates cash and non-cash revenue and requires recurrent and long-term investment spending, farmer profits are calculated in gross and net terms based on cash and total imputed revenue as shown in the tables below.

26. **Cash and imputed profits.** The first set of profit calculations look at farmer profits for an immature dairy unit before revenue from stock sales enters the picture. As shown, farmers at the basic and recommended level actually lose money in net terms when profits are measured only by the income from milk. This finding underscores the importance of covering other aspects of dairy production than market-oriented sales and also shows why progress cannot be measured by IR indicators that look milk production and sales alone. Other types of revenue also need to be tracked to show the overall viability of dairy production as a model for reduced food insecurity.

27. The data also show that dairy provides relatively little cash profit after all costs are covered. At the recommended level, 1-cow dairy production provides only about ZMK 314,000 (USD 90) gross cash profit, or around ZMK 341,000 (USD 97) loss in net terms after the depreciation of essential fixed assets is taken into account. Once all the other sources of revenue are taken into account however, including the imputed value of milk retained for home consumption and potential value of manure if used for fertilizer, the system annual profit of ZMK 2.2 million (USD 630) in gross terms or ZMK 1.6 million (USD 443) in net terms after depreciation.

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<sup>21</sup> Annual cost = purchase price of implement \* capital recovery factor.  $CRF = ((1+i)^n)^i / (1+i)^{n-1}$  where  $i$  = real interest on savings and  $n$  = number of years in the implement's useful life. For a full description of this methodology see Monke and Pearson (1989). For this study, it is assumed that the real annual interest on savings is equal to 3%.

**Table 31: Gross and Net Profits for Immature 1-cow Dairy  
(before pass-on, excluding stock sales)**

	BASIC		RECOMMENDED		ADVANCED	
	USD	ZMK '000	USD	ZMK '000	USD	ZMK '000
<b>Profit from milk</b>						
Gross cash profit (milk sales - variable costs)	(64)	(222)	90	314	243	850
Net cash profit (milk sales - total costs)	(209)	(730)	(97)	(341)	52	182
Total net profit from milk (total milk revenue - total costs)	43	150	211	739	383	1,342
<b>Cash profit (annual &amp; occasional cash revenue)</b>						
Gross cash profit (all cash sales - variable costs)	(64)	(222)	90	314	243	850
Net cash profit (all cash sales - total costs)	(209)	(730)	(97)	(341)	52	182
<b>Total profit (all cash and imputed sources)</b>						
Total gross profit (all revenue - variable costs)	419	1,468	630	2,204	806	2,820
Net total profit (all revenue - total costs)	274	960	443	1,549	615	2,152

28. This finding is actually quite significant and has important implications for the promotion of dairy as a model for food security improvement. In the first place, there is clearly an imperative to emphasize other revenue sources than cash sales from milk. Smallholder dairy always profitable in gross and net terms, but is only viable in net terms when the imputed value from milk consumed at home and benefit of applying manure as fertilizer are taken into account.

29. The data also show that vulnerable farmers are likely to earn much less profit than they really think after all costs are settled. During field work for the MTR, one of the main advantages of participating farmers identified is that they get paid once a month so it is easy to save enough money for a large purchase. As shown, however, by the time all cash costs of dairy production are settled, farmers have very little cash income left over and actually make a loss in net cash terms except with advanced management. From this perspective, it is easy to understand why the survey data show that the majority of households are spending their incremental income from dairy on medicine for animals. Only when the current pass-on obligation is settled and the farmer is able to earn revenue from cull-cow and calf sales does the 1-cow system become truly viable in net terms.

30. The next table looks at the gross and net profits from a 1-cow dairy unit after the pass-on obligation has been fulfilled and the farmer is able to earn revenue from stock sales. Without the pass-on, this will occur in about 1 to 3 years after receiving an in-calf heifer depending on whether the farmer expands from a 1-cow to a 2-cow unit. With the pass-on obligation, farmers will have to wait at least twice as long before reaching this stage. Because the goal is for dairy production to provide a solid platform that keeps vulnerable individuals from requiring food assistance in the future, one key objective for the DAP should be to help farmers produce at this more profitable level (i.e. by earning revenue from stock sales) as quickly as possible. The current pass-on modality delays this outcome.

**Table 32: Gross and Net Profits for Mature 1-cow Dairy  
(after pass-on, including stock sales)**

	BASIC		RECOMMENDED		ADVANCED	
	USD	ZMK '000	USD	ZMK '000	USD	ZMK '000
<b>Profit from milk</b>						
Gross cash profit (milk sales - variable costs)	(64)	(222)	90	314	243	850
Net cash profit (milk sales - total costs)	(209)	(730)	(97)	(341)	52	182
Total net profit from milk (total milk revenue - total costs)	43	150	211	739	383	1,342
<b>Cash profit (annual &amp; occasional cash revenue)</b>						
Gross cash profit (all cash sales - variable costs)	249	870	573	2,007	727	2,544
Net cash profit (all cash sales - total costs)	103	362	386	1,353	536	1,876
<b>Total profit (all cash and imputed sources)</b>						
Total gross profit (all revenue - variable costs)	731	2,560	1,113	3,897	1,290	4,514
Net total profit (all revenue - total costs)	586	2,052	926	3,243	1,099	3,846

31. Compared with the immature unit, the table above shows that 1-cow dairy production is much more profitable without the pass-on obligation. Whereas dairy generates a modest gross profit and modest net loss in cash terms without stock sales, the enterprise becomes much more profitable when occasional annual revenue is taken into account. Dairy still generates a net loss at the basic and recommended levels if profits are measured by the income from milk alone, but is much more profitable, both cash and total terms once livestock sales are added and all other revenue streams are taken into account.

32. **Returns to Labor.** Another dimension to the profitability analysis is to look at returns to labor. These calculations are carried out in the next table based on the estimated number of days family and hired labor used at each level. As shown, even with advanced management, 1-cow dairy only generates about one half-time job per year equivalent to 173 days of wage employment. The exact distribution of hired and family labor between farmers, of course, can vary quite considerably with important implications for total profitability. Family labor was not given a value in the enterprise budgets, which means that total gross and net profit data above can also be interpreted as annual returns to labor.

33. On a daily basis, however, the data again show there is a large difference between a mature and immature unit. Before the pass on, farmers at the basic and recommended levels actually make a daily loss in net cash terms, although the system is still profitable in imputed terms. Once the pass-on obligation has been fulfilled for a mature unit, the daily returns improve significantly.

**Table 33: Daily Returns to Family and Hired Labor for Mature and Immature 1-cow Dairy Unit**

	BASIC		RECOMMENDED		ADVANCED	
	USD	ZMK	USD	ZMK	USD	ZMK
Hired labor (days)		27		100		173
Family labor (days)		252		284		339
<b>Total labor (days)</b>		<b>279</b>		<b>384</b>		<b>512</b>
<b>Mature Unit (including stock sales)</b>						
Net cash profit (all sources) per day family labor	1.73	6,056	3.51	12,279	3.95	13,811
Net cash profit (all sources) per day total labor	1.56	5,477	2.59	9,077	2.61	9,140
Net imputed profit (all sources) per day family labor	4.81	16,838	6.50	22,755	6.54	22,881
Net imputed profit (all sources) per day total labor	4.35	15,229	4.81	16,821	4.33	15,142
<b>Immature Unit (before stock sales)</b>						
Net cash profit (all sources) per day family labor	(1.17)	(4,084)	(0.49)	(1,721)	0.21	720
Net cash profit (all sources) per day total labor	(0.89)	(3,123)	(0.21)	(721)	0.07	259
Net imputed profit (all sources) per day family labor	1.53	5,367	2.23	7,814	2.43	8,510
Net imputed profit (all sources) per day total labor	1.17	4,105	0.94	3,273	0.88	3,066

34. To help interpret these data, it is useful to note that Zambia's per capita gross national income (GNI) for 2005 was estimated to be USD 490.<sup>22</sup> This equates to USD 1.34 per day over a complete 365 day year, which is considerably less than most of the daily income figures shown above. In other words, dairy can provide an income well above average GNI per capita and so makes a clear contribution to poverty reduction, not only in for vulnerable individuals (who are at the bottom of the income scale), but even for the country as a whole compared with overall GNI per capita.

## **V. TWO-COW DAIRY**

35. The final part of the financial analysis was to consider a few other variations for farmers producing at the two-cow level. Full results for the 2-cow dairy model are given in Annex 1.

36. For the main report, what is presently important to note is that dairy does more than become twice as expensive and twice as profitable at this level. Instead, farmers start to realize better economies of scale (and lower overall annual depreciation costs), more even milk production (because when one animal is dried off, the other can still be milking), and better rates of return to spending on variable and fixed inputs. It is therefore quite important to help farmers advance to the two-cow level as quickly as possible. Dairy becomes much more appealing as a farm business and livelihood system at this level of production and program activities in the second half should focus on helping farmers to reach this goal. The first most important step to achieve this is to revise the current pass-on requirement.

<sup>22</sup> World Bank, 2006.

**Table 34: Financial Analysis of 2-cow Dairy**

	BASIC		RECOMMENDED		ADVANCED	
	USD	ZMK '000	USD	ZMK '000	USD	ZMK '000
<b>1. Gross Revenue</b>						
Milk sales (total cash sales * cash price)	469.08	1,642	1,219.60	4,269	2,045.69	7,160
Calf and heifer sales (annual equivalent occasional revenue)	624.07	2,184	967.84	3,387	967.84	3,387
<b>Total cash revenue (all sources)</b>	<b>1,093.15</b>	<b>3,826</b>	<b>2,187.44</b>	<b>7,656</b>	<b>3,013.52</b>	<b>10,547</b>
Imputed value of milk for home consumption (lt saved * imputed price)	314.29	1,100	385.71	1,350	414.29	1,450
Imputed value of manure used for fertilizer	462.86	1,620	462.86	1,620	462.86	1,620
<b>Total gross revenue (cash and imputed income all sources)</b>	<b>1,407.44</b>	<b>6,546</b>	<b>2,573.15</b>	<b>10,626</b>	<b>3,427.81</b>	<b>13,617</b>
Total milk revenue (cash and imputed income)	783.37	2,742	1,605.31	5,619	2,459.97	8,610
<b>2. Production Costs</b>						
<b>Total variable costs</b>	<b>419.94</b>	<b>1,470</b>	<b>871.88</b>	<b>3,052</b>	<b>1,349.04</b>	<b>4,722</b>
<b>Total production costs (variable costs + depreciation)</b>	<b>656.72</b>	<b>2,299</b>	<b>1,192.86</b>	<b>4,175</b>	<b>1,677.79</b>	<b>5,872</b>
Variable cost per liter of milk	0.136	0.48	0.147	0.51	0.166	0.58
Total cost per liter of milk including depreciation	0.213	0.75	0.201	0.70	0.207	0.72
<b>3. Profit from Milk</b>						
<b>Gross cash profit from milk (milk sales - variable costs)</b>	<b>49.14</b>	<b>172</b>	<b>347.72</b>	<b>1,217</b>	<b>696.65</b>	<b>2,438</b>
Net cash profit from milk (milk sales - total production costs)	(187.64)	(657)	26.74	94	367.89	1,288
<b>Total net profit from milk (total milk revenue - total costs)</b>	<b>126.64</b>	<b>443</b>	<b>412.45</b>	<b>1,444</b>	<b>782.18</b>	<b>2,738</b>
<b>4. Total Profit (income from all sources)</b>						
<b>Gross cash profit (total cash sales - variable costs)</b>	<b>673.21</b>	<b>2,356</b>	<b>1,315.56</b>	<b>4,604</b>	<b>1,664.49</b>	<b>5,826</b>
Net cash profit (gross cash profit - depreciation)	436.43	1,528	994.58	3,481	1,335.73	4,675
<b>Total gross profit (cash and imputed revenue - variable costs)</b>	<b>1,450.35</b>	<b>5,076</b>	<b>2,164.13</b>	<b>7,574</b>	<b>2,541.63</b>	<b>8,896</b>
<b>Total net profit (total gross profit - depreciation)</b>	<b>1,213.57</b>	<b>4,248</b>	<b>1,843.15</b>	<b>6,451</b>	<b>2,212.88</b>	<b>7,745</b>
<b>5. Rates of Return</b>						
Gross return to milk sales (gross cash profit from milk / variable costs)		0.12		0.12		0.12
Total return to milk (total net profit from milk / total costs)		0.19		0.19		0.19
Total imputed return (total net profit / total costs)		1.85		1.85		1.85
<b>6. Labor</b>						
Hired labor (days)		27		27		27
Family labor (days)		252		252		252
<b>Total labor requirement (days)</b>		<b>279</b>		<b>279</b>		<b>279</b>
Net cash profit (all sources) per day family labor	1.73	6.1	3.51	12.3	3.95	13.8
Net cash profit (all sources) per day total labor	1.56	5.5	2.59	9.1	2.61	9.1
Net imputed profit per day family labor	4.81	16.8	6.50	22.8	6.54	22.9
Net imputed profit per day total labor	4.35	15.2	4.81	16.8	4.33	15.1

37. **Concluding remarks.** Many other conclusions besides those noted above can be drawn from the detailed indicators produced by the financial analysis. Project administrators, FFP and other donor representatives, farmers, bulking group managers, and dairy processor are all likely to interpret the data differently with an increased emphasis on their particular area of concern. Once a basic set of enterprise models have been prepared, however, it is relatively easy to use computer software to test the effects of alternative price and management assumptions to look at the viability of each system from a rural livelihoods perspective. The approach adopted here cannot point to optimal development strategies or food security interventions alone, nor can these methods substitute for other more traditional, consumption-based measures of program impact. The financial data do, however, help to understand some of the important trade-offs farmers and other sector participants face following dairy development as a food security model. It is hoped that LOL and FFP will want to build on this approach to program analysis and develop further techniques for assessing the impact different dairy systems at the farm level, investments in rural collection centers, and development of improved processing operations.

## **PART FIVE – CONCLUSIONS AND RECOMMENDATIONS**

1. This MTR set out to look with fresh eyes at the development process being followed by the Land O'Lakes DAP and to help LOL and FFP program managers to understand better how project activities are (or are not) contributing to the main Title II food security strategic objective and associated results indicators. In so doing, the MTR has identified a number of important lessons from the experience so far and made several important recommendations that could help increase program's effectiveness in time remaining under the current agreement. The report has also looked at some of the general issues associated with dairy development as a model for food security improvement that may help LOL and FFP with the design and implementation of similar programs in the future.

2. This final section of the MTR, therefore, summarizes the main conclusions and recommendations on a crosscutting basis. First, the MTR looks at the overall progress and relevance of the value chain approach being supported by Land O'Lakes and then provides a more thematic summary of main findings and recommendations related to food security impact and monitoring, the efficacy of farmer-level field services, and importance of long-term market development work.

### **I. OVERALL PROGRESS AND RELEVANCE**

3. Overall, the report finds that dairy development can make an important contribution to solving Zambia's food security problem for farmers vulnerable yet viable, and who are vulnerable to periods of food insecurity during times of drought or other economic crisis. Intensive dairy production based on exotic animals, however, is unlikely to be an effective tool for reaching *extremely* poor and vulnerable people because of the extra cost and time requirements associated with this activity.

4. The main benefit of successful dairy production is that the enterprise generates cash and non-cash revenue from multiple sources, thereby leading to a more diversified rural income base that contributes to improved food access and reduced probability that participating farmers will require emergency food assistance during the next drought or other economic shock. Dairy production can also help farmers cope better with seasonal food shortages because milk yields normally peak during the rainy season when other crops are still growing and household food stocks are at their lowest. As a part of Zambia's growth from a subsistence-oriented rural economy to market-based agriculture production, the development of new dairy systems and market outlets is also important.

5. The MTR also finds that LOL/Z is implementing a well-run program that delivers a wide range of services that are important to long-term dairy development. Farmer selection and training appears very effective in identifying vulnerable (yet capable) beneficiaries, and participating farmers are mostly doing very well by selling their milk to a nearby MCC. The challenge of providing an adequate diet and veterinary care for the improved livestock, however, causes many farmers to produce well below their potential and is an important threat the program will need to deal with over the next two and half years. Similarly, little evidence was found of farmers actually using manure as fertilizer, which is another important revenue stream from dairy (particularly from the food security perspective) and this is something the DAP will likely need to emphasize much more as the program continues. Far reaching management problems at several of the MCCs and the need for an expanded artificial insemination or other breeding program are also important challenges the DAP will need to address.

6. Taken together, therefore, these practical considerations show that one of the main management difficulties LOL has had to cope with is to maintain a sharp focus on delivering the services that are directly relevant to the Title II target group rather than simply promoting the cause of dairy development and market expansion more generally. Broad sector growth is certainly important for successful smallholder participation over the long-run and this has led Land O'Lakes to focus on certain value chain activities that do not directly involve food insecure beneficiaries. Some of these activities, like the work with processors that lead to new market linkages with vulnerable farmers, do in fact contribute directly to the Title II mandate. General product promotions, however, are probably not needed in the short to medium term and are mainly relevant to the long-term challenge of improving Zambia's trade competitiveness in dairy rather than help new farmers find a place in the existing market

7. **Value chain development.** As described throughout this report, LOL/Z is taking a unique value chain approach to implementation of the FFP mandate. Like all Title II programs, the main objective of the DAP is to reduce food insecurity among vulnerable populations. Unlike all emergency programs and most ongoing multi-year development programs worldwide, however, LOL/Z is not carrying out any sort of food distribution or other relief activity currently associated with Title II assistance. Instead 100% of the food aid provided by FFP is being monetized to support smallholder dairy production and expansion of a warehouse receipt-based marketing program. These value chain activities are meant to lead to increases in farmer income through dairy production and other changes in crop marketing that, in turn, guarantee better access to food and greater resiliency to shock.

8. Project activities are first and foremost designed to promote dairy production and consumption by vulnerable households in food insecure regions, but also focus on other aspects of the domestic supply chain that add value to local production and help create new opportunities for direct beneficiaries and other smallholder dairy farmers to participate in the commercial economy. By focusing on primary production and consumption together with the business aspects of dairy production, LOL/Z not only expects the program to have a direct impact on the nutritional status of households that receive an in-calf heifer, but also to open the way for dairy farming to be a sustainable route to increased rural incomes and reduced food insecurity for other community members as well.

9. Although value chain development has gained considerable popularity in recent years as a normally successful and sustainable way of linking smallholder farmers to the commercial market, this approach is unusual for a Title II program. In the first place, not all value chain activities directly involve the primary target group. Downstream processors, marketing agents, and industry representatives, for example, are also key participants in the value chain and may require various types of support to develop or expand their relations with smallholder farmers. Improvements at this level, however, can be difficult to link directly to discrete changes in food consumption among the primary target group and so have presented a challenge for LOL in reporting on its progress to FFP.

10. In the second place, value chain participation will almost by definition have only an indirect impact on an individual's food security status. Although whatever agriculture product is being produced can normally be used for home consumption (as is most definitely the case with milk), value chain development is primarily concerned with participation in the cash economy and therefore focuses on questions of cash income, farmer profitability, international competitiveness, systems organization, product differentiation, and adherence to quality standards. These considerations do not preclude the successful application of a value chain approach in a non-emergency Title II program, but do demand special management (and reporting) consideration to ensure that program resources are always focused on the primary objective of creating new market opportunities for food insecure

individuals rather than the more general cause of enhanced sector performance or market expansion.

11. By following a value chain approach, the DAP is in fact focused on long-term strategic aspects of food security. As discussed, this has important implications for the design of the program's M&E system and requires special consideration on the part of FFP and other USAID stakeholders on what is realistic to achieve and how to interpret long-term consumption-based indicators such as MIHFP, HDDI, and IDDI. To this point, LOL has struggled to demonstrate impact using these very discrete food security measures, but this has far more to do with the type of long-term changes that are occurring and multidimensional challenges of dairy development in Zambia than with any weakness of the LOL model. Even at the end of the DAP, several of the program's food security benefits will not be adequately captured by these indicators.

12. Better systems are also needed for monitoring progress at the intermediate result level. Several of the IR indicators selected by Land O'Lakes for tracking the DAP's progress are more concerned with general dairy development and sector expansion than with monitoring the specific costs and benefits of dairy production at the household level and how well participating farmers are managing the new enterprise. Much more attention, therefore, needs to be given to understanding the underlying costs and profitability of a one-cow dairy system and to helping vulnerable farmers to expand their herd and capture other benefits from dairy than just cash income from milk sales to a MCC. Only by looking at the underlying financials of the development model Land O'Lakes is promoting can these types of conclusions be reached.

13. **Synergies with USAID/Zambia.** Although reduced food insecurity for vulnerable populations is not the primary objective of the Bilateral Mission, USAID/Zambia, of course, also works towards this goal and is one of the main stakeholders of the DAP. By working to build market linkages between small farmers and commercial agribusiness, the Land O'Lakes program, in fact, crosses well into the "income growth" sphere of USAID operations and there are many opportunities for the DAP to complement the bilateral program and vice-versa. Especially since 2005 when USAID/Zambia launched its new strategy for agriculture and natural resource development, the Bilateral Mission is focused directly on matters of economic growth and competitiveness (SO5: Increased Private Sector Competitiveness in Agriculture and Natural Resources). SO team leaders in the local mission therefore asked the MTR to reflect on current and potential synergies between their market-oriented work and food security activities being carried out by Land O'Lakes.

14. In this respect, one reoccurring theme of this MTR has been that the very narrow focus of Title II assistance on individuals who are vulnerable to food insecurity has sometimes made it difficult to address other larger-scale development issues and structural prerequisites for market expansion. Land O'Lakes has generally managed this challenge effectively, but there are clearly many aspects of long-term dairy development that a Title II program is not well equipped to address. The need for market promotions to increase domestic demand is the most obvious example, but even business training for milk collection centers can sometimes appear to be an awkward fit with the Title II mandate.

15. To the extent the Bilateral program could pick up on these types of activities, therefore, and/or address other issues of trade expansion (including regional market competitiveness and enforcement of tariffs on imported dairy products) there are many good opportunities for expanded collaboration between the economic growth part of USAID's

portfolio and the mandate from FFP to reduce food insecurity.<sup>23</sup> Opportunities to involve larger-scale farmers and more established dairy producers who are not vulnerable to food insecurity are also an important part of developing the new economic systems that are needed to support vulnerable individuals. Without better economies of scale at some MCCs, for example, the infrastructure being developed under Title II may not stand the test of time.

16. Currently, LOL is the only USAID contractor working in Zambia on dairy development and so has had to address some of these larger-scale market development issues using Title II resources. Although these activities do not all have an immediate impact on food insecure individuals, they are still important in the long run and represent a challenge to USAID more generally to see that these issues are addressed somehow or another. If LOL cannot do this because of the narrow focus of its Title II obligations, then bilateral programs like MATEP and/or PROFIT may need to step in and help address other dairy development issues. At the time of writing, discussions were under way about a new Dairy Directive program for Zambia, which would clearly go a long way to alleviating this pressure of always remaining focused on primary food security concerns, while at the same time trying to address more general requirements of value chain development.

## **II. SUMMARY OF FINDINGS AND RECOMMENDATIONS**

17. Having summarized the main contextual issues facing the DAP, the rest of this concluding chapter lists several specific findings and recommendations. These findings are grouped together in three main categories covering (i) recommendations related to food security impact and monitoring; (ii) farmer-level field services; and (iii) market linkage development.

### **A. Food Security Impact and Monitoring**

18. With respect to the DAP's main objective of contributing to reduced food insecurity for vulnerable people, the following main conclusions and recommendations stand out.

⇒ **Dairy production can make an important contribution to reduced food insecurity for vulnerable farmers.**

19. Through careful selection of farmers that are both vulnerable to food insecurity, yet viable enough to engage in market-based dairy production, there is no doubt that dairy development contributes to improved rural livelihoods of selected beneficiaries and enhances their food security status. Dairy is especially attractive as a model for food security improvement because of the multiple income sources this enterprise generates. In addition to cash income from milk sales, dairy cows provide milk for home consumption and manure that can be used to fertilize vegetable gardens and staple food crops. Over the long run, as the animals start to multiply, significant cash income can also be realized from cull cow and calf sales. These other benefits are, in fact, sometimes more valuable than cash income from milk.

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<sup>23</sup> At the bilateral level, USAID/Zambia's MATEP project would likely be in the best position to address these trade issues for dairy. Regionally, the USAID Southern Africa Global Competitiveness Hub in Gaborone, Botswana also has a team of experts that deal specifically with trade facilitation, trade competitiveness, and trade capacity building that could also help.

- ⇒ **Dairy management is a demanding task and requires substantial cash and non-cash expenditures by small farmers in order to succeed.**

20. Land O'Lakes is demonstrating that vulnerable farmers can succeed as first-time dairy producers, but dairy is also a demanding enterprise and is probably not appropriate for extremely poor or vulnerable individuals. The estimated start-up costs for a first-time dairy unit, for example, are between ZMK 600,000 and 1.2 million (USD 172 – 342) and monthly costs are around ZMK 190,000 (USD 55) in net terms with recommended management. One important advantage of dairy is that farmers who deliver milk to an MCC receive monthly cash payments (as long as the MCC is working properly), but dairy is still a complicated task that requires considerable effort to manage and maintain good yields. Inadequate fodder production and veterinary care have led to animal mortality, difficulties with heat detection, and reduced milk yields. As a model for food security improvement, important questions also remain about the sustainability of smallholder production during the next drought when targeted households will naturally be under other kinds of stress.

- ⇒ **Program activities have so far focused too narrowly on heifer recipients.**

21. The DAP's focus on food security has led the program to focus in a very narrow sense on direct heifer recipients. This is unfortunate because most of what LOL is doing at the farm level can have far greater outreach to other beneficiaries if managed from a wider perspective. Roughly one-third of the total population in the program area was determined by USAID and others to require emergency food assistance during the last drought and there are a number of straightforward opportunities to extend the DAP's outreach through frontline marketing centers and expansion of the animal breeding program to these other individuals as well. LOL needs to do a better job of showing how the program impacts the wider community in addition to direct heifer recipients who have been singled out for the highest level of assistance.

- ⇒ **At least three classes of program beneficiaries should be discussed in future results reports.**

22. Land O'Lakes should start counting program beneficiaries in terms of direct heifer recipients, non-recipient group members, and non-group members. Assuming a workable system can be devised to collect appropriate food consumption and income data from these groups (perhaps by instituting a routine questionnaire all farmers complete when they are paid for their milk), these classifications would help to show how different parts of the DAP contribute to the overall cause of reducing food insecurity in the program area. This type of information would be very useful for Land O'Lakes and FFP, not only in tracking the DAP's progress, but also in helping to decide which program services are most cost effective and have the greatest impact. These data would also help to diffuse criticisms about the program's high cost per beneficiary.

- ⇒ **Over time, investments in artificial insemination and/or other breeding methods are also critical and will have important food security benefits.**

23. Aggressive expansion of breeding program could be one of the most direct ways to increase the program's outreach to the wider community. Especially in Southern Province, most households keep traditional livestock that could be transformed into higher-yielding dairy animals through better breeding with improved genetics. Aggressive promotion of the AI work, therefore, could be one of the most effective short-term routes to dairy expansion and increased involvement of other beneficiaries who are also vulnerable to food insecurity. This would also lead to increased collections by new MCCs that (among other things) need to achieve better capacity utilization to become financially sustainable.

- ⇒ **Proper financial analysis is necessary to understand the food security model Land O'Lakes is promoting and how this model can be fine-tuned to achieve the greatest impact on vulnerable individuals.**

24. As an access-based food security program, the financial analysis carried out for the MTR is important for impact monitoring to show whether dairy production is profitable and works as a viable livelihood model as promised. While the models do show that dairy is always profitable in net terms when the imputed value of milk used for home consumption and manure used as fertilizer are taken into account, dairy typically makes a net loss at the basic and even recommended levels when profits are just measured in cash terms by the revenue from milk. This is important because Land O'Lakes has so far mainly emphasized the benefit of cash sales through an MCC and given less attention to the food security and other income benefits farmers derive from these additional (imputed) revenue streams. The models also show that it is important for one-cow farmers to either expand their unit to a two-cow system as quickly as possible or be allowed to sell (or save) the first female calf to raise additional cash revenue and move to the next level where it truly becomes a sustainable enterprise. Unless these conditions are met, there is a strong likelihood that dairy production may actually sap the cash reserves of participating farmers over the long run as systems wear out and producers cannot afford the replacement costs of essential equipment and dairy structures. Before depreciation, a one-cow dairy is always profitable in gross terms.

- ⇒ **Many of the benefits to food security will only be seen over the long term and cannot be measured by short-term surveys and immediate changes in MIHFP, HDDI, and IDDI.**

25. Land O'Lakes has invested considerable resources in its attempts to establish baseline data and to track changes in MIHFP, HDDI, and IDDI that sit at the top of the results framework. Unfortunately, these consumption-based proxy measures for increased income do not capture many of the benefits of dairy development including the long-term investments LOL is making in market expansion and improved animal breeding services. The analysis of MIHFP, HDDI, and IDDI should therefore be treated as a long-term undertaking and the limitations of these indicators need to be recognized in describing the DAP's short-term food security outcomes. The process for collecting and tracking these data should also be simplified and made more routine.

- ⇒ **Several of the IR indicators being tracked by LOL could be better focused on the actual process through which dairy contributes to reduced food insecurity for vulnerable people.**

26. Many of the intermediate results indicators being tracked by LOL also do a poor job of showing how the DAP is benefiting first-time dairy farmers. The current system is cumbersome to operate and provides little information program managers need to show how the program is impacting primary, secondary, and tertiary beneficiaries. Rather than focus on average volumes and gross turnovers, for example, the IR indicators should focus much more specifically on how different groups of farmers are doing with the new dairy enterprise and financial viability of each milk collection center. There also needs to be greater consideration for other revenue streams from dairy than just milk production and sales.

- ⇒ **Dairy would be a more effective tool for food security improvement in countries with better developed smallholder infrastructure and more favorable climatic conditions.**

27. Taken together, these points lead to a general conclusion that dairy development can be an effective tool for achieving reduced food insecurity among a fairly wide group of

vulnerable individuals, but that this would be much easier to achieve in a country where more of the basic marketing infrastructure and other support services needed to assist smallholders is already in place. Not only does the relatively low population density in DAP's program area in Zambia make it difficult to achieve effective economies of scale at the MCC level and with the artificial insemination program, but Land O'Lakes has also had to invest in new veterinary systems, quality control improvements, and product development. These types of investments would probably not be required (or at least not to the same extent) in another country with an already well developed smallholder dairy sector. Under these conditions, Land O'Lakes would be better able to focus exclusively on helping vulnerable individuals to establish a dairy unit. In Zambia, by contrast, the DAP has had to start at a much more rudimentary level and focus on general value chain issues that might not be necessary with different conditions. Alternatively, Title II funding should be provided when other types of funding are available for development of livestock development and dairy market infrastructure so that the entire value chain is addressed.

## **B. Farmer Development**

28. With respect to the DAP's operational field work with farmers, the following key points stand out.

⇒ **The training program seems effective in providing farmers the key skills they need.**

29. Land O'Lakes and its sub-participants appear to have developed a good training program that is as effective as might be expected in putting across key messages first-time dairy farmers need to understand. Most heifer recipients, in fact, seem to be doing quite well with their new dairy enterprise and have responded well to the challenges associated with this enterprise. Rather than emphasize only on milk production and milk hygiene, however, other important messages, particularly related to the use of manure as organic fertilizer, should also be given high priority in the training program.

⇒ **Animal nutrition is compromised by inadequate attention to fodder production and limited use of mixed feeds.**

30. The provision of a proper diet for livestock to maintain good milk production is an important challenge that is likely to require a re-concentration of program efforts. Left unchecked, this is probably the greatest single threat to successful dairy production in the short run. In addition to problems with reduced milk yields, poor nutrition also makes heat detection difficult and is an important threat to the success of the artificial insemination program. Moreover, farmers could easily become de-motivated and lose interest in dairy production if high yields are not maintained. As shown by the financial analysis in Part Four, dairy production is much less profitable at the basic level compared with recommended or advanced management, and LOL should always look for ways to impress upon farmers the importance of good management and otherwise find ways to help them produce at these levels over the long run. Continued training in fodder production and use of concentrate feeds will likely be required until the end of the DAP and probably even beyond.

⇒ **Animal health is compromised by inadequate dipping and poor access to veterinary services.**

31. Other important problems at the farm level relate to the inadequate use of acaracides to control tick-borne diseases and limited access to other veterinary services. Poor dipping practices, in particular, have led to a 10.5% mortality rate of distributed heifers and LOL should consider types of remedial action to address this problem and promote better

practices. As noted, dairy production is a demanding business and these types of problems should not be unexpected among first-time dairy farmers. They do, however, require special attention to ensure that farmers continue to benefit from dairy in the long run.

⇒ **The pass-on modality should be dropped or significantly revised.**

32. Although the pass-on modality is meant to instill a sense of ownership of the new heifers among first-generation recipients and help extend the program to a second generation of direct beneficiaries, this arrangement is likely to have very serious negative implications for first and second generation recipients alike and should be completely rethought. By requiring the first generation recipient to give up their first female calf, this vulnerable individual will just take longer to reach the point where dairy truly becomes a solid platform for income improvement and resiliency to shock, either by earning income from calf sales or by improving to a two-cow production unit. Likewise, considering that it will be at least two years after receiving a pass-on calf before the animal provides the second-generation recipient any benefit from dairy, the high probability of there being some major drought or other food crisis between now and then must be recognized. Under the current pass-on plan, for example, there will likely be second-generation recipients in the project area who are not only struggling to overcome the effects of the next drought but who are also faced with the challenge of feeding a hungry, but still immature, dairy heifer. Fortunately, no pass-ons have yet taken place because the first calves are just now approaching the right age for this to take place. Again, Land O'Lakes should completely revise the pass-on modality.

⇒ **Land O'Lakes should produce easy-to-follow dairy manuals in the vernacular languages.**

33. Because of the complexity of dairy farming, Land O'Lakes should develop a set of very practical, simple, and easy to understand field handouts aimed specifically at the small farmers it targets. This kind of smallholder dairy field manual does not exist in Zambia and would be extremely useful, not only to improve the success of farmers being assisted now, but also as matter of long-term sustainability. The manuals could also have important benefits by extending the program's outreach to other rural residents who have surplus milk, but for one reason or another, cannot participate in the full training program. The precise format and amount of information to include obviously requires much more thought, but at the very least, it is recommended that the manuals should be in the vernacular language and include as many pictures and diagrams as possible that are clear and easy-to-understand.

⇒ **The artificial insemination program requires a complete overhaul.**

34. At current levels of farmer participation, AI services are not sustainable and far more needs to be done to promote the development of improved breeding services for the benefit of current heifer recipients and other group and non-group members who also own livestock. An investment of DAP resources in this area would be one of the most direct ways to extend the program's impact and reach a greater number of food insecure beneficiaries. Many milk collection centers are, in fact, struggling because the volumes going through their tanks are barely sufficient to justify the investment. There is also a need for volume increases to attract the interest of commercial buyers and eventually agree on forward contracts on the basis of long-term commitments that are the true function of a milk collection center.

35. To do this, one attractive option would be for the DAP to focus on inseminating as many animals as quickly as possible. Together with appropriate investments in social marketing and training of the wider community in the basics of dairy management (including the publication of practical field manuals), this certainly would be one of the most direct ways

to promote quick gains in milk production and market development. The larger business model for the AI program, however, also needs to be rationalized and perhaps put out to tender for a private genetics company to develop a plan for the establishment of a private AI service.<sup>24</sup> The current system of equipping each MCC with a full set of flasks and AI capabilities is barely productive and certainly not efficient or sustainable, mainly because of low turnover of AI straws and high fixed costs of liquid nitrogen and depreciation. It appears, therefore, that there need to be far fewer nitrogen hubs and that several MCCs would in fact benefit from being relieved of this responsibility (to the extent they are even taking much of an active part in the AI work to begin with).

### **C. Market Linkages**

36. With respect to the DAP's market linkages work, the following main points stand out.

⇒ **Market development work at the primary collection level is highly relevant to food insecure individuals.**

37. Small dairy farmers primarily need a secure place to sell their milk and the DAP's support for the establishment of rural milk collection centers is an integral part of the food security program. Without access to the cash market, farmers would not be able to afford the inputs required to manage an exotic dairy animal successfully and so would not benefit from the assistance being provided. That said, most of LOL's work with rural collection centers has focused on the technical aspects of dairy development and quality control systems rather than the fundamentals of business management. By involving farmer co-ops in the running of MCCs, Land O'Lakes is also taking a complicated route to market development that requires further sensitization and training on the fundamentals of cooperative development in order to succeed. So far, this work has not received adequate attention, and it appears that many MCCs are struggling with unrealistic business plans and over-inflated expectations about what they can and should do for their members. Few MCCs have much sense of their underlying cash flow or operating requirements of their business and corruption of board members is a persistent problem.

⇒ **Rural market development also requires building linkages with processors.**

38. In addition to getting the fundamentals of MCC management right, these new centers also require market linkages with the formal processing sector to buy the milk. Land O'Lakes is taking an indirect but highly effective route to achieve this outcome. Specifically, by working with small- and medium-scale dairy companies to improve their own quality control systems and introduce new products, LOL has been able to forge very good working relations with the dairy companies, which helps when introducing these firms to the MCCs as a potential source of supply. MCCs still need to increase their total collections to become more attractive to commercial buyers for long-term contracts, but this kind of exposure is still a highly productive and important first step in the process of building long-term market relations with new rural suppliers.

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<sup>24</sup> There may be opportunities to fund this through a GDA-type arrangement outside the strict Title II framework. If combined with some plan to inseminate a large number of cows, for example, this could be quite lucrative for a private genetics company. To be successful in the long run, however, this support should be tied to a matching (and legally binding) commitment on the part of the genetics company to develop a private AI network that meets certain criteria set out by Land O'Lakes, but is otherwise be organized however the firm wants.

- ⇒ **Product promotions to build overall dairy demand are not immediately critical to the marketing needs of vulnerable smallholders.**

39. Far-reaching dairy promotions work is less significant for the time being since the main challenge now, and especially from the Title II perspective, is to build new market linkages at the rural level between small dairy farmers and the still-emerging domestic processing industry. Zambia is a milk-deficit country and local producers only supply about two-thirds of total domestic demand. Long-term growth in demand is still important, but not immediately critical to helping vulnerable farmers find a place in this deficit market. As a function of the ZDPA, dairy promotions work should continue with support from the industry, but other investments that reduce the cost of local production and improve quality are more important for Title II and contribute more directly to the objective of increasing the competitiveness of local farmers.

- ⇒ **Limited management capacities at the MCC level are an important threat to the long-term viability of these rural institutions and require a long-term approach.**

40. Rather than focus on long-term demand issues, a far more important challenge for market development is to improve the overall management of rural MCCs. Although some established MCCs like the ones at Magoye and Palabana are doing quite well, others are not, and many new MCCs are also likely to struggle with problems of capacity utilization and lack of essential management skills. Thus far, most program work has focused on the construction of new MCCs and equipping each center with cooling tanks and milk analysis equipment. While good (and important) progress is being made in these areas, far less attention has been given to training farmers in the principles of cooperative development and/or how to manage the MCC from a financial perspective. Indeed, one important problem with the MCC development is LOL has tended to cast these new marketing centers as a kind of catchall problem solver for troubles small farmers face. These centers should focus first and foremost on providing an efficient and remunerative milk collection service. The promise of creating new revolving funds and loan facilities, input procurement services, management of artificial insemination work and all kinds of other functions including HIV/AIDS awareness and dissemination of messages on household nutrition merely complicates the challenge of market development and increases the risk of failure. In some cases, it is not even clear that the farmer group is best equipped to manage the MCC and opportunities to involve other private sector stakeholders should also be explored.

- ⇒ **The warehouse marketing program is another innovative approach to food access improvement but is not closely integrated with the rest of the DAP and so far adds little value to the main dairy development work.**

41. The warehouse marketing program is effectively being managed as a standalone activity with little integration to the rest of the DAP. The food security benefits for smallholders who participate in the warehouse program are not being monitored at the goal level by DAP's IPTT system and important opportunities to link new dairy groups to the warehouse receipt program are being overlooked. These observations are definitely not to say that the warehouse marketing program is irrelevant to improved food security for smallholders since participation in the program can have several important benefits. Equally, however, ZACA already seems to be reasonably well funded and Land O'Lakes needs to make a more persuasive case for why Food for Peace should also be supporting this effort. Again, the ZACA program is a fabulous development initiative, but it also seems that LOL's agenda is already quite full with the promotion of smallholder dairy. The DAP, therefore, may be better to focus on just one innovative area of agriculture than risk spreading the program's resources too thinly across other non-essential areas.

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