LAND O'LAKES, INC.
INTERNATIONAL DEVELOPMENT

Innovative Solutions for Global Prosperity

FINAL REPORT

Mid-Term Evaluation for FY 13 Food for Progress Bangladesh Dairy Enhancement Project (BDEP)

February 2016

Center for Resource Development Studies Ltd.

FINAL REPORT

Mid-Term Evaluation
for Bangladesh Dairy Enhancement Project (BDEP)

Submitted to

BANGLADESH DAIRY ENHANCEMENT PROJECT (BDEP)

Land O'Lakes-Bangladesh

February 2016

Submitted By

Center for Resource Development Studies Ltd

FY 13 Food for Progress Bangladesh Dairy Enhancement Project Baseline Study

Program: Food for Progress

Agreement Number: FCC-388-2013/031-00
Funding Year: Fiscal Year 2013
Project Duration: 2013-2017
Implemented by: Land O'Lakes

Evaluation Authored by: Innovision Consulting Private Limited

DISCLAIMER: This publication was produced at the request of the United States Department of Agriculture. It was prepared by an independent third-party evaluation firm. The author's views expressed in this publication do not necessarily reflect the views of the United States Department of Agriculture or the United States Government.

Accessibility Note: An accessible version of this document can be made available by contacting fas.monitoring.evaluation@usda.gov

Acknowledgement

Our sincere acknowledgement goes to the Land O'Lakes team in Bangladesh for awarding this work to CRDS. Our heartfelt thanks go to the Chief of Party of Bangladesh Dairy Enhancement Project sponsored by USDA, for his guidance and clarifications that he provided regarding the dairy business at both a farmer and processor level. His advice helped in designing the survey and communication with Key Informants (KI). We would like to thank the staff members from Land O'Lakes both at the local and international levels who provided their assistance in designing the questionnaire and subsequent field survey.

Our thanks also goes to the KIs, who are the great contributors of information for this report. Secondary data sources are quite old and frequent surveys are not possible by the government due to financial constraints and lack of human resources. Updated information and statistics are rare in dairy or livestock sector in Bangladesh. Therefore, interviews with KIs from individual dairy farmers to input suppliers to market players to processors to service providers to government officials is needed to confirm available data in the sector. In this aspect, KIs contributed to enrich the information providing the updated project information and performance.

We thank those people with whom this report has been developed out of experiences and efforts of so many involved in regions e.g. Rajshahi and Khulna in its process. The interviews and discussions conducted with the farmers are the key actors of this report. We like to thank those farmers who have given their valuable time to the household surveyors and to those whom participated in FGDs keeping pending their routine works.

Special acknowledgement goes to those women in the villages who participated in FGD and giving the team information about their lifestyle and rights in family without any hesitation. Teams learned a great deal from them about their family life and experience of work sharing and decision making processes in daily life.

Table of Contents

Acknowledgement 1
Abbreviation and Acronyms 5
EXECUTIVE SUMMARY 6
CHAPTER I: INTRODUCTION 11
1.1 Background 11
1.2 Background to the Bangladesh Dairy Sector 11
1.3 Project Objectives 11
1.4 Program Description 12
1.5 Present Situation of the Project 12
1.6 Purpose and Objectives of the Midterm Evaluation 13
1.7 Scope and Limitation of MTE 14
CHAPTER- II METHODOLOGY 15
2.1 Description of the Study Area and Sample Frame 15
2.2 Development of Study Instruments 17
2.3 MTE Survey activities 17
CHAPTER III: RESULTS AND FINDINGS OF QUANTITATIVE STUDY 18
Section-I: General Findings from the Field Survey 18
3.1 Household Heads' Profile 18
3.2 Landholdings of the Households 18
3.3 Breeds of livestock 19
3.4 Milk production 19
3.5 Feed Trial and Cost of Feeding 21
3.6 Insemination and fertility 25
3.7 Management Practices 25
3.8 Women involvement in Dairy farming 28
3.9 Farmers' Perception about BDEP 28
Section -II: Objective Based Performance Evaluation 29
Section III - SWOT Analysis of the BDEP 38
CHAPTER IV: KEY FINDINGS OF FOCUS GROUP DISCUSSIONS 41
CHAPTER V: Findings of Key Informant Interviews (KIIs) 43
5.1 Findings from Project Management and BDEP Staff 43
5.2 Findings from Partner Processors and 4th Partner Management and Staff 44
5.2.1 Findings of Project Partner 1. 44
5.2.2 Findings of Project Partner 2 44
5.2.3 Findings of Project Partner 3 45
5.2.4 Findings of Project Partner 4 45
5.2.5 Findings of DDOs 45
5.2.6 Findings of MAB 45
CHAPTER VI: CASE STUDIES 47

CHAPTER VII: CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED.....53

7.1 Conclusions 53

7.2 Recommendations.....55

7.3 Lessons Learned 56

Annexure 1: Individual Report of the Focus Group Discussions (FGDs).....58

Annexure 2: Individual Report of the Key Informant Interviews (KIIs).....59

Annexure 3:Trends of daily milk production of individual cows.....60

Annexure 4: Screenshots of DRS 61

Annexure 5: Household Questionnaire for Livestock Producers.....62

Annexure 6: Qualitative Data Collection Tools.....75

List of Tables

Tables	Headings	Pg.
Table-1	Bangladesh: Milk Production in Million Metric Tons	11
Table-2	Sampling frame for Quantitative Survey	15
Table-3	Sampling frame for Qualititative Survey	15
Table-4	HH Heads Profile.	17
Table-5	Landholdings of the respondents	17
Table-6	Type and breed of cattle at household at present	18
Table-7	Per Household: Cow, Milking cow and Milking Pregnant Cow	18
Table-8	Per Cow Milk production and lactation period of the Beneficiaries interventioncow	18
Table-9	Per Cow Milk production and lactation period of beneficiaries other cows	19
Table-10	Information on Feed Input Costs.	21
Table-11	Feed trial started on 17th Feb 2016 at Khamersanila (including adjustmentperiod)	22
Table-12	Feed trial started on 10th Feb 2016 at Potazia (including adjustment period)	22
Table-13	Management Practices	23
Table-14	Implementation of BDEP Management Practices	26
Table-15	Places from where respondents received training	30
Table-16	List of Different Training Program of BDEP	30
Table-17	SWOT Analysis Regarding Evaluation Criteria of the BDEP	36
Table-18	Major Findings from the FGD	39

List of Figures

Figures	Headings	Pg
Fig-1	Survey activities at a glance	16
Fig-2	Monthly Sales Revenue Taka	32
Fig-3	Monthly Profit	32
Fig-4	Monthly Sales Volume - Concentrate	32

Abbreviation and Acronyms

BDEP	Bangladesh Dairy Enhancement Project
CMT	California Mastitis Test
DDO	Dairy Development Officer
DLS	Department of Livestock Services
DRS	Dairy Recording System
FGD	Focus Group Discussion
FMD	Foot and Mouth Disease
KII	Key Informant Interview
LOL	Land O'Lakes
MAB	Mini-Agri Business
MCC	Milk Collection Center
MTE	Mid-Term Evaluation
USDA	US Department of Agriculture

EXECUTIVE SUMMARY

Introduction

Land O'Lakes (LOL) is implementing a three-year (November 1, 2013 – March 31، 2017), $7.1million dollar Food for Progress Program, Bangladesh Dairy Enhancement Program (BDEP), funded by the US Department of Agriculture (USDA). BDEP plans to support 9,625 smallholder-dairy farmers in Khulna and Rajshahi Division through creating market linkages between the farmers and dairy companies, and providing capacity building to the dairy companies to provide ongoing farmer training in improved feeding through use of superior fodder and higher quality concentrate, animal health, and other whole farm management practices. The dairy companies will also set up milk collection centers ("MCCs") for these farmers and use the project supported Dairy Recording System (DRS) to record milk volume offered, milk sales, and payments for each farmer. BDEP is also working with mini-agribusinesses to set up dairy feed businesses in the target regions, to make sure the farmers have access to improved feed for their cattle. Through these activities, the program will help to improve dairy production, facilitate market linkages and improve market orientation of smallholder farmers. In order to build sustainability into the project and its dairy development activities, BDEP is partnering with dairy companies to assist them to build Advisory Services which have the capability of meeting the needs of the dairy farmers of Bangladesh.

As of January 2016, BDEP has only 67 targeted beneficiaries which is very small compared to its target. A major contributing factor for this state of affairs is the lack of formal approval from USDA of the project redesign and budget submitted in July 2014 and resubmitted in March 2015, which stalled start-up and delayed Land O'Lakes' ability to reach beneficiaries. Without USDA approval BDEP did not have the legal authority to issue partner sub-award and major activities remained on hold until November 2015. At that time, following USDA's verbal support for activity revisions, concurrence on sub-award partners, and approval of the midterm evaluation SOW reflecting revised indicators, Land O'Lakes moved forward with executing sub-awards with dairy company partners and full implementation in order to remain on track with the ambitious targets outlined in the modification. As of this writing, formal approval is still pending.

BDEP commenced in October 2013 and the baseline survey was done in the first half of 2014. The project design has been revised based on the expertise of the Chief of Party plus recommendations from the baseline survey. To date, BDEP has conducted trials of new/improved feed formulations of concentrates to supplement green feed and the more typical ration based on rice straw. Based on the results of these feed trials, Land O'Lakes provided training to farmers in optimal feed utilization and basic animal nutrition, focusing on locally available sources of crude protein and energy. Land O'Lakes combine this basic nutritional training with training on provision of sufficient water to cows to meet their metabolic and cooling needs, and the demand for water in milk production, milk being 87% water. Land O'Lakes has also provided training on animal management to improve animal health, and other factors relating to nutrition and cow comfort. In addition, BDEP provided technical and financial support to "mini-agribusinesses" (MABs) to produce the enhanced quality concentrate derived from the feed trials, plus fodder with superior nutritional value and supply it to farmers in their area.

Below is a summary of the activities BDEP has undertaken to date are:

1. Contracts with three partner dairy companies. These dairy companies will establish milk collection centers and build Advisory Services capable of providing genuine assistance to dairy farmers.
2. Contracts with a project partner to drive establishment of MABs in Khulna Division.
3. Feed trials to develop concentrate formulations, and to demonstrate BDEP's approaches of whole farm management and on-farm training.
4. These feed trials also serve as locations for the training of Dairy Development Officers who will form the Advisory Services being launched by dairy company partners.
5. The feed trials also allow for the training of beneficiary farmers.
6. Establishing MABs and providing both technical assistance and financial support through a small grant. These MABs are producing better quality and more nutritious concentrate and green fodder.

Midterm Purpose and Methodology

The main objective of the Mid-Term Evaluation (MTE) is to assess the project's progress and approach. The MTE is an implementation evaluation, with findings focusing on identifying opportunities and challenges in the project approach and determining whether alterations are needed to achieve maximum impact.

The study uses both quantitative and qualitative methods to capture information from the project participants and stakeholders. A quantitative household survey was administered to 58 people to collect information on dairy farming practices, revenue, productivity and basic demographic information. Ten (10) focus group discussions were conducted with participant farmers and non-participant farmers that were clients of the mini agri-businesses. Key informant interviews were conducted with dairy processor partners, other NGO partners, mini agri-businesses entrepreneurs, and BDEP staff.

The expectation was that the quantitative findings would be compared to the findings at the baseline. However, the evaluation team felt that the geographical differences between the baseline population and the participant population was too great to make this comparison. This change in geography was due to the change of the approach and the need to focus on areas where processors would have milk collection centers. Instead the evaluation team added retrospective questions to the household survey to assess the state of the participants before and after the intervention.

Major Findings

1. BDEP has a new approach to training farmers

BDEP has introduced a far higher level of "on-farm training" than is the norm in development activity. There are several reasons for this:

- BDEP considers classroom training normally followed by development programs to be ineffective for the dairy sector. In support of this contention is the fact that overwhelmingly farmers continue to follow traditional practices.
- Each farm is different, and the farmer must be shown practices that take into account his/her situation.
- Change management is a significant factor in a sector dominated by tradition. On-farm training supports the farmer through a period of great change.
- Importantly, on-farm training facilitates much greater access to the female farmers of Bangladesh.

2. Participant farmers are implementing BDEP recommended "whole farm management" practices.

BDEP is introducing modern farm management practices to Bangladesh. These include:

- Separate troughs for water and feed.
- Greater volume of water provided to cows.
- Supply of better nutrition to dairy cows, sourced from a concentrate formulated by BDEP and tested in feed trials, and chopped maize sourced from MABs.
- Other minor components in the feed include black cumin and rock salt.
- Vaccination against Foot and Mouth Disease and regular de-worming.
- California mastitis testing and feed management strategies to reduce risk of mastitis.
- Washing hands prior to milking, also to reduce the risk of mastitis.
- Early weaning and rumen development strategies.
- Use of calf milk replacer.
- "Bathing" to mitigate high temperatures.

Based on the household survey, all participant farmers are following at least one of these new and more productivity farm management practices, many are applying them all. The two techniques that are not applied as commonly are the use of calf milk replacer because it is a novel concept in the area and washing hands prior to milking, especially in Khulna where middlemen often complete the milking. In FGDs with non-BDEP farmers, they indicated that they are eager to join the project and take advantage by implementing the BDEP approach.

3. Milk Production and Revenue has increased for participant farmers

The quantitative survey, as well as monitoring data and qualitative findings has found that average milk production per day, lactation period, and maximum and minimum milk production have all increased, while the interval period for next heat time has declined after intervention of BDEP. For local breeds, the productivity has increased from before the intervention of 2 liters per day to 5 liters, or a maximum of 9 liters per day. For cross-bred cows, milk production is reaching between 12 and 20 liters compared to 7.6 liters per day before the intervention. Further, all of these cows were malnourished in the womb and then throughout their lives,

thus will never achieve their genetic potential. As new generations enter the herd, the gap between actual production and genetic potential will close. Thus, it is anticipated that local breeds will deliver even higher yields that what is seen here. The difference this could make to the Bangladesh dairy sector and the income of smallholder dairy farmers would be immense. These results indicate the positive impact of BDEP activities. Total revenue per household per day has increased after intervention for both local and improved cows for BDEP farmers. BDEP participants are gladly accepting advice relating to BDEP farm and animal management practices, and are getting good results applying the BDEP approach. However, with this increase in milk production, feed and cow management costs have also increased. As a result total profit has been marginally increased at the farm level.

4. Farmers have a positive perception of the BDEP Approach, but they worry about the increased time commitment.

The BDEP approach is appreciated by both project participants and non-participants but some consider the work load, feed cost and other costs of cattle management have increased while milk production has also increased. They are expecting that support will be continued by the BDEP as well as processors companies for future development of dairy sector. The processor companies and their staff must be trained on the whole farm management approach for increasing milk production and profitability, while ensuring quality supply of milk and sustainable development for the dairy sector. BDEP and processor companies must be extended their activities regarding whole farm management at farm level.

5. Private sector engagement has moved slowly

BDEP has entered into contracts with 3 partner dairy companies. These companies will have responsibility to establish milk collection centers and provide advisory services to farmers using personnel trained in whole farm management by BDEP.

Dairy companies have been slow, but they have started their activities in the selected areas to provide advisory services to farmers by employing management and field staff. In recent months the pace of their activity has improved and it is expected that their targets will be met. Certainly, in terms of infrastructure investment, commitments have been made which will see 70 milk chilling centers established, above Land O' Lakes target with USDA of 55 in the modified design. Orders for a further ten MCCs are expected in March or April 2016. Dairy companies have a big incentive to earn a return on these investments through registering farmers and training them, in order to achieve the desired milk flows. The linkage of training and milk supply, and the formal market linkage between farmers and dairy companies, significantly increase the prospects of BDEP for sustainable development.

Feedback regarding the BDEP approach to dairy development from partner dairy companies is very positive, and this is presented later in this report.

6. High performance of MABs in fodder and concentrate production

BDEP's mini-agribusiness (MAB) component is a new concept for dairy development in Bangladesh. Farmers are not traditionally acquainted with improved feed and concentrates for cattle rearing. Through feed trails at farm level, BDEP has introduced improved feed formulations for concentrates and green fodder with higher nutritious value. BDEP has provided the formulation for its concentrate to MABs, who are commercially producing the feeds and supplying to the project beneficiaries as well as to non-beneficiary farmers. As a result, BDEP ration will be available to all and MABs have the opportunity for developing feed businesses in their localities.

Four MABs have been established for several months, with a further four commencing at the time of report preparation. These MABs offer chopped maize and other green fodders, BDEP formulated concentrate, calf milk replacer, rock salt, de-worming tablets, mastitis testing, enhanced quality fodder seed and other products and services as needed by farmers. Importantly, now farmers are getting good quality feed in their locality with fair price and these MABs are building higher sales and profitability gradually.

These first MABs are proving to be profitable within a short period of establishment, and sales of concentrate and chopped maize in particular are showing growth trends on a month to month basis – the four MABs made Tk. 77,241 profit in January '16, which was a 91% higher than that in December 2015.

The entrepreneurs selected by BDEP for assistance are very positive about their new businesses. One demonstration of this is the leasing of additional areas of land for fodder crop production, under the sole initiative of some MABs. The perception of MABs about the new concept is discussed later in this report.

7. Dairy Recording System and Other M&E tools are promising

BDEP is developing a software system in which tablets are used by field staff to register farmers, record "individual baselines" for the time the farmer is registered, herd information, land utilization information, training and treatment. The field data will be uploaded to a database located in "the cloud". Data from dairy companies' milk payment systems will be uploaded to the cloud database as well, and linked by consistent registration numbers to individual farmers. DRS will provide both farm management records and excellent data for live monitoring and evaluation.

DRS remains under development, with BDEP management expecting roll out in April 2016, in time for the commencement of operation of the first milk collection centers established by dairy company partners. This stage of development makes it hard for the useful of DRS to be assessed in this survey, but it seems an exciting advance with huge potential.

Conclusion

Using the midterm findings, the evaluation team assessed whether the project redesign is bringing the right approach to dairy development in Bangladesh. The overall finding was an emphatic YES.

It does not take long for a visitor to BDEP supported farms to see the impact of better diet and adequate water supply. The condition of BDEP cows is significantly better than the standard in Bangladesh. BDEP farmers report more regular vaccination and much lower, or even zero, treatment cost as a result of the combined effect of vaccination and enhanced nutrition. More notably, milk production and revenue is up substantially. The farmers with whom BDEP is working are very happy with the program, and neighbors are using some of the practices being introduced by BDEP in good spillover effects.

Another important factor to aid judgment on the redesign is the fact that private sector dairy companies are investing about $US 4 million in partnership with BDEP. Further, they are recruiting new personnel, who represent the beginning of services with the ability to offer genuine assistance to farmers in animal husbandry and other elements of BDEP's whole farm management system. Such investment is unlikely to be occurring if these professional sector participants did not support the BDEP concept. Indeed, a word which came up often during key informant interviews with dairy company field staff was "revolutionary".

Finally, the mini-agribusiness component introduced by BDEP is playing an important role in starting to be able to offer sources of better nutrition promoted by BDEP. The results of a sound technical approach to fodder crop production, including soil testing for pH followed by pH adjustment, the application of compost to build presently negligible levels of organic matter in Bangladesh soil, the application as fertilizer of elements in which Bangladesh soil is deficient, and the use of higher quality seed is resulting in great harvests. These mini-agribusinesses are also offering to farmers "BDEP concentrate", developed by BDEP staff and tested through feed trials; this concentrate is proving popular among both BDEP and non-BDEP linked farmers owing to its very positive impact on milk production. The initial MABs are achieving good levels of profitability and consider their sales will continue to grow.

In summary, the BDEP approach is working for the present low number of beneficiaries, it is supported financially by private sector dairy companies, and it integrates successfully mini-agribusinesses, which as they are offering products and services in genuine demand from dairy farmers, will prove sustainable.

BDEP is an exceptional concept for dairy development in Bangladesh. In terms of depth, BDEP is realizing great achievements and impacts to meet the milk requirements of Bangladesh. The milk processing companies are investing huge amounts of capital for conceptualizing the BDEP at rural level. It will help to create business entrepreneurs in livestock sectors, modernizing dairy farming system and ultimately alleviate the poverty and livelihood through dairy farming in Bangladesh.

The Challenge

BDEP has not achieved significant progress on many of the key targets included in its Agreement with USDA. This state of affairs is outside the direct control of BDEP to a reasonably large extent: the proposed modification is not yet approved, and dairy company partners have been slow. The tardiness of dairy companies also means that the MAB component could not progress: BDEP acts in an integrated fashion and until the locations of MCCs as decided by dairy companies were firm, additional MABs could not be established.

More recently, dairy company activity has gathered pace, and initial operation of the first MCCs supported by BDEP is scheduled for April 2016. Orders have been placed for equipment for seventy milk collection centers, with a further ten orders planned for March or April.

Training in whole farm management of Dairy Development Officers employed by dairy companies is underway very successfully. Dairy companies, however, need to recruit more such positions in order to meet target and be able to train the intended 9,625 farmers.

Recommendations

A summary of the Recommendations arising from this evaluation is as follows:

- Drive dairy company performance.
- Drive dairy company recruitment and assignment of DDOs for training with BDEP.
- Ensure BDEP has the data to convince farmers that its methods result in higher profit.
- Build links with financial institutions in case working capital is required to meet higher initial costs of a BDEP ration.
- Consider how to streamline the BDEP whole farm management system to reduce unnecessary workloads.
- Seek to increase the number of MABs established through the project, or supported via technical assistance.
- Emphasize the necessary quality standards to MABs.
- Record details of BDEP concentrate formulation and quality standards for broader use by the sector.
- Drive completion of the whole DRS system.
- Pursue collaboration with public sector entities named in the Agreement between USDA and Land O' Lakes.
- Seek the support of USDA to partner with a university to significantly enhance the education of animal husbandry and agribusiness at a professional level.

CHAPTER I: INTRODUCTION

1.1 Background

Land O'Lakes (LOL) is implementing a three-year (November 1, 2013 – March 31, 2017), $7.1million dollar Food for Progress Program, Bangladesh Dairy Enhancement Program (BDEP), funded by the US Department of Agriculture (USDA). BDEP plans to support 9,625 smallholder-dairy farmers in Khulna and Rajshahi Division through creating market linkages between the farmers and dairy companies, and providing capacity building to the dairy companies to provide ongoing farmer training in improved feeding through use of superior fodder and higher quality concentrate, animal health, and other whole farm management practices. The dairy companies will also set up milk collection centers ("MCCs") for these farmers and use the project supported Dairy Recording System (DRS) to record milk volume offered, milk sales, and payments for each farmer. BDEP is also working with mini-agribusinesses to set up dairy feed businesses in the target regions, to make sure the farmers have access to improved feed for their cattle. Through these activities, the program will help to improve dairy production, facilitate market linkages and improve market orientation of smallholder farmers. In order to build sustainability into the project and its dairy development activities, BDEP is partnering with dairy companies to assist them to build advisory services which have the capability of meeting the needs of the dairy farmers of Bangladesh.

1.2 Background to the Bangladesh Dairy Sector

For the purposes of this MTE, this is not a complete backgrounder to the Bangladesh dairy sector; rather it is intended to provide some features which are relevant to dairy developments such as BDEP.

Key Features of the Bangladesh Dairy Sector include the following:

1. Herd size is low at around 3-4 animals per farm on average.
2. Productivity is poor, with yields generally accepted as being less than 2 liters per day for local breeds, and 6.5 liters for cross-breeds. These were the findings of the BDEP Baseline Survey which was conducted in 2014, and are in line with official data and other publications, where available.
3. Milk processed by the formal sector is a low percentage of total milk production. It is generally considered that only 5% of milk is procured by the formal sector. It is noted that by definition informal milk supplies are hard to measure with any accuracy.
4. Owing to poor productivity, farm profitability is also poor.
5. The origins of the dairy sector of the sub-continent are as a supplier of draft power for ploughing rice paddies, and as a supplier of energy and fertilizer through dung, with only low volumes of milk being used for home consumption. These origins explain some of the traditional practices still prevalent in the Bangladesh dairy sector, and especially the reliance on rice straw for feed, despite the almost complete absence of nutritional value.
6. Institutions supporting the dairy sector, notably the Department of Livestock Services (DLS), focus on veterinary treatment and artificial insemination rather than animal husbandry. The services which are provided are not regarded particularly highly in terms of meeting the needs of farmers, and there is little if any change to increase the scope of DLS services to provide advice on animal husbandry.

Annual milk production in Bangladesh is illustrated in the following table:

Table-1: Bangladesh: Milk Production in Million Metric Tons

Fiscal Years	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Quantity MT	2.140	2.270	2.280	2.650	2.286	2.365	2.947	3.463

1.3 Project Objectives

Land O' Lakes monetized 9,190 MT of Crude Degummed Soybean Oil, and, over a period of approximately three years, will use the proceeds from the sale to implement a project in Bangladesh focused on achieving the following objectives:

- Increase agricultural productivity in the dairy sector by optimizing feed formulations and training to improve farm management, and

- Expand trade of agricultural products in the dairy sector by supporting investment in milk collection centers and milk hubs; facilitating agricultural lending, improving infrastructure, and build sustainable linkages between formal buyers and sellers.

1.4 Program Description

The new approach of BDEP is quite different from other dairy development efforts. BDEP is implementing a novel and systematic approach to dairy development. This may be summarized as follows:

- Focus on the main factors limiting the productivity of the dairy farming sector. Primarily, these relate to the lack of knowledge about the nutritional needs of dairy cows, heifers and calves, and in addition the lack of availability of such enhanced nutrition.
- Train farmers on-farm in whole farm management, such that significant change is achieved, the training is put into the context of the individual farm, and the training of female farmers is facilitated.
- Involve dairy companies to achieve sustainability and in order to bring private sector capital into the project.
- Those dairy companies will establish in excess of 55 milk collection centers to provide formal market linkage for the smallholder dairy farmers.
- Assist the establishment of mini-agribusinesses in the immediate locality of beneficiary farmers, and train them to provide better quality concentrate and green fodder, plus other products and services for which demand is created by BDEP farmer training.

BDEP will partner with 4 partners, 3 dairy companies and the 4th partner will focus on the establishment of MABs in Khulna Division.

With respect to selection of beneficiaries, it is important to note that the involvement of the private sector dairy companies, and especially owing to the significant capital expenditure by those companies, beneficiary "selection" is conducted in a quite different manner than normal. Dairy companies must achieve a return on their capital investment in milk procurement chains/milk chilling centers for the MCCs to be sustainable. This means that within the defined geography of BDEP (Khulna and Rajshahi Divisions), dairy companies must be free to select the best places to locate MCCs. Then, once a location for the particular MCC is defined, dairy companies will seek to register as many farmers as close as possible to the MCC; this is the best way to preserve the quality of milk as well as to make operation of their new Advisory Services as efficient as possible. Dairy companies cannot be expected to turn down milk supply from any farmer willing to provide milk (and receive training).

1.5 Present Situation of the Project

BDEP commenced in October 2013 and the baseline survey was done in first half of 2014. The project design has been revised based on the expertise of the Chief of Party plus recommendations from the baseline survey. It is further noted that this project is funded through the monetization of an agricultural commodity, crude de-gummed soybean oil. Between the award of the Agreement to Land O'Lakes and the actual monetization date, international soybean oil prices dropped, causing a significant reduction in funds available to the project. This situation required the project to focus on a narrower range of activities and to reduce the target beneficiary numbers. It is the revised activities and narrower scope which will be reviewed in the course of this mid -term evaluation.

BDEP submitted a project redesign and revised budget for the project July 2014 and resubmitted in March 2015. Despite consistent follow up, USDA formal approval is still pending, and this has stalled start-up and delayed Land O'Lakes' ability to reach beneficiaries. Without USDA approval BDEP did not have the legal authority to issue partner sub-award and major activities remained on hold until November 2015. At that time, following USDA's verbal support for activity revisions, concurrence on sub-award partners, and approval of the midterm evaluation SOW reflecting revised indicators, Land O'Lakes moved forward with executing sub-awards with dairy company partners and full implementation in order to remain on track with the ambitious targets outlined in the modification.

Due to the delay in modification approval, and hence delays in partnership arrangements and implementation of activities, there are very few activities running at this time. The present activity areas include Upazilas namely, Shahjadpur Upazila under Sirajganj District of Rajshahi Division, Jessore Sadar under Jessore

District, Narail Sadar under Narail District, Kaliganj under Jhenaidah District, Dumuria Upazila under Khulna District, Debhata and Tala upazila under Satkhira District from Khulna Division. The activities that have taken place in the project to date are described below:

(i) 59 dairy farmers have been trained in a variety to topics within the description of whole farm management. These topics include better nutrition, provision of adequate water supply, separating water and feed supply, rumen development and early weaning, regular de-worming and vaccination for Foot and Mouth Disease.
(ii) Through feed trials, BDEP developed a more nutritious concentrate for feeding of dairy cows, with superior quality and cost-effective impact on milk production.
(iii) Sub-awards have been signed with three dairy companies and one NGO, the latter to focus on the "mini-agribusiness" component.
(iv) Four mini-agribusinesses ("MABs") have been established for blending "BDEP concentrate", the production of fodder, and provision of other goods and services needed by dairy farmers. Both farmers linked to BDEP feed trials and other farmers are buying these products and services.
(v) Master training has been provided to eight Dairy Development Officers ("DDOs) employed by either BDEP or its partners. These DDOs will form the staff of Advisory Services being established with BDEP assistance by dairy company partners.
(vi) Four staff of one project partner have been trained to assist in the establishment and support of MABsin Khulna Division.
(vii) The development of a "Dairy Recording System" or "DRS" is nearing its final stages. A key feature of successful dairy farming all over the world is the maintenance of appropriate farm management records. This generally does not happen in Bangladesh, and most target smallholder dairy farmers do not have the skills nor education to create and maintain such records. BDEP and its partners will undertake this farm management recordkeeping through our Advisory Service staff. The tablet-based record keeping system will also enable live monitoring and evaluation.

1.6 Purpose and Objectives of the Midterm Evaluation

The main objective of the Mid-Term Evaluation (MTE) is to assess the project's progress and approach. The MTE is an implementation evaluation, with findings focusing on identifying opportunities and challenges in the project approach and determining whether alterations are needed to achieve maximum impact. The objectives of the MTE are:

(1) Assess progress made in identifying the real reasons for poor dairy farm productivity in Bangladesh.
(2) Assess to what extent BDEP feed trials, whole farm management practices and technologies have led to improved farmers practices, increased milk production and higher profitability for participating farmers. Please also assess spillover effects.
(3) Measure the progress being made in training Advisory Service Staff and the relevance, quality and timing of training.
(4) Assess progress towards establishment of Milk Collection Centers by partner dairy companies, and compare this against agreed Work Plans.
(5) Assess the effectiveness of trial mini-agribusinesses established with the support of BDEP, and the prospects of these MABs to meet the needs of dairy farmers in their locality and achieve profitability as a business.
(6) Assess the effect of MABs have had on both participating and non-participating clients.
(7) Understand the views of partner dairy companies and dairy farmers in the planned MCC areas about the planned approach to establishing MCCs and providing advisory services to farmers that contribute milk.
(8) Assess the Dairy Recording System (DRS) and other M&E approaches and their appropriateness in measuring the results of the project.
(9) Verify the numbers provided in the Dairy Recording System (DRS) for a sample of participants.
(10) Provide relevant and actionable recommendations that follow logically from the findings and conclusions of the evaluation that the project needs to take into account in rolling out the approach in the last half of the project
(11) Develop lessons learned and good practices to date that will inform similar or future projects in the dairy sector.

1.7 Scope and Limitation of MTE

For the Mid-Term Evaluation (MTE) of Bangladesh Dairy Enhancement Project (BDEP), beneficiary farmers, BDEP staff, milk processors and their management officials were the most important sources of information to assess project performance on production and profitability and status of implementation. Quantitative data was collected through household surveys with BDEP project participants. Qualitative information were gathered through FGDs with male and female participants and non-participants and key informants interviews with different level of project officials. The data provided a more robust illustration of the dairy sector in Bangladesh.

Instead of comparing the results of the midterm qualitative data to that of the baseline, the evaluation team decided that the baseline population was not an adequate comparison. The baseline data was collected in the same districts, but not the same exact regions where the current BDEP participants are located. Instead, the participant farmers were asked about their experiences before and after participation in BDEP activities. Using retrospective information, especially with dairy production can be difficult because farmers generally do not keep records on production, herd management or investments in farming or household expenses. While the quantitative survey collected this information from farmers, the values should be interpreted with caution, but the direction of change should still be accurate.

Limited field activities were started in February 2014 at the time of the MTE. It has been difficult to obtain 100% confirmed information from dairy company partners on the locations for the MCCs to be established with BDEP support, which has continued to delay broader field implementation. Accordingly, measuring impact is very difficult within the short duration. It would be more appropriate that measure the impact after disseminating the technologies to a much larger number of beneficiaries and also more progress by the processors.

The remainder of this report is broken into chapters.

- Chapter II describes the midterm methodology;
- Chapter III describes the results from the quantitative household survey;
- Chapter IV and Chapter V summarize the focus group discussion and key informant interview findings;
- Chapter VI highlights three case studies; and
- Chapter VII describes the conclusions, recommendations and lessons learned.

CHAPTER- II METHODOLOGY

The midterm evaluation (MTE) has been conducted using mixed methods, including a rural dairy farm household quantitative survey with participant farmers, focus group discussions with target participant and non-participant farmers that are MAB clients; and key informant interviews with processors, MABs, project staff of both Land O'Lakes and Partner NGO, dairy development officers, and USDA. The evaluation has been participatory, ensuring that the communities in the target districts provide key inputs into the evaluation.

Prior to starting evaluation activities, the team leader had a meeting via teleconference on January 15, 2016 (Friday) at 8:30 pm to 9:05 pm with USDA-Washington staff to discuss BDEP activities. They suggested conducting the MTE by applying the appropriate methodology that should reflect the appropriateness and relevance of the project. They have also focused on judging the monitoring and evaluation system of Land O'Lakes (LOL) and finally, suggested to make the actionable recommendation for enhancing BDEP in Bangladesh.

2.1 Description of the Study Area and Sample Frame

The project intervention is ongoing over the 7 upazilas, namely Shahjadpur of Sirajganj District, Debhata and Tala of Satkhira District, Dumuria of Khulna District and Jessore Sadar under Jessore District, Kaliganj of Jhenaidah and Narail Sadar of Narail District under the Khulna and Rajshahi Divisions. However, activities have been closed in Natore and Narail where few beneficiaries were involved with BDEP and no survey was conducted in Natore.

Sampling for data collection:

As of January 2016, the project had 84 farmer beneficiaries, including both active and discontinuing. More farmers had been registered under feed formulation trial in Satkhira, Khulna and Jhenaidah since the TOR was written, thus the number is higher. In consultation with the BDEP team, it was decided that the evaluation would sample all oft he active areas and one oft he discontinued areas to concentrate on the most recent results, while still exploring change in discontinued areas. The survey was intended to be a census of the BDEP participants in the selected areas, however some participants were not available at the time of the survey. Thus the final sampling frame and sample size stands as below:

Table-2: Sampling frame for Quantitative Survey

Area			Number of Beneficiary	Sample Size for Survey	Remarks
Division	**District**	**Upazila**			
Rajshahi	Sirajganj	Shahjadpur	20	17	
	Natore	Natore Sadar	21	0	Activity closed & not surveyed
Khulna	Jessore	Jessore Sadar	14	13	
	Satkhira	Tala	08	07	
	Khulna	Dumuria	03	03	
	Jhenaidah	Kaliganj	10	10	
	Narail	Narail Sadar	08	08	Activity closed but surveyed
Total			84	58	

Table-3 : Sampling frame for Qualititative Survey

Qualititative Survey	Participants Type	# of FGD / KII	# of Participant	Organization / Location
FGD	Male Farmer Group	02	11	BDEP beneficiaries
	Female farmer Group	03	23	BDEP beneficiaries
	Non-BDEP Male Group	05	31	Non-participating but MAB Clients
KII	DDO, MAB, BDEP Staff, Processor and Partner NGO management and field staff	29	29	LOL = 05 MAB = 04 DDO = 08 Partner processor & NGO = 14

2.2 Development of Study Instruments

Both primary and secondary data were used in this evaluation study. The study used the following instruments for generating the information:

- Survey Questionnaire
- Checklist for Focus Group Discussion (FGD)
- Checklist for KII for in-depth interview

FGD checklists were prepared in order to understand the attitude of the target beneficiary group as well as other stakeholders and actors of this sector, and to collect information related to the livelihood condition of target households, among others, rearing practice & culture, milk production, scope of sale, source of feed, vaccination facilities, employment situation, vulnerability, strengths and weaknesses of the sector.

In-depth interviews/Key Informant Interviews (KIIs) with key informants were conducted with among others, staff of processing companies, PNGOs and other service providers representatives to gather information on production of milk and prospects, market linkages & potentials, contribution of different stakeholders and service providers, thoughts & ideas, constraints and opportunities etc.

The questionnaires, check lists for FGD and KII and other guidelines were finalized in consultation with the client after awarding the project and are included in Annexure 2 and Annexure 3.

2.3 MTE Survey activities

The study conceptualized the approach in a systematic and sequential manner (Fig-1). Cognizance was taken of the fact that some activities must precede some other works.

Fig-1: Survey activities at a glance

Literature Review & Desk work	• Reviewed Project Documents (Project agreement, M&E plan, DRS, periodical reports etc.) • Target population and study area • Project Indicator selection & finalization • Data Source Identification. • Participated in an inception meeting with LOL. • Development of Study Instruments.
Preparatory Work	• Recruited and provided two days training to data collectors. • Pre-tested, edited and finalized Study Instruments. • Finalized sampling frame and samples. • Finalized Survey plan. • Submitted Inception Report.
Data Collection & Quality Control	• Conducted Quantitative HH survey (58). • Conducted Qualitative survey (FGD - 10 & KII - 29) • Checked and verified data on sample basis.
Data Management &Processing	• Coded quantitative and qualitative data where required. • Data entry to the computer and compilation • Data editing and cleaning • Data analysis and produce of output tables
Report Preparation &Submission	• Prepared and submitted Draft Report • Presented draft report and got feedback • Finalization and submission of reports incorporating comments & suggestions of the Land O'Lakes.

Analysis

The MTE collected both quantitative and qualitative data. Initially it was envisioned that the quantitative data would be compared to the baseline, however, due to the change in approach, the baseline was conducted in different areas within the districts than the current participants reside. Therefore, the midterm survey asked retrospective questions about the status before their participation in the project and this is compared to the status afterwards. The qualitative information was analyzed by themes.

CHAPTER III: RESULTS AND FINDINGS OF QUANTITATIVE STUDY

Chapter-III discusses results and findings of the survey and is broken into three Sections:

- Section I presents general findings from the field survey and other findings which support these;
- Section II presents findings related to Specific Objectives 1 to 9. (Specific Objectives 10-11 cover Recommendations and Lessons Learned; these are presented in Chapter VII);
- Section III presents a SWOT analysis of BDEP.

Section-I: General Findings from the Field Survey

Household Socio-Demographic-Economic Information

The foremost objective of the BDEP is increased milk productivity for increasing profitability through modern dairy management by the participation of the different stakeholders. The below project participant's information on household demographics and socio-economic status have given an essence about the capacity of the beneficiaries regarding human resources and socio-economic condition.

3.1 Household Heads' Profile

Table-4 : HH Heads Profile.

Particulars	Male [N=48]	Female [N=10]
Household Head	83%	17%
Av. age of HH Head (Years)	48	47
Marital Status of HH Head		
Married	98%	60%
Widow	2%	30%
Separated	-	10%
Education of HH Head [M=34, F=10]		
College	-	10%
High School	33%	20%
Primary	27%	40%
No Education	40%	30%

Source : Mid-Term Quantitative Survey, January 2016.

Out of 58 respondents of the Survey, 60% of them were male and 40% were female. Among respondent households, 83% household heads were male and 17% HH heads were female. Average ages were 48 and 47 years for male and female HH heads respectively. Marital status of HH heads were of different category. Out of Male HH Heads 98% were married and 2% were widow. On the other hand, among 10 female HH Heads, 60% were married, 30% were widow and 10% were separated. Among male HH heads, 33% and 27% had sigh school and primary level education and the rest 40% had no education. A surprising 10% of female heads had college level education while 20% had high school (Class VI-Class-X) and 40% had primary level (Class I-V) schooling (Table-4).

3.2 Landholdings of the Households

Table-5: Landholdings of the respondents.

Land type	Av. land per HH (decimal) [N=58]
Homestead	13.5
Share crop	55.4
Own cultivation land	97.2
Fallow land	30.4
Fodder land	45.4
Others land	7.2
Total	131.4

Source : Mid-Term Quantitative Survey, January 2016.

Landholding of a household plays an important role in determining its socio-economic condition as rural households depend on land for their livelihoods. This will also help finding opportunity of any project intervention specially linked with broader aspect of agriculture. However, average land size (Decimal) of households has been given in Table 5.

3.3 Breeds of livestock

Breed is an important criterion for increasing productivity of dairy management. Normally, cross breed cows provide a higher level of milk production. BDEP farmers are rearing both local and cross breed with different classes of cattle. It was found that the about 69% were cross breed and 31% were local breed cattle. So, the BDEP would be helpful for dairy development in both of Rajshahi and Khulna Divisions.

Table-6: Type and breed of cattle at 58 household at present.

Breed	Cattle Type							Total
	Milking	Dry	Pregnant	Milking & Pregnant	Female (<1 year)	Male Calf (<1 year)	Ox & Bull	
Total	46	33	24	45	26	50	18	242
Local	28%	36%	17%	27%	27%	28%	71 %	31 %
Cross	72%	64%	83%	73%	73%	72%	29 %	69 %

Source: Midterm Quantitative Survey, January 2016

It is observed from the Table 7 the average number of cows per household, the number of milking cows per household and also of milking pregnant cows all increased in participant households since participation in the intervention with the project. While participants were not asked specifically about why they increased their herd size, the increase in the number of cows indicates that the participants are doing well enough to maintain and expand their herds.

Table-7: Per Household: Cow, Milking cow and Milking Pregnant Cow

Particulars	Before BDEP	At Present
Cow	208	**285**
Household	58	**58**
Per HH Cow	3.6	**4.9**
Milking Cow	**48**	47
Household	**33**	28
Per HH Milking cow	**1.5**	1.7
Milking & Pregnant Cow	30	**51**
Household	25	**38**
Per HH Milking & Pregnant cow	**1.2**	**1.3**

Source: Mid-term Quantitative survey, January 2016

3.4 Milk production

Under normal situations, milk production increases during the first six weeks of lactation and then gradually decreases. The actual amount of milk produced during the lactation period is affected by several factors such as management factors (especially nutrition, water and cow comfort) and genetic potential. Table-8 illustrates information on milk production and lactation period for BDEP intervention cows comparing before and after participation in the project. The, average milk production per day, lactation period, and maximum and minimum milk production has increased and interval period for next heat time has declined after BDEP intervention. All these factors demonstrate the positive impact of the training and feed trial of BDEP.

Table-8 shows that average milk production per cow were increased by 55% and 21% over the lactation period. Average lactation period increased by 8% and 7% and days for showing heat after birth of a calf reduced by 53% and 21% for local and cross breed cows. Maximum milk production increased by 85% and 24% for local and cross breed while the figures were 110% and 45% in case of average minimum milk production.

Table-8: Per Cow Milk production and lactation period of the Beneficiaries intervention cow.

Milking cows	BDEP trial cow					
	Before		**After**		Changes	
	Local	**Cross**	**Local**	**Cross**	**Local**	Cross
Normal average production (Ltr/day/cow)	2	7.6	3.1	9.2	55%	**21%**
Lactation period (Days)	156	227	169	242	8%	**7%**
Interval period for next heat time (Days)	195	94	91	74	-53%	**-21%**
Maximum milk production (Ltr/day/cow)	2.6	9.3	4.8	11.5	85%	**24%**
Minimum milk production (Ltr/day/cow)	**1**	**4.2**	**2.1**	**6.1**	**110%**	**45%**

Table-9 shows performance of other, non-intervention cows of same participants. Participants were only requested to try to new techniques on a certain number of their herd, and the rest of the herd it was up to them whether they applied the new techniques. Not surprisingly, the changes were smaller for all parameters as compared to intervention cows. Direction of changes is as desired, though at a slower rate.

Table-9: Per Cow Milk production and lactation period of beneficiaries other cows.

Milking cows	BDEP non-trial cow				Changes	
	Before		After			
	Local	Cross	Local	Cross	Local	Cross
Normal average production(Ltr/day/cow)	2	7.6	2.3	8	15%	5%
Lactation period (Days)	156	227	160	230	3 %	1%
Interval period for next heat time(Days)	195	94	150	90	-23%	-4%
Maximum milk production (Ltr/day/cow)	2.6	9.3	3	10	15%	8%
Minimum milk production (Ltr/day/cow)	1	4.2	1.1	4.8	10%	14%

Keep in mind that this performance data was recalled from participant farmers from memory and at a single point in time, and thus the values should be interpreted with caution. During the interviews, it was difficult for farmers to respond confidently on exact numbers, and to separate information between individual cows. This underscores the need for a recording system where dairy farming information could be recorded that could provide actual data tracking performance. In the future, DRS (still under development) will assist to record necessary data for analyzing dairy farm performance. While the values on production from the survey should be interpreted with caution, the direction of change in more reliable. Additionally feed trial records collected from the project and responses in FGDs with participant farmers corroborated the change. Both indicated much higher performance after participation in the intervention in all cases. Range of average milk production increase for local breeds was reported between 50%-100% and 50% for cross breeds. For some individual cows, milk production was as much as 500% more than before the intervention.

Appendix-3 also contains BDEP monitoring data on milk production for selected cross-breeds cows involved in BDEP feed trials. When compared to the initial average daily milk production of 5.9 liters, these charts show very good gains in milk production. They also suggest another management practice which needs attention: the tendency for farmers to milk too long, especially as before BDEP intervention these cows were getting pregnant until far too long after calving.

3.5 Feed Trial and Cost of Feeding

BDEP feed trials/whole farm management demonstrations are very different from the general practices of traditional dairy farmers. Bangladeshi dairy farmers generally mix the feed / fodder with water and normally do not provide concentrate to cows. The provision of better quality and nutritious feed, however, is one the most critical factors for dairy improvement. Improved feed is being implemented in an integrated manner by recommending the products and services provided by the Mini-Agribusiness (MABs) entrepreneurs in the local BDEP trial areas, and demonstrating to farmers the benefits of providing the enhanced nutrition to their cows. MABs are producing different types of fodders (but mainly maize) plus BDEP concentrate, maintaining the quality of feed ingredients according to the formulation developed by BDEP team leaders. To date, in order to encourage farmers to participate in feed trials, BDEP has supported the supply offered to the beneficiaries at free or subsidized cost; BDEP has reduced the subsidy over time as farmers see for themselves the gains in milk production and profit possible through the BDEP whole farm management approach. MABs are selling the feed to other dairy farmers in the local areas, without any subsidy.

The feeding pattern has changed significantly after the intervention of BDEP. Presently, all 57 dairy farmers in BDEP feed trials are providing more fodder and BDEP concentrate, chopping straw and offering large volumes of clean fresh water. They are also producing fodder on their own land where possible. Non-BDEP farmers are purchasing BDEP feed from MABs for their cows and they are also accepting the techniques and technology of BDEP for higher milk production and profitability.

To date, BDEP is implementing its field activity largely through “feed trials”. The background to these trials is as follows:

- BDEP needed to develop a “concentrate strategy” appropriate for Bangladesh that it could promote to farmers. Consistent with both the original and modified project designs, a concentrate strategy would be developed through a series of feed trials. Limited feed trials commenced in March 2014.
- As this work progressed, the BDEP formulation for concentrate was developed and has been successful in lifting milk production as part of a comprehensive animal nutrition strategy and broader farm management approach quite different to traditional sub-continent dairying practices.
- Given that by the time a sound concentrate formulation had been developed and proven effective, formal modification approval still had not been granted, BDEP management decided to continue these feed trials, in order to test further concepts likely to enhance productivity of the dairy sector of Bangladesh, and also to begin to build evidence of BDEP’s effectiveness at an individual farmer level.
- Later, as BDEP built its field team numbers (from two divisional Team Leaders, to add a further four Dairy Development Officers), working on-farm in feed trials were used as a vital means to train the new recruits.
- It is accurate to state that feed trials have been expanded in scope from the testing of nutritional inputs to effective demonstrations of BDEP’s whole farm management concept.
- More recently, the number of feed trials has been increased somewhat. BDEP management advises that the primary purpose of the larger number of “feed trials” is not so much to increase the number of beneficiaries being assisted by BDEP (the vast bulk of the effort of BDEP in this regard will be conducted through newly established Advisory Services located within dairy processing companies). Rather, the primary purpose of the new feed trials is to train Dairy Development Officers in BDEP’s whole farm management system.

It is important to appreciate, therefore, that the direct goal of feed trials has never been to reach beneficiary target numbers. In the first instance, there were clear technical needs to be addressed, and more recently feed trials enable on-farm, practical and in-depth training of Dairy Development Officers, who will form the backbone of the effort to assist the dairy farmers of Bangladesh, for the immediate BDEP project and in future. In addition, by undertaking the training of, for example, one partner dairy company’s DDOs, farmers in that area are being made aware of the company, and that training will be supplied to farmers who provide milk to new milk chilling centers which are being established. This will increase the speed of uptake of farmers as the new MCCs become operational.

As noted, the field activity of BDEP to date has been focused on feed trials, which in reality have grown to become demonstrations of whole farm management. An important feature of the BDEP feed trials needs to be described, in order that some farmer comments relating to feed cost may be better understood.

BDEP COP was always aware from his previous experience that productive dairy farming requires significant change from the traditional approach to dairying as practiced through the sub-continent. Further, he was aware that in a time-bound project, the time taken for change management could create a significant burden. It was recognized that feed trials were of benefit not just to the farmers, but also to BDEP itself, in terms of identifying a sound concentrate formulation, allowing BDEP to test expansion in the scope of its interventions, and to provide locations for the practical training of DDOs. Accordingly, it was decided from the outset that in feed trials, assistance in the purchase of recommended sources of nutrition would be made.

BDEP recognized that such an approach contains some risk, namely that farmers would not take responsibility for the profitability of their own farm, and could fail to purchase appropriate fodder and concentrate once BDEP support was removed. The sustainability of BDEP could be threatened. Accordingly, it was decided that financial support would be reduced over time, and this reduction is taking place.

A further benefit of the extended feed trials is that it allows the capture of data on milk production over an extended period. Given the short time frame of BDEP in a dairy context, and the lack of scale to date, such data is invaluable (Annexure 3). BDEP management wished to guarantee availability of extended data series and accordingly decided to continue contributing to the cost of feed purchases. It is not the intention of BDEP to provide financial support for feed purchase to the target universe of 9,625 dairy farmers.

The cost of feed is a very important factor in farm economics, whether that is in the USA or in Khulna and Rajshahi Divisions, Bangladesh. Some farmers interviewed in the course of this survey have complained about high feed costs, and desire BDEP assistance to purchase superior feed for their cows not covered in the feed trial. BDEP management response to this point is as follows:

1. A dairy company in Pakistan came to an informal view that if traditional farmers were to continue to not feed their animals satisfactorily, it might be better "to not feed a buffalo compared to not feeding a cow". Of course, neither strategy allows productive dairy farming. There is some similarity to the situation which BDEP detects in some farmer comments: there is no technical value, only emotional value, in comparing the cost of purchasing BDEP recommended feeds to what might be perceived as very low cost traditional practices (if the farmer has his or her own rice straw, and does not take into account that this rice straw could be sold – "opportunity cost"). Of course, the traditional practices which some may think are low cost, also result in very low milk production. The BDEP approach results in higher milk production of greater value than any higher input prices, and has other impacts with financial reward: lower treatment cost and much better fertility being prime examples.
2. MABs are selling chopped maize for BDT 3.5 per kg; this compares very favorably with rice straw, for which a typical market value might be BDT 5 per kg; the rice straw has no nutritional value, so the comparison is very much in favor of chopped maize.
3. BDEP concentrate is being sold at BDT 34 per kg. Commercial concentrate may be available at one taka or so less, but its quality is markedly inferior, especially in terms of its protein content.
4. BDEP has conducted exercises on the price of feed, two of which are relevant to the present debate. These are discussed below.

Calculations Regarding Feed Input Costs
The following table shows the costs of different rations for cows, the BDEP recommendation, and three traditional rations. It is noted that while grounded in real practice in Bangladesh, there is a theoretical component to these data: in order to calculate the cost of a ration, body weight should be taken into account for example. The table can be considered an example only. Of particular importance, however, is that the more traditional rations are not balanced in terms of protein requirements. Not only does this result in low milk production, it also leads to poor fertility, extended dry periods and high veterinary treatment costs.

Table-10: Information on Feed Input Costs.

Feeds	Kg	Unit Cost	Sum
BDEP Recommendation: This ration should deliver 10 kgs of milk, so approximately Tk. 20.3 per kg of milk.			
BDEP Concentrate	4	32	128
Green Fodder	20	3.5	70
Rice straw	1	5	5
Sum per Day			203
Traditional (1) : Low Input-low output (May deliver 1.5 kgs of milk, so approximately BDT 21.66 per kg of milk and Probably offered to local cows			
Rice straw	5	5	25
Road side grass	30	0	0
Rice polish	1.5	5	7.5
Sum			32.5
Traditional (2) : Somewhat more sophisticated, probably still local cow (May deliver 3 kgs of milk, so approximately BDT 21.3 per kg of milk)			
Rice straw	6	5	30
Wheat bran	1	28	28
Rice polish	0.5	5	2.5
Mustard oil cake	0.1	35	3.5
Roadside grass	30	0	0
Sum			64
Traditional (3) : For cross-bred at the Baseline of 5.89 kgs of milk (At 5.89 kgs of milk, this is equivalent to BDT 43.2 per kg of milk)			
Rice straw	9	5	45
Wheat Bran	5	28	140
Rice polish	1.5	5	7.5
Mustard oil cake	0.25	35	8.75
Kheshari* bran	0.5	18	9
Green fodder	20	5	150
Sum			310.25

* Kheshari is a Bengali name of a variety of pulses.

The above table demonstrates that on per kg of milk basis, the BDEP total ration is cheaper against traditional rations. In addition, it is noted that roadside grass, valued at zero in the above table, requires significant labor, to take cows to and from the "roadside locations." If labor were valued, it could result in a per kg cost of say BDT1 per kg of grass. The BDEP recommended total ration is cheaper than the "more professional" traditional (3) ration. Other factors such as more calves, reduced dry periods and lower treatment costs are not included in this analysis of feed costs alone.

This analysis demonstrates that BDEP may need to be aware of the "seed capital" which the most "unprofessional" farmers may face in order to invest to become more productive farmers.

Monitoring Data
The following two tables illustrate both pre-BDEP feed costs and milk production from feed trials started very recently in Rajshahi Division. These are actual results, post-BDEP, and in the case of pre-BDEP intervention, determined from farmer interviews, which have been signed by the farmers involved.

Table-11: Feed trial started on 17th Feb 2016 at Khamersanila (including adjustment period)

Farmer ID	Past feeding cost BDT/day	Present feeding cost BDT/day	Past Milk Productions/lit.	Present Milk Productions /lit.	Milk production increase/ lit.
601	543	202	Pregnant	Pregnant	
602	379	234	7	7.5	0.5
603	520	218	1st lactation	8	
604	373	314	14	16	2
605	397	330	18	18	0
606	207	218	7	8	1
607	392	266	13	13	0
608	488	186	Pregnant	Pregnant	
609	474	314	7	8	1
610	355	298	5	6	1

Table-12: Feed trial started on 10th Feb 2016 at Potazia (including adjustment period)

Farmer ID	Past feeding cost BDT/day	Present feeding cost BDT/day	Past Milk Productions/lit.	Present Milk Productions /l.	Milk production increase/ L
501	412	290.5	6	7.5	1.5
502	550	322.5	9	12.25	3.25
503	330	291	10	11.5	1.5
504	367	275	7.9	9.5	1.6
505	356	278	7.5	11	3.5
506	470	278	10	13	3
507	343	267	6.5	8.75	2.25
508	367	269	5	6.25	1.25
509	465	310	17	20.75	3.75
510	381	251	9	12	3

Feed Costs Summary

1. The evidence demonstrates that if a farmer is providing anything which resembles a reasonable ration, even under more traditional conditions, the BDEP recommended ration is significantly cheaper and generates more milk.
2. Farmer concerns about the price of feed may have two sources:
    a. If compared with a ration based on farmers providing fodder from their own sources, i.e. with no cash purchase, the higher cost is real. This, however, may be akin to the situation pertaining to Pakistan described above. This comparison is one between not feeding a cow and feeding a cow properly to achieve higher milk production and lower costs in other areas.
    b. There may be some desire to seek further contribution from BDEP, as this is perceived as the way in which development projects should operate.

3.6 Insemination and fertility

Fertility is a vital factor for productive dairy farming. With respect to insemination, FGD participants indicated that almost all intervention cows conceived after first attempt while other cows required 2-3 attempts on an average. It could be noted that BDEP cows showed first heat even within one month after calving (but insemination is never done at first heat). Insemination is done at second heat. The fertility of BDEP cows has clearly increased. Other positive results regarding pregnancy were noted e.g. reduced complications of delivery which also reduced farmers' costs. It could also be noted that BDEP ration includes Black Cumin in the ration with good result in terms of fertility. This is an excellent innovation by BDEP. Average cost of insemination was Tk. 334 for BDEP cows. The cost ofinsemination was higher (Tk.400) for non-BDEP cows as compared to BDEP cows.

One farmer of Shahjadpur said in the FGD that one of his cow aged 36 months but had never conceived. After introducing with BDEP, he provided BDEP formulated ration and that cow conceived within 2.5 months.

3.7 Management Practices

BDEP has introduced significant changes in dairy whole- farm management practices, moving away from traditional approaches to more productive and animal welfare sensitive practices. The below section describes the different practices introduced and the uptake of those practices from the farmers. Table 13 summarizes the difference practices used before and after the intervention. It should be noted that farmers were asked to use these practices on certain cows, whereas it was their choice as to whether they applied the practices to other cows on their farm. Table 14, at the end of this section shows the percentage of farmers that use these new techniques on their intervention cows and other cows.

Table-13: Management Practices

Management Practice	Before	After
Feeding	Chopped straw & non-chopped fodder	Chopped green fodder and less straw.
Bathing	Usually 2-4 times in a month	At least once in day -100% intervention cow
Feed mixing	Water mixed with feeds and loss of feed and nutrition	Water provided separately and no loss of feed and nutrition -100% intervention cow
Cleanliness	Cow sheds were not cleaned regularly	Regularly cleaned -100% intervention cow
Early weaning	None	Early weaning practiced for intervention cows -100% intervention cow
Space	Not enough space for cows for comfortable environment.	Comparatively enough space and ventilation, sand bed using for cow comfort – 93 % intervention cow.
Hand washing for milking	Not aware—both farmer or middle-men and not washed hands always.	Much aware—both farmer and middle-men but needs to wash hands for milking each cow. Usually still wash hands once before milking.
Treatment of cows	Prevalence of Foot and Mouth Disease (FMD), Mastitis, Anthrax, Fever, Complicated delivery of calves etc. caused higher treatment cost.	Precaution using proper vaccination, de-worming and improved nutrition caused lower cases of disease invasion and cost of treatment.

Nutrition

Traditional low cost "rations" provided to cows are based on rice straw and roadside grass. There is a gross shortage of energy and especially protein in such rations, leading to poor animal health, poor fertility (with attendant lengthy dry periods) and low milk production. In Khulna, previous development projects have recommended the provision of boiled rice to cows. The carbohydrate in this supplement can provide an immediate boost to milk production, but at the cost of significant fertility and other health problems. Boiled rice does not solve the shortage of protein. "More professional" dairy farmers may provide green fodder, generally Napier, but a variety of feeds are used. These farmers may also use a concentrate, but the concentrates produced commercially in Bangladesh tend to be of poor quality, poorly formulated and

sometimes adulterated in order to boost apparent protein content. Commercial concentrate still focus too much on energy and insufficiently on real protein.

BDEP has introduced a ration based on maize (higher protein than Napier) and a well formulated concentrate providing energy and protein. BDEP has also introduced minor components such as rock salt for trace elements and black cumin for boosting fertility. All farmers surveyed provided the new feed to theirintervention cows, while 60% also provided the feed to their other cows.

Fodder Chopping
Often, fodders such as Napier are fed either without any chopping or insufficient chopping. This increases waste as well as reducing digestibility. BDEP has introduced comprehensive fodder chopping. All participants surveyed provided both interventionand other cows with chopped fodder.

Water
Cows are tied up and it is the farmer who must decide when the cow is to drink. Water is usually provided only twice per day; some farmers only provide water once per day. This is a significant animal welfare issue, as well as having a negative impact on milk production and animal health.

BDEP trains farmers to provide clean, fresh water 24 hours per day. All farmers interviewed indicated that they provided water in a separate trough to both their intervention and other cows. Project beneficiaries provided 22 liters and 14 liters of water to cross and local breeds before the intervention.

Feeding
Farmers generally use one trough for water and feed, which are mixed. It is terrible to see a cow having to dip her head underwater to be able to eat, sometimes so that nostrils are below the water level. This practice also leads to waster as feed in water ferments. It was also observed that cows stepped into the feed trough to reach feed.

BDEP has introduced a dual trough system for separate provision of water and feed. All farmers surveyed indicated that they provided the water separately.

Body Condition Scoring
BDEP has introduced the very important body condition scoring to record the condition of cows. This is always used in developed dairy sectors, but not within the Bangladesh dairy sector to any degree.

Cow Comfort
BDEP has trained farmers to “bathe” their cows at least twice per day, in summer we aim for three. This is to mitigate the high temperatures prevalent in Bangladesh. It is evident from their behavior that the cows love their showers.

It is common in winter time to see cows covered with canvas blankets to keep them warm. This is not necessary and counterproductive. All BDEP farmers have ceased this practice. Also, it is common for cows in winter time to be housed in sheds with canvas awnings down, again to keep them warm. BDEP has stopped this practices which elevates temperatures unnecessarily and increases health risks. BDEP has trained farmers to locate cows outside and under shade for best ventilation and lowest temperature.

BDEP is influencing farmers to provide sand beds for far better cow comfort and reduction in lameness (it is noted that lameness negatively impacts milk production). Some bigger farmers are accepting BDEP advice to build new sheds with fencing, so that cows can be untied. This further enhances cow comfort, allows the cows to demonstrate normal animal behavior (establishment of a pecking order, and bulling, which assists in heat detection). Untying cows also reduces work load significantly.

The survey indicated that all respondents bathed, provided better ventilations, and provided no cover in the winter to their intervention and other cows. Three-quarters allowed the cows to be outside in the shade. Only about 20% had sand beds for their cows, although this training was only introduced in the recent feed trials.

Animal Health Practices
Farmers tend not to vaccinate on a regular basis. The key disease of concern in the areas BDEP is active is Foot and Mouth Disease (FMD), and when this is done it is often with poor quality vaccines, or vaccines which have not been maintained in a satisfactory cold chain. The Department of Livestock Services is an offender in this regard. Cows are not de-wormed on a regular basis, and often when de-worming is undertaken, it is done without an assessment of the weight of the cow. As a result, under-dosing is common and therefore the treatment is ineffective.

BDEP has promoted regular vaccination of cows with an effective, imported FMD vaccine and providing deworming on a quarterly basis. BDEP has also introduced the California Mastitis Test (CMT) to Bangladesh. This allows for detection of sub-clinical mastitis and early treatment before it becomes clinical and causes loss of production (and poor quality milk being offered for sale). Also, BDEP recommends natural remedies for particular issues, where these are effective and low cost.

According to the survey, all respondents gave quality FMD vaccinations to their intervention cows, and 10% also gave it to their other cows; all respondents performed regular deworming on their intervention cows, and 50% on their other cows; and all respondents used California Mastitis Test on both intervention and non-intervention cows.

Mitigation of Calving Difficulties
Difficulties with calving are common Bangladesh, largely owing to poor nutrition. Specifically, uterine prolapse is common. If farmers note the placenta has not released within 3 to 4 hours they call veterinarians who uterine palpation or oxytocin hormone, resulting in infertility and milk production decrease owing to hormonal imbalance.

BDEP advises farmers that after calving the cow should be offered sugar or molasses solutions and then proper mixed ration which contains micro-minerals.

Provision of Colostrum
Not all traditional farmers allow the calves to suckle colostrum as early as desirable, in sufficient volume and on occasion colostrum is not provided at all. BDEP ensures that all calves have full and appropriate access to colostrum. The survey confirms that all farmers allow calves to suckle colostrum on both their intervention and non-intervention cows.

Introduction of Calf Milk Replacer
Calf Milk Replacer (“CMR”) is essentially unheard of in Bangladesh. The provision of CMR is both cheaper than the supply of milk, and better for the calf as it is possible to accurately measure the volume supplied compared to letting the calf suckle for a somewhat indeterminate time at the end of milking, which is existing practice. About 10% of farmers indicated that they use calf milk replacer. This is a new intervention in the area and was not found before the intervention.

Rumen Development and Early Weaning
Traditional farming practice in Bangladesh is to allow calves to suckle for extended periods, generally at least six months and sometimes nine months or even longer. This represents a significant loss of income to farmers.

BDEP has introduced the provision of maize powder to calves at around one week’s age. This encourages early rumen development which in turn allows for early weaning. BDEP calves are weaned at around 4-6 weeks. The survey indicated that all farmers do early weaning on their intervention cows and about

Practices for Milking Hygiene and Mastitis Prevention
BDEP has trained farmers to wash hands before milking, and between milking if the farmers have more than one cow, in order to reduce the prevalence of mastitis. Also, BDEP has trained farmers to offer feed immediately after milking, to encourage the cow to stand and hence time for the keratin plug in the teat to close. This also reduces the risk of mastitis. The survey indicated that 70% of the farmers utilized these practices.

Ear Tagging
BDEP cows are tagged for unique identification and hence enable farm management records. Ear tagging is not done at the smallholder level. This was not found prior to the intervention, but the household survey found that all farmers use ear tags on intervention cows and 10% of farmers also use them on non-intervention cows.

Table 14 - Implementation of BDEP Management Practices

BDEP Recommended Practice	Uptake by BDEP Farmers [N = 58]	Spillover to Other Cows of BDEP Farmers [N = 58]
Better Nutrition	100%	60%
Fodder Chopping	100%	100%
Adequate Water	100%	100%
Separate water and feed troughs	100%	100%
Cow comfort - bathing	100%	100%
Cow comfort – better ventilation	100%	100%
Cow comfort – no covers in winter	100%	100%
Cow comfort – outside in the shade	75%	75%
Cow comfort – sand beds	20%[1]	20%
FMD vaccination with good quality vaccine	100%	10%
Regular de-worming	100%	50%
Use of California Mastitis Test	100%	100%
Adequate and timely provision of colostrum	100%	100%
Use of calf milk replacer	10%	10%
Strategy for early rumen development	100%	100%
Early weaning	100%	70%
Mastitis prevention practices – feeding after milking	100%	100%
Mastitis prevention – milking practices	70%[2]	70%
Ear tagging	100%	10%

Source : Mid-Term Qualitative Survey, January 2016.

Notes:

1. BDEP did not focus on sand beds until more recent feed trials were implemented. Also, existing farm layout can make this difficult to achieve.
2. Especially in Khulna Division, quite a high proportion of milking is being conducted by middlemen; it is harder to get them to wash hands, but some BDEP farmers are pushing for this with a degree of success.

3.8 Women involvement in Dairy farming

It was found that women members of 100% respondents' households were involved in dairy farming activities. From the quantitative survey, it was found that women were mainly involved in cow shed cleaning (93%), cattle feeding (93%), fodder / straw chopping for other cows (84%), bathing of cows (48%) and milking (53%). In addition, wives of MABs provided support to their husbands in operating their business.

3.9 Farmers' Perception about BDEP

Farmers have various types of feelings, demands and perception about BDEP. To exemplify, some have been mentioned below:

- Training is necessary to be extended
- Application of New technology / Technique
- Continuity of the project for long term
- Good for Milk production and health management
- Necessary to include successful and new farmers with project
- Whole farm management helped to increase efficiency with better management
- Created opportunity to increase income
- Created new opportunity for employment of men and women
- Improved standard of living and livelihood pattern
- Simplified the marketing facilities at home level

Section -II: Objective Based Performance Evaluation

Objective-1: Identification of the Real Reasons for poor productivity
BDEP claims to focus on the real rather than the perceived reasons for poor productivity, a precondition for addressing those factors. In order to investigate this claim, we considered two scenarios: progress of the sector prior to BDEP, and progress of the small number of farmers being assisted by BDEP to date.

Scenario I
The Government of Bangladesh, through the Department of Livestock Services, has funded activity in the dairy sector for decades. In addition, considerable funding of development projects in the dairy sector has occurred, financed by international donors.

Despite these efforts, significant development has not taken place. There has been growth in milk production, but in general this has been driven not by higher productivity but by higher farmer and cow numbers: production by masses, not mass production.

DLS and many donor programs place a great deal of emphasis on genetic enhancement through artificial insemination. An anecdote is provided by the BDEP staff on this matter is that if the best cow in the world was brought to Bangladesh, fed primarily on rice straw, offered very limited volumes of water at times of its owners choosing, kept in hot conditions on hard floors, and milked in such a manner that mastitis was more than likely, then very, very probably it would no longer be the best cow in the world. The meaning of this anecdote is that even with the best genetics, if the farmer does not know how to look after her cow properly, the cow will not be as productive as the cow's genetic potential suggests it should be. This implies that in the situation of Bangladesh today, animal husbandry is more fundamental than genetic improvement. Farm management practices need to be improved before efforts based on genetic gain will have a sound return on investment.

Another comment from the BDEP staff is that if cows are not fed a healthy diet, they will not be healthy, leading to significant treatment costs. This is a logical position, and is reflected in our own families: if humans are not fed properly, they will become ill, just as cows will. Again, this suggests that providing better nutrition is more fundamental than increasing veterinary treatment.

It may be a fair and logical conclusion that most efforts to date have not identified the real factors limiting productivity at the farm level.

Scenario II
This scenario reviews whether BDEP is having the impact which, if significant productivity factors have been identified and are being addressed, it should.

Our survey and BDEP data indicate the following:

- Milk production is higher, sometimes markedly so (gains of up to 500% for local breed cows have been reported).
- Animal health (and welfare) is significantly enhanced, with lower treatment costs being reported by all farmers.
- Poor fertility is a significant problem causing lost productivity and higher costs. The approach prior to BDEP has been to either wait for extended periods before a cow becomes pregnant (dry periods of 6-9 months are typical, and up to one year or even longer are not uncommon), and/or to seek veterinary treatment. BDEP farmers are achieving first heat show around 30 days after calving, and cows are becoming pregnant at second heat some 55-days after calving. This is in line with international norms, and represents a tremendous productivity boost for the Bangladesh dairy sector. This significant gain has been achieved solely through enhanced nutrition, rather than being any pharmaceutical effect.

These gains, as reported by farmers in discussion groups and through BDEP monitoring data, strongly suggest that BDEP has identified the real factors limiting productivity of the Bangladesh dairy farming sector, and is addressing these comprehensively. There is further support for this position with the involvement of significant private sector companies in the project. These companies are investing their own funds together with BDEP; they would not be doing this if they believed BDEP was on the wrong track.

Objective-2: Assess to what extent BDEP feed trials, whole farm management practices and technologies have led to improved farmers practices, increased milk production and higher profitability for participating farmers. Please also assess spillover effects.

Visits to the farms of beneficiaries of BDEP show the following:

1. The first impression is that BDEP farms are much cleaner than is typical.
2. Feeding stations have been built out of cheap, locally made materials, at far lower cost than the shed design recommended to farmers to date. These feeding stations are built primarily out of bamboo and mud, with two concrete troughs, one each for water and feed. Water and feed are nearly always mixed in Bangladesh, and seeing a cow having to dip its head under water (such that nostrils are below the level of the water) to reach feed is a common sight.
3. Farmers are providing much more water to their cows than previously.
4. In the more recent feed trials, BDEP is assisting farmers to install sand beds for much improved cow comfort.
5. The feeding stations are open and well ventilated, and under shade to the maximum extent possible.
6. Body condition of BDEP cows is markedly ahead of the cow's prior condition, and much superior to those of typical cows in Bangladesh.
7. Farmers report bathing of cows much more often than in the past, in order to mitigate the effects of high temperatures. Temperatures in Bangladesh often reach the point at which milk production is negatively impacted.
8. Feed has been chopped more finely by "toka machine"; typically, chopping is either done by hand or not at all. Chopping of feed to a reasonably small size reduces waste and enhances digestibility.
9. Calves are receiving much more attention, and are healthier and much larger than is the norm. BDEP considers that the calves born to cows under their management system will attain a higher proportion of their genetic potential than is the case under traditional management. Quite frankly, traditional calf rearing is a serious animal welfare issue, and calves are near starvation from when in the womb and then on through much of their lives.
10. Farmers are achieving early weaning through the BDEP rumen development and weaning strategies, resulting in a higher proportion of milk being available for sale.
11. A small proportion of farmers use Calf Milk Replacer, which is cheaper than the value of milk consumed by calves. At least as important, using CMR facilitates accurate measurement of milk offered to calves, rather than making assumptions about how much milk it is drinking from the mother.
12. BDEP supports vaccination against Foot and Mouth Disease with an effective vaccine, and conducts regular de-worming.
13. More attention is paid to hygiene at milking, and to feeding straight after milking as part of a mastitis prevention strategy.
14. BDEP has introduced the California Mastitis Test, allowing detection of sub-clinical mastitis and early treatment.
15. For some illnesses, BDEP has introduced natural remedies, notably green bananas for the treatment of diarrhea. The farmers are pleased with the saving of money this enables.
16. Rock salt is being provided in the feed trough, contributing to better animal health. The fact that the cows are licking the salt block indicates that the cows feel the need. Mineral blocks are commonly provided in developed dairy sectors.

It is clear that dramatic changes in farm management practices have occurred.

With respect to milk production, farmer responses illustrate the milk production is higher, sometimes by a high percentage. While the values reported by farmers based on memory and at a single point in time should be used with caution, farmers indicated in the quantitative and qualitative interviews and monitoring data that production has increased. (It is noted that lactation effects and the lack of farm management records across the dairy farming sector of Bangladesh make it difficult for a single point evaluation, as is the case in the present survey, to develop much reliable data).

At any time it is hard to measure dairy farm profitability, especially in a sector without a history or even the ability to maintain farm management records. Nevertheless, as general statements the following can be reported:

1. Milk production is up.
2. Owing to early weaning, a higher proportion of milk is available for sale or home consumption.
3. Fertility gains are resulting in reduced dry periods, which will have a significant profit impact over time (and incidentally results in lower greenhouse gas emission per unit of milk production).
4. Treatment costs are lower.
5. Healthier and bigger calves may be sold for a higher price than was achievable previously, or go on to be more productive lives than ever believed possible.
6. Feed costs are lower when compared to typical diets offered at the “more professional” end of dairy farming in Bangladesh. This is the common situation in Rajshahi Division. Especially, feed costs are lower on a per kg of milk basis, even when compared to traditional and low productivity rations at the “least professional” end of dairy farming.

All these factors suggest that profitability is up. Further support for this claim comes from sales of BDEP concentrate to non-BDEP linked farmers. They would be unlikely to be buying this product if it were not having a positive impact on productivity and profitability. Considerably more time, over at least two full lactations for a larger number of farms would be needed to provide an in-depth report on profitability, but the qualitative evidence is clear: BDEP is having a very positive impact.

With respect to spillover effects, farmer group discussions indicate this is occurring, very probably to a higher degree than is common in most projects. Another indication of this is with sales of concentrate: the first four MABs reported sales of concentrate in January 2016 to 37 BDEP farmers, and 67 non-BDEP farmers.

Objective-3: Measure the progress being made in training Advisory Service Staff and the relevance, quality and timing of training.

Owing to tardiness of dairy company partners, training on the BDEP approach of dairy company Advisory Service staff has been provided to relatively small numbers of DDOs. At 1 March 2016, BDEP was training or had trained ten DDOs employed by one dairy company partner; four DDOs employed by another, with two more to join this week; and four DDOs employed by a third, with two more expected to join within a short time.

The BDEP target for DDOs to be employed by dairy company partners is 70, so better action is required by dairy company partners.

In addition to the above, one Business Development Manager and three Business Development Officers recruited by the fourth partner for the support of MABs have been trained. This is the full complement of staff to be trained. The focus of their staff training has been on fodder crop production and concentrate blending to high quality standards, in addition to business support training.

Key Informant Interviews of selected DDOs illustrate the effectiveness of the BDEP approach, with in-depth and hands-on training. The detailed comments of KIIs have been enclosed in Annexure 2.

BDEP Team Leaders note that partner DDOs receive the same training as BDEP DDOs have in the past, and their effectiveness has grown markedly since commencing this training. The effectiveness of this training is best measured by the success of farmers supported by DDOs, and this is recorded elsewhere in this report.

The chief challenge for BDEP in this particular piece of the project is to hasten the recruitment of DDOs by dairy company partners, and their effective assignment to BDEP for training purposes.

Meaningful and effective training of dairy farmers is vital to achieve better productivity and profitability. BDEP is undertaking its training through an innovative and in-depth system based around individual, on-farm training. DDOs visit every beneficiary household on a regular basis. The training information and outcomes are presented in Table 5 and Table 6. The beneficiaries have received training mostly more than one place, but on the beneficiaries own farm was the dominant place for the training in more productive dairy farm management. All project beneficiaries advised that they received training from BDEP where there was a very low number of trainees, allowing excellent interaction between farmers and trainers.

Table-15: Places from where respondents received dairy training.

Place of training	% of Respondent [N=58]
At home (on farm)	100
At home + class room	41.4
At home + others	100
At home + other village	6.9
Others	24.1

Source : Mid-Term Qualitative Survey, January 2016.

BDEP has been providing training to both male and female farmers. Trainings are being given on-farm so that need-based training can be provided to farmers. All of the 58 BDEP farmers interviewed indicated that they received training at home. Some of the respondents also indicated receiving training in a classroom setting or through other means. These methods of training were not provided by BDEP.

Regarding the level of satisfaction of training, most of the respondents (58%) were satisfied following by highly satisfied (12%) with the training programs provided by BDEP. It could be noted that all beneficiaries and non-beneficiaries said in the FGDs that they were well aware about hands-on training programs of BDEP and were achieving better results by applying the knowledge from BDEP training programs. They followed instructions of Dairy Development Officers (DDOs) in order to achieve higher levels of milk production and better management practices for their cattle. In addition, they were also applying these methods for cows not included in the BDEP.

Training topics received by the participants included Quality animal identification, Quality milk collection, AI-Merit-Demerit, Fertility improvement, Fattening, Business planning and Communication which were provided by Government Officials or other NGOs. Table 15 lists the different training topics covered.

Table-16: List of Different Training Programs of BDEP

	Water & Nutrition		Disease Management
1	Importance of providing clean water to animals	1	CMT test and Mastitis prevention
2	Feeding systems	2	Other Disease Management
3	Crude Protein	3	Regular Health Check up
4	Energy	4	Vaccination and Deworming
	Fodder Cultivation & Processing		Record keeping
1	Soil conditioning	1	Record keeping
2	Types, characteristics and qualities of green fodder	2	Own farm production records
3	Preparation and using compost for fodder cultivation	3	Own income & expense records
4	Using chopped fodder	4	-
5	Silage making	5	-
	Whole-farm management		
1	Farm cleanliness	10	Feed management (Concentrates)
2	Housing conditions	11	Feed management (Green fodder)
3	Bathing/temperature mitigation	12	Weaning and calf rearing; rumen development
4	Male calf growth management	13	Milk replacer for calf
5	Udder Development	14	Heat detection and insemination
6	Cow shed (ventilation and temperature)	15	Calving management
7	Body Condition Scoring (BCS)	16	Feeding of colostrum
8	Body Weight measurement	17	Water and Feed Troughs
9	Milking hygiene and complete milking	18	Special care on calf at the age of 3-4 weeks.

Objective-4: Assess progress towards establishment of Milk Collection Centers by partner dairy companies, and compare this against agreed Work Plans.

Progress on MCC establishment has not been as desired. BDEP has involved dairy companies in its project in order to achieve sustainability and formal market linkage, as well as significant private sector capital investment. BDEP management believes strongly this is the way forward for dairy development in

Bangladesh. One of the BDEP philosophies described by BDEP staff relates to specialization: "farmers should farm; processors should process". It is noted that specialization is a key driver of all modern economies, and in addition this BDEP philosophy reflects practices in developed dairy sectors. A downside of the involvement of the private sector, however, is that it is the companies who must act on investment schedules. BDEP management pushes dairy company managers to meet their contractual commitments, but still there are delays.

An important number for BDEP in terms of dairy company infrastructure development is the target of 150 tons of new milk chilling capacity. This includes both MCC and Milk Hub capacity. As of the time of writing, the following is the situation by partner:

- Partner 1: 14 tons of MCC capacity has been ordered and is being shipped to Bangladesh as this reportis written.
- Partner 2 has the letter of credit processes underway for the purchase of 80 tons of MCC capacity plus30 tons of Hub capacity.
- Partner 3 has made all preparations for the purchase of 10 tons of MCC capacity; an order has been placed with the local representative of the equipment manufacturer.

The above figures mean that two partners will have under order 100% of their obligations as per contract. The third still needs to order a further 26 tons of capacity. This is planned for March or April.

So, by the time this report is presented to USDA, 134 tons of new milk chilling capacity will be either being shipped to Bangladesh, or under order. This means that dairy companies are moving or have moved from contractual commitment to financial commitment. This is not to suggest that contractual commitment is insufficient, but having major investment on the ground brings its own incentive for more rapid progress.

The original project design anticipated the installation of only 42 MCCs and total 82 tons of new milk chilling capacity; it is considered that the intended investment as per the original design may have proven insufficient to cater for the milk of the originally targeted 17,000 farmers.

After review of the present situation, it is noted that dairy companies are slower than they indicated via agreed work plans, but that plans are now well underway to achieve the desired target. Indeed, when one partner orders the further 26 tons of capacity, the target will be exceeded. It is further noted that many of its new MCC facilities will have ample room to expand chilling vat capacity when milk production increases in future. They are building in a degree of future proofing, demonstrating the sustainability of this development.

Objective-5: Assess the effectiveness of trial mini-agribusinesses established with the support of BDEP, and the prospects of these MABs to meet the needs of dairy farmers in their locality and achieve profitability as a business.

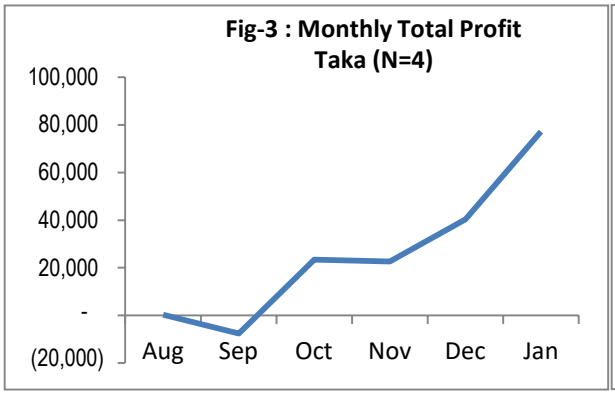
Objective-6: Assess the effect of the MABs has had on both participating and non-participating clients.

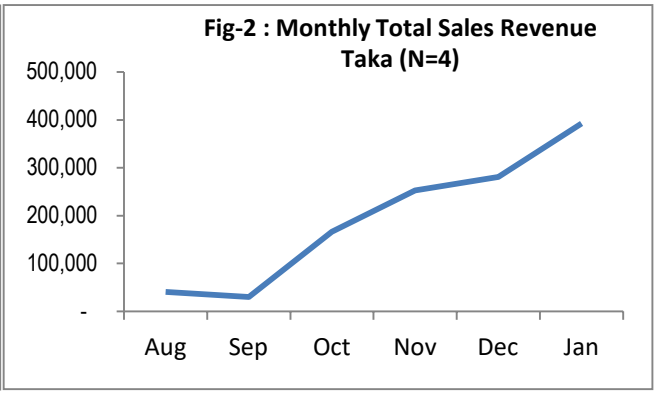
At the time field work was conducted for this survey, BDEP had supported the establishment of four MABs. Before write-up was complete, a further four had entered into contract with BDEP, the partner is well placed to proceed with further identification and selection of MABs in its geographic zone.

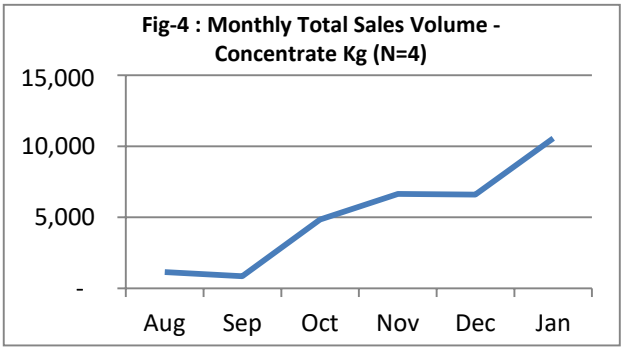
Key Informant Interviews with the existing four MABs (see KIIs) indicate this new and innovative concept will succeed. Each month BDEP receives reports from the four MABs on sales of key items, income and profit. These reports have been reviewed in the course of this survey. The following charts, based on monthly MAB reports, strongly suggest:

- This is a sustainable endeavor.
- While there is a range of progress among the four MABs, they are effective and the products and services they are providing are in demand from farmers, both BDEP linked and non-linked.

- They are profitable







The above profit figure includes an allowance for the MABs own labor. It is noted that a monthly income of BDT 5,000 would be considered good in rural Bangladesh, so while there is variation between them, the overall picture for BDEP MABs is very positive.

The performance of some MABs is compelling, to the extent that the experience of one MAB is included as a Success Story in this report (see Section-Case study).

One of the key factors limiting the productivity of thedairy sector of Bangladesh is the nutrition provided to dairy cows. BDEP acts in an integrated manner, and the MAB concept is dealing with the supply side ofnutrition, while farmer training is addressing the demand side.

It is further noted that non-BDEP farmers who purchase BDEP concentrate and feed do so owing to its superior quality and effectiveness relative to other commercially available concentrates.

With respect to the effect of MABs on BDEP farmers, it is noted that as per the above comment, BDEP acts in an integrated fashion, and supply and demand of sources of nutrition are two sides of the same coin. As noted previously in this report, milk production is higher for BDEP farmers, as is profitability. The products and services offered by MABs are a key part of this story.

For non-BDEP farmers, we suggest the proof is in the sales being recorded. But in addition, BDEP has provided some anecdotes as follows:

> "Today, I talked with four farmers in avillage at our MAB's shop with a Manager and DDOs about concentrate feed quality and impact on production and cow health. All farmers said this feed is the best feed so far we found in the market". 16 November, 2015.
>
> "In a village, one farmer purchases concentrate feed; he is getting 33 liters of milk but previously he got only 24 liters, a 9 liter increase in his farm production. In addition all farmers have milk production increase 1-2 liters in short time". November 2015.
>
> "In a village, I visited one farmer and advised him for provide our concentrate feed and follow our system; after 5 days he got result that milk production increased 5 liters. in his farm then he talked another farmer about this then that farmer purchase 30 kg on the spot". December 2015.
>
> "A farmer at another village is a Non-BDEP farmer. He has purchased feed from MAB for six months.

That time he had seven cattle including three milking cows; his feed cost was BDT 6000 per week and total farm milk production was 15 liters per day. Now, with the same cattle total farm milk production is 33 liters per day and feed cost per week is BDT 5000. The health of his cows is very good, their coats are glossy and treatment costs have decreased. He is very happy".

"A farmer is an enthusiastic non-BDEP farmer. He had one heifer only when this heifer became pregnant; at that time he started to purchase concentrate feed from MAB. During parturition she did not face any difficulty and milk production reached 16 liters per day. He said, generally we do not get milk like this in first lactation. He is very much happy".

Objective-7: Understand the views of partner dairy companies and dairy farmers in the planned MCC areas about the planned approach to establishing MCCs and providing advisory services to farmers that supply milk.

The partner dairy companies have signed contracts with the LOL for establishing MCCs and providing advisory services to farmers following the BDEP approach. They are now at initial stages for establishing MCCs however they have started their activities in the project areas. But, they are not collecting milk from farmers at this stage. The detailed progress activities of partner dairy companies have been outlined chapter 5. The project performance and implementation will depend on the enhancement of project activities by the partner dairy companies.

One project partner has provided a comment about BDEP as follows:

"The approach is good because dairy farmers are able to increase their knowledge on dairy farming and from now onward they can take dairy farming as a primary source of income which is not common. By our focus and concentrated services most of the cases farmers milk production also doubled, so it reduces their production cost also.

By the help of BDEP, we work on every step of dairy value chain and quality input also available in community which was not available before our joined work. We work from fodder crop to consumers' glasses which cover all of the area in dairy farming and the dairy sector in general. We not only work for farmers' milk production but also buy back of milk is guaranteed. This system reduces the probability of milk adulteration, so we can assure 100% quality milk to consumers".

Another project partner has provided overall comment about BDEP as follows:

"As a technical person on dairy production, I believe that the approach of BDEP is the most perfect and very much sound. Our nondescript deshi cows are sorely underfed at farmer's house level in the rural areas. If they are managed nicely with abundant water and provide balanced feed with green roughage and balanced concentrate separately, it will reduce the daily work load of the farmers, health condition of the cows would be improved, calving interval would be reduced, normal disease intensity will be almost absent. Animal comfort would be achieved etc. which results one calf in one year.

By introducing the techniques related to dairy production, milk production will be increased at the farmers' level, by which the farmers through which they will benefit. They can sell more milk to the market for their good livelihood earning and consume a bit by their households. Establishment of MCC will reduce the collector system (middle man) of milk collection and it helps the farmers by supplying milk directly to the MCC with more benefits - like bonus, transport benefits and others. In my consideration BDEP's concept is a good concept.

Regarding dairy production, most of the technocrats in Bangladesh are giving wrong advisory services to the farmers, as they are not acquainted with appropriate knowledge and are giving wrong advice to the farmers. I believe that proper advisory services by the skilled staff can provide genuine assistance to dairy farmers, will prove to be an asset in terms of farmer loyalty.

"It can be said that all appropriate dairy production personnel as well as management personnel related to dairy production of this dairy company will believe the concept of BDEP".

Responses from another partner' Dairy staff, as described in Key Informant Interviews, are very positive towards BDEP, with the description "revolutionary" being used.

As noted elsewhere in this report, dairy farmers are very positive about the BDEP approach. In FGDs, they recommended BDEP expand to other locations and cover more farmers. This is considered to be positive support for BDEP.

Objective-8: Assess the Dairy Recording System (DRS) and other M&E approaches and their appropriateness in measuring the results of the project.

Dairy Recording System: There are three components to DRS.

1. A tablet based system for keeping farm management records.

Maintaining farm management records is a necessary part of successful dairy farming, and is practiced throughout developed dairy sectors. It is not considered feasible, however, to ask smallholder farmers to maintain records owing to high levels of functional illiteracy in rural Bangladesh. One partner records some farm management data for the larger farmers supplying milk directly to the company, but they acknowledge that the amount of paper required makes it impossible to use the data for analytical purposes. The partner struggles for a limited number of farmers, but the task would be impossible if the goal were to assist all 9,625 target beneficiaries.

BDEP management considers it is time to take advantage of modern technology for the purpose of recordkeeping. Accordingly, DRS is under development. At the tablet end of this tool, DDOs enter farm management data whenever they are on-farm. All DDOs will have tablets and will be trained in the use of DRS.

It is noted that there is a good degree of overlap between the records needed for sound dairy farm management and the recording of training of beneficiaries, and the data needed for Monitoring & Evaluation as per the Agreement between USDA and Land O' Lakes. Accordingly, it makes sense to use the data for these twin purposes.

Some example screenshots to illustrate the type of farm management data that BDEP will capture through DRS are include in Annex.

2. Cloud Database Analysis

Data from the tablets from the DDOs will be uploaded from to a database in the cloud, where it will be analyzed as per the needs of BDEP, dairy companies and other stakeholders. BDEP intends to provide access to USDA if desired.

3. Data from dairy company milk payment systems.

Data from individual dairy company payment systems shall be uploaded to the cloud database. Farmer registration in DRS will use the same code as for milk payment systems, together with a code for the individual dairy company. Payment data will be linked to DRS information through this code. Payment system data will provide twice daily records of milk offered for sale and the fat content of this milk, on an individual farmer basis. BDEP and its partners, therefore, will have 100% records of probably the single most important indicator, milk being offered to sale through the new MCCs, the volume of which will reflect the performance of the BDEP whole farm management system and partner expertise.

Some examples of the intended analysis made possible through this integrated system combining field data and payment system data are as follows:

1. Number of farmers registered by individual BDEP partner.
2. Number of training sessions, on water utilization, nutrition, etc.
3. Number of vaccinations and de-worming.
4. Treatment records.
5. Dry periods.
6. Milk offered for sale on twice daily basis, by farmer, by MCC, by partner.
7. Sums paid for that milk.
8. Fat content of that milk.
9. Gender analysis.
10. Milk production by breed and geographic zones.

Where appropriate, these analyses will be presented by chart.

DRS and Cloud Based Analysis will build a comprehensive picture of the progress of BDEP and its partner dairy companies and farmer beneficiaries. One partner is already considering expanding the use of DRS to the other locations where farmers supply milk directly, but note that DRS needs to be proven first.

BDEP considers DRS and cloud database analysis to have excellent potential for both dairy sector and development purposes, and will be on great interest to local government in Bangladesh as well.

Other M&E Approaches
BDEP has an M&E system to monitor project activities and progress as well as evaluating performance. The project initially had a total of 80 indicators. Project indicators have been revised during modification of the BDEP design. At present there are 47 indicators of which 24 indicators are activity level and 23 indicators are result level. BDEP results framework has also been revised accordingly. Achievements against those indicators are being monitored monthly. DRS will be useful simultaneously for recording dairy related information for long-term use e.g. history of cow generation, milk production and sales volume, on-farm training etc. DRS will be useful for monitoring progress and generating reports and identifying deviations when occurred. DRS will also automatically notice if any farmer ceases the supply of milk the respective Milk Collection Center (MCC).

With the commencement of partner activity, comprehensive reports on monthly, quarterly and annual basis are a contractual requirement.

M&E system of BDEP at present produce reports for project management, headquarters and donor periodically e.g. quarterly, semi-annually and annually. Field activities are being monitored time to time through field visits. There is option for baseline, mid-term and final evaluation to evaluate project performance against set objectives and indicators. Besides of those, M&E section also performs internal research to monitor trends of performance,
e.g. study on milk profitability.

Semi-annual reporting format for USDA ("Logmon") has changed with revised targets. But it is difficult to understand previous period's achievements from the format at a glance as it updates only reporting period's data. Using an excel format could be an easier and provide better information to management.

From the perspective of project management, there are concerns about the number of targets and indicators. It is the view of BDEP that data management is a significant challenge with such a high number of targets. Managing to all of these targets is difficult. Further, many of the targets for BDEP are inputs rather than inputs; it is hard to see why such inputs are included when many do not have a direct correlation with impact. BDEP management would prefer to be able to focus on a smaller number of targets, those with the greatest impact.

Objective-9: Verify the numbers provided in the Dairy Recording System (DRS) for a sample of participants.
Verification of numbers provided in DRS was not possible during MTE as the system was under development. The development of DRS has taken longer than planned, but progress is building. The tablet side of this integrated management information system is close to finalization, subject to continuing development as new issues arise. More attention is now being paid to the cloud database and analytical side. BDEP management hopes to be able to invite USDA to view the results of cloud analysis, in real time, as from around the beginning of May. That USDA review will be able to be conducted through the cloud based server, from the desks of relevant staff.

The status of DRS is not quite as advanced as hoped; it was planned that the present survey could undertake a more comprehensive review, but this will not be possible. It is considered, however, that if DRS operates as described above it will be a breakthrough for the dairy sector of Bangladesh.

(Note that Objectives 10 and 11 relates to Recommendations and Lessons Learned; these are recorded in Chapter VII).

Section III - SWOT Analysis of the BDEP

The table below identifies the overarching questions anticipated have been addressed by the program's evaluation framework by the quantitative survey and FGDs and KIIs for qualitative survey. To assess the program indicators taking into account the following six evaluation criteria: relevance/appropriateness, effectiveness, efficiency, impact sustainability and gender equality and equity. The results are portrayed in the Table-17.

Table-17: SWOT Analysis Regarding Evaluation Criteria of the BDEP

	Strength	Weakness	Remarks
Relevance/ appropriateness	1. The project management is very experienced in the dairy sector. With around 40 years' experience in dairy in many countries of the world like New Zealand, Pakistan etc. 2. This project is not only related to dairy sector but also it related to business development. 3. Three well established milk processing companies and one NGO are working as partners of this project. 4. Marketing facilities, in the form of MCCs, are being brought to the doorsteps of the farmers.	1. Delay in project implementation. 2. It is very difficult to motivate farmers for adapting new technology and practice. 3. Lack of manpower of dairy processing companies. 4. Lack of supply adequate feed	The project is very relevant in the rural country context. But very difficult to change orthodox traditional practice.
	Opportunity	**Threat**	
	1. Increase milk production by improving animal health and breeding. 2. Increase income of farmers. 3. Create new employment opportunity. 4. Infrastructural development. 5. Increase the pace of economic development. 6. Help to make linkage between farmers and market. 7. Removal of middlemen. 8. Improve farmer's knowledge. 9. Promote commercialization in dairy sector. 10. Make efficient use of indigenous breed. 11. Fulfilling the domestic demand and reduce the dependency on import.	1. Traditional mentality of farmers 2. Spread of unknown diseases. 3. Turnover of employee 4. "Least professional" farmers who may pay little at present for feed (and accordingly obtain little milk), may not be able to afford seed capital needed to invest in higher milk production, with some gap between investment and return on investment. 5. Reliance on independent businessmen (MABs) to provide better sources of nutrition.	

	Strength	Weakness	Remarks
Effectiveness	1. Provide hands on training on farm 2. Continuous monitoring of farmers. 3. MABs provide the balanced diet. 4. Build strong interactive relation with target farmers. 5. Good team spirit. 6. BDEP is technically sound. 7. Strong collaboration with BDEP and partners. 8. Processors and partners NGOs are involved.	1. Shortage of manpower partner processing companies. 2. Delay in project implementation. 3. Number of MABs is not sufficient. 4. Processors have not started operation of MCCs, but this is under process	The results of BDEP are remarkable but very challenging to reach 9660 beneficiaries within shortest possible time. BDEP objectives must be given priority to government dairy development policy
	Opportunity	**Threat**	
	1. Income generation through MAB. 2. Non beneficiary can get benefit from MAB. 3. Breaking down traditional practice and adopt new technology. 4. Control the unwanted diseases. 5. Make effective use of available resources.	1. Increase the production cost of fodder and feed. 2. Turnover of DDOs and team leaders. 3. Continuity of MABs 4. Mix practice in a single household 5. Lack of availability BDEP concentrated at locally other shops.	

	Strength	Weakness	Remarks
Efficiency	1. Whole farm management approach has increased milk production. 2. Availability of all dairy related data through DRS (under development) 3. Time to time monitoring 4. Skilled team leaders and DDOs. 5. Proper utilization of space for cow shed.	1. Higher cost when measured against feed with very limited nutrition 2. Lack of knowledge on DRS. 3. Financial inability of farmers. 4. Availability of feed for all times for all	The milk processors companies may enhance their support through feed and training. DDOs must attend to the dairy farmers for solving the dairy related problems
	Opportunity	**Threat**	
	1. Increase milk production by whole farm management. 2. Increase income of farmers. 3. Availability of dairy related data. 4. Improve farmer's knowledge. 5. Ensure milk selling at home 6. Better price of milk 7. Removal of middlemen for better quality milk	1. DRS is a new concept and not yet established. 2. Traditional mentality of farmers. 3. If farmers are not properly implement the project concept of BDEP.	

	Strength	Weakness	Remarks
Impact	1. Whole farm management approach 2. Tremendous increase of milk production. 3. Will ensure the sale of milk. 4. Ensure fair price. 5. Encouragement of other dairy farmers	1. Higher cost for farmers providing very limited nutrition at present may slow implementation 2. Lack of knowledge on DRS. 3. Financial inability of farmers. 4. Stop feed support to farmers	Provide credit facilities to poor farmers with low interest rate.
	Opportunity	**Threat**	
	1. Bring infrastructural change 2. Socio-economic development of farmers. 3. Enhance child nutrition status of targeted areas. 4. Improve farmer's knowledge. 5. Alleviate poverty through dairy farming 6. Engagement of women in dairy farming 7. Income opportunity for women at household	1. Influence of Milk-vita and Gowala. 2. Influence of local lender. 3. Natural disaster 4. Cessation of BDEP	

	Strength	Weakness	Remarks
Sustainability	1. Huge domestic demand 2. Favourable environment for dairy farming. 3. Huge investment of processor companies for commercial purpose. 4. Benefits of this project are visible to farmers now. 5. MABs are profitable.	1. Difficult to break down traditional practice. 2. Short duration of project 3. Covering the very limited areas 4. Lack of competitiveness in MABs	It is necessary to create the competiveness to grow more MABs in the locality. Maximize the BDEP feed supply to ensure ability to purchase at a fair price. MCC must be established within shortest possible time farm. The training program should be continued for long time. BDEP support is necessary to expand in other areas of Bangladesh.
	Opportunity	**Threat**	
	1. Bring infrastructural change 2. Socio-economic development of farmers. 3. Enhance child nutrition status of targeted areas. 4. Improve farmer's knowledge. 5. Achieve self-sufficiency in milk production. 6. Empowerment of women. 7. Increase the living standard of people.	1. Influence of other dairy companies andGowala. 2. Influence of local lender. 3. Natural disaster. 4. Price hike of fodder and BDEP concentrate	

Gender equality and equity	Strength	Weakness	Remarks
	1. Dairy farming is home based. 2. Most of the activities are done by women 3. BDEP ensures women participation. 4. Require less amount of capital investment	1. Limited access of women in decision making. 2. Lack of education. 3. Existing Purdah system at village level.	Women are very encouraged for home based dairy rearing.
	Opportunity	Threat	
	1. Empowerment of women. 2. Increase the living standard of people.	1. May not be accepted by orthodox society.	

CHAPTER IV: KEY FINDINGS OF FOCUS GROUP DISCUSSIONS

The Focus Group Discussions (FGDs) were conducted with both BDEP beneficiaries and non-BDEP with separate groups of male farmers and female farmers. The detailed findings from each group have been presented in the Annexure 1. The key objectives of FGDs were as follows:

Key Objectives of FGD for men/ women Dairy Farmers

1. Understand whether BDEP approach serves women farmers.
2. Understand whether BDEP approach of whole farm management is working (productivity and if possible profitability).
3. Understand whether BDEP approach of whole farm management is creating more or less work for the farmer.
4. Determine to what extent female farmers are discouraged by male members of the household, and recommend, if this is an issue, what can be done.
5. If your neighbors are not involved in the BDEP trial, do you think they are interested in learning from BDEP and its partners?
6. Appreciate whether farmers are satisfied with the work BDEP is doing.
7. Understand why farmers won't apply BDEP promoted technologies for all of his cows, if that is the case.

Table-18: Major Findings from the FGD

	BDEP (MALE)	NON BDEP (MALE)
Whole farm management	According to the farmers, BDEP has guided them for whole farm management. Under this practice, they have learned about the feeding system of cows, vaccination, de-worming, times of bath per day and mainly about the hygiene of cows. Now they chop the feed and fodders and give them water and feed separately. Now they keep their cows under a shed which protect them from sunshine. More farmers are using sand beds rather than having their cows stand and rest on hard concrete or bricks (often uneven) all day and night. Sand beds are more comfortable for the cows and also allow drainage of urine. Now they provide concentrate as recommended by the BDEP.	When non BDEP farmers observe the benefits of BDEP's farming practice, they get interested about their activities. Many of them try to implement whole farm management practices for their farm. They are mostly influenced by vaccination, de-worming and the BDEP feeding system. Many of them became alert about the hygiene of cows and times of per day bath. Many non BDEP farmers purchase concentrate and chopped fodders from MABs. Now they are more concerned to care for their cowsin a profitable way.
Application of BDEP approach	According to some farmers, for adopting the BDEP they have to work more than before as now they have to chop feed and maintain better hygiene. But some other farmers said that, they do not feel any difficulties and pressure of more work. Many farmers, especially in Khulna, offer boiled rice to their cows; the boiling process requires a lot of effort. In addition, some farmers purchase chopped fodder, reducing the workload.	Non BDEP farmers said for following the BDEP activities they have to work more than before, as now they have to chop feed and maintain better hygiene. But some other farmers said that, they do not feel any difficulties and pressure of more work. Because they know, if they want to get more milk and have healthier cows, they need to do more work.

	BDEP (MALE)	NON BDEP (MALE)
Milk production & Profitability	Through BDEP the production of milk has increased. Some farmers said that in the past they got 10 liters milk, and that has now increased to 12-15 liters. By maintaining the hygiene, the cost of treatment has reduced, and that saving is spent for household purposes. Fertility is much improved, which is resulting in cows getting pregnant quicker. The cows are healthier now as they get balanced feed.	By adopting BDEP practices, production of milk has increased. Some farmers feel the feeding cost is high which is burden for them. They are satisfied about vaccination, de-worming system and many other health issues. They thought, this project can promote milk production and it should continue for long time and should cover more beneficiaries.
Apply to others cows	The farmers already follow the BDEP project for other cows in his farm. According to some farmers, “it would be better if all the cows considered under BDEP”. It might be understood from such comments that beneficiaries want greater subsidy from BDEP, which is not the intention.	Some poor farmers consider that the BDEP feeding recommendations are costly to bear. It may be considered that such farmers are seeking a financial contribution from BDEP as the farmers in the feed trials receive. Most importantly, many farmers are conservative and do not want to change their traditional practices.
	BDEP (FEMALE)	NON BDEP (FEMALE)
Involvement	The women members are highly involved with whole farm management. For the BDEP project, the women also involved in the dairy farming and marketing of milk. Their husband now gives them more priority than before and they takes part in the decision making about dairy and as well as others.	Women most of the works at home and their contribution in whole farm management is inevitable. The women also involved in the dairy farming and marketing of milk. Their husband now gives them more priority than before and they takes part in the decision making about dairy and as well as others.
Training	The women are now trained by the BDEP which encourage the women members about the involvement with commercial activities. Now they know many things about the farming.	The non BDEP women are interested about the training activities of BDEP; they thought if they get training; they can rear their cows more properly and can contribute more to improve their condition.
Feed and Housing	According to some female farmers, the work has increased as they have to work more. Some other farmers say the opposite, especially those who have been boiling rice and feeding it to their cows. Now they have to keep their cows clean and they also have to be cleaned themselves.	Some female farmers think, after following BDEP the work has increased as they have to work more. Now they have to keep their cows clean and they also have to be cleaned themselves.
Neighbor Effect	Now the women are encouraging their neighbors to adopt this project and their neighbors are also interested to adopt it as they are seeing the benefit of BDEP.	Now the non BEDP women are interested to be part of BDEP. They are influenced by their neighbors and feel motivation after observing the benefits of being part of BDEP.

CHAPTER V: Findings of Key Informant Interviews (KIIs)

Key Informant Interviews (KIIs) were conducted individually by the research team. The findings of the KIIs have been presented in detail in the Annexure 2. This chapter records the key findings of the KIIs.

5.1 Findings from BDEP Staff

- The BDEP approach is a noble approach in dairy development. In the implementing process, emphasis has been given to the following aspects: developing organizational capacity and involvement, training on whole farm management, especially provision of better nutrition, animal husbandry & farm management. The project will create market linkages by establishing MCCs by the Dairy Companies in rural areas, ensuring feed supply through developing MAB entrepreneurs, providing hands-on whole training on-farm for men and women, assisting the provision of improved feed for trial based demonstration; these feed trials are also demonstrating the benefit of the BDEP whole farm management system to non-BDEP farmers, achieving spillover effects for sustainability of the BDEP technology.
- The BDEP team leaders, M&E specialist and other staff of BDEP, Milk Processors and their staff are working under guidance of COP.
- Allocated program budget expenditure is not satisfactory level due to delay in receiving formal approval of the Modification redesign from USDA, and the lengthy process to reach contractual status with dairy company partners. At the present time, with respect to the budget for Activities, only around 5% has been spent. More recently, dairy company partners are taking initiatives to progress quickly. Milk chilling vats for 70 MCCs and one milk collection hub have been ordered (above the target of 55 MCCs in the proposed redesign and 42 in the original Agreement).BDEP is operating on the basis of reimbursement of expenditure rather than any advance payment to partners; when this equipment arrives in Bangladesh, partners will be in position to claim significant funding from BDEP. Further, MCC establishment will “encourage” the processors to move rapidly in order to achieve returns on their investments; self-interest will drive partner performance as much if not more than contractual commitments. In the case of two dairy company partners, the recent ordering of the milk chilling equipment (plus the earlier purchase by the third dairy company partner) provides confidence that the program budget will be incurred by March 2017.
- Dairy farmers in Bangladesh typically offer to their cows a diet based on rice straw, which is of very low nutritional value. Concentrates available commercially are of poor quality, may be adulterated and are based on energy supply with limited, inappropriate protein content. Farmers do not have any idea about least-cost and balanced rations. Water is not provided sufficient regularly not at proper volumes to meet the needs of cows. Implementation strategy of water and nutrition to cow though it is the basic knowledge for dairy development. The BDEP approach is great for learning and dairy expansion in Bangladesh.
- In the rare cases where professionals in the dairy sector use a system to calculate a balanced ration, the system used is Total Digestible Nutrient (TDN). BDEP has developed spreadsheets based on the Pearson Square method for both protein and energy. This uses the more modern and effective calculation of MJME (mega joules of metabolizable energy). BDEP is developing a “Dairy Recording System” which covers farm management records. The smallholder dairy farmers of Bangladesh do not maintain such records, and owing to low levels of education and literacy, they probably do not have the capability. DRS will also enable live Monitoring & Evaluation to occur: DRS is a paperless software system and users will be able to access M&E records from any corner of the world. All BDEP linked farmers and their cows be identified individually. DRS is the first such software to be used in Bangladesh. It could be improved as and when necessary based on field activities and needed; already one dairy company partner has suggested an extension of scope which may be able to alert extension staff of looming animal health epidemics.

- The whole farm management activities on BDEP philosophies will be sustainable. But there are some challenges like:
- Change management is very challenging in a sector dominated by traditional practices. It would be desirable if BDEP could recommend to farmers that fences are installed and cows no longer tied up, but the experience in Pakistan suggests that this makes the change management challenge even greater, and not feasible in a three year project.

- BDEP recommends that cows be removed from the concrete shed construction that many have, in order to have lower temperatures and better ventilation, but there is not always sufficient space to redesign farms
- Coordination among partners organization.
- To make farmers free from the influence of middlemen.
- To encourage farmers to do their own milking, when in Khulna Division it is very common for goala (middle-men) to do this.
- More land is needed to allow for higher volumes of BDEP recommended fodder crop production in order to meet the needs of dairy farmers. With greater acreage, more silage could be produced which would mitigate seasonal effects during the monsoon/flood season.

5.2 Findings from Partner Processors and 4th Partner Management and Staff

5.2.1 Findings of Project Partner 1.

- Project Partner 1 started its journey with BDEP in 1st October, 2015. They already have taken many initiatives forimplementing this project.
- They have a plan to establish 20 MCC. Capacity of each MCC will be 2000 liter and the capacity will be extended up to 6000 liter as milk production increases. They are well down the track of establishing 10 MCC which will be started from April and another 10 MCC will be established around June-July. For this project, they are investing around BDT 25 core (approximately $US. 3.23 Million)
- They have a target to reach about 6000-8000 farmers within this project duration.
- They have recruited their 10 DDOs.
- They will provide different services to the farmers such as free treatment, vaccination, veterinary surgeon etc.
- Their project is mainly implemented in Satkhira District of Khulna.
- The partner believes this project has huge opportunity to explore. Our country has huge domestic demand for milk. By increasing milk production and building market linkage between producers and farmers, this project will create employment opportunities for poor farmers and will contribute to increase theliving standard of people.

5.2.2 Findings of Project Partner 2

- The company started their journey with BDEP in November, 2015. They are only in the starting point of theproject.
- They have a plan to establish 40 MCC within next 6 months. Capacity of each MCC will be 2,000 liters. They will invest approximately $US1.45 million.
- They have a target to reach about 4000 farmers within this project duration.
- According to the company, BDEP is a revolutionary initiative to change dairy farming practices in Bangladesh. This project is working to increase milk production and makes a direct linkage between farmers and producers.
- They have recruited their own DDOs.
- They will provide different services to the farmers such as free treatment, vaccination, veterinary surgeon etc.
- They consider BDEP's whole farm management practice to be scientific and approved approach for increasing milk production.
- The main problems that trustworthiness of people about end result of project, influence of local goala (milk collectors), the perceived cost of whole farm management practice, lack of financial capability and most importantly farmers are habituated with traditional practice.
- They think the main strength of BDEP is its teams which provide on farm training and regularly contact the beneficiaries through continuous monitoring. They build an interactive relationship with farmers. The association of of the company makes this project more viable because they can assure farmersof consistent offtake for their milk.
- The existence of middlemen and diseases can be challenge for BDEP project.
- There is scope for they company to extend whole farm management to the other farmers it supports, once the company's DDOs and other field staff have the necessary skills and commitments to BDEP are met.

5.2.3 Findings of Project Partner 3

- The company made contract with BDEP on November, 2015 and the implementation started on 1 February,2016.
- According to the company, the BDEP will cause the revolutionary change.
- They will establish 20 MCC and its capability will be 500 liters.
- They will cover 1,000 farmers by June or July, 2016.
- BDEP may face many problems where the influence of Goala is highly noticeable.
- They will provide different services to the farmers such as free treatment, vaccination, veterinary surgeon etc.
- There is scope for the company to extend whole farm management to the other farmers it supports, oncetheir DDOs and other field staff have the necessary skills and commitments to BDEP are met.

5.2.4 Findings of Project Partner 4

- The NGO started its activity as a partner of BDEP on 15 November, 2015.
- They will cover 40-50 MABs from 40-50 villages within one year and they are expecting that, it will be possible to achieve this target well before the end of the project; this is necessary in order to increase supplies of better quality and more nutritious fodder and concentrate to the farmers linked with BDEP. The organization is very hopeful about the success of BDEP in the development of milk production.
- According to them, the main reason of success of BDEP is the experienced project management and linkage between the milk producers and the formal market.
- They work mainly in Paikgachha and Dumuria villages of Tala, Satkhira, but are extending their reach to all areas in Khulna where BDEP partner dairy companies are establishing MCCs
- They have recruited one “Business Development Manager” and three Business Development Officers to implement this project in the field.
- On behalf of BDEP, the organization will provide small grants of around BDT200,000 (approximately $US2,500) to each MAB. This grant will be provided in a phased approach as MABs develop.

5.2.5 Findings of DDOs

DDOs have been recruited by both BDEP partner dairy companies to provide on-farm training to the targeted farmers and keep all the records of targeted cows.

- BDEP provides an in-depth training to DDOs about whole farm management practice after recruiting them, which help them to provide on-farm training to farmers.
- From the BDEP training, DDOs now know about the scientific farm management practices, disease management, vaccination system, de-worming system, how to prepare a good ration for a cow according to their class (dry, milking, heifer, pregnant heifer), milk production and body weight, how to maintain cleanliness of cow shed, how to prepare a cow shed, how much water to a provide to cows, how to take care a cow in pregnancy period, about early weaning and so many things.
- DDOs think this BDEP training help them to communicate with farmers properly. Whenever farmers feel any problem, they communicate with DDOs and DDOs try to solve their problems.
- The farmers have a positive mentality towards BDEP now and they believe BDEP will help them to increase their milk production.
- DRS is a new software system and a very innovative idea to monitor and evaluate project improvement.
- DDOs think this software can bring revolutionary change to keep statistics in the livestock sector and assist farmers to manage their farms.

5.2.6 Findings of MAB

MABs are very effective in different target areas. They are not only helping the target farmers but also help the non-beneficiaries, while earning profit:

- MABs provide training to the farmers about the feed and fodders.

- They undertake the California Mastitis Test upon farmer request and the payment of a small fee.
- According to the MABs, the demand of concentrate is increasing day by day.
- When the farmers listen to their advice, milk production also increases.
- MABs are earning profit from the sales of concentrate and chopped fodder. MABs are also offering rock salt, seed, calf milk replacer, and other products and services as recommended by BDEP and in demand from farmers.
- MABs face following opportunity, problems, challenges, and threat:
  - MABs have opportunity to train the farmers regarding fodders and concentrate
  - Not to follow the advice regarding supply feed and water separately
  - Farmers give blame to the MABs if do not get higher amount of milk from the cows after feeding concentrate.
  - Shortage of supply of fodders due to not properly grow fodders

CHAPTER VI: CASE STUDIES

BDEP Farm Management Practices: Success Story

Case Study 1:BDEP Farmer #1 Satkhira, Khulna.

BDEP Farmer #1 may be considered a success story on whole farm management for productive dairy farming.

This farm is located in a village of Debhata Union under the Debhata Upazila of Satkhira district, Khulna Division. He started his dairy business with 2 cows since early 2000. From the beginning, he was very interested in dairy as dairy has tremendous benefit for optimum agricultural production through its linkages to shrimp culture, crop fields, bio-fertilizer, biogas and milk for human consumption. His first business was in shrimp culture, for which he needed a lot of slurry which he used to buy from other dairy farmers nearby. As a result, he had to spend a lot of money and significant labor, but the expenditure of both money and effort decreased dramatically when he started dairy farming himself, using a biogas plant to produce slurry. The chief purpose of dairying was in fact the by- product of slurry for his shrimp farming. Later he found some profit in dairy farming itself; accordingly he has increased his herd size over time, through a breeding program and through the purchase of high yielding cows.

In 2009, he made his dairy farm as large as he could and more efforts have been given towards dairy farming. He is known as a community leader in the village and is involved in numerous activities. He is now linked with Governing Body of the Local School managing committee, Farmers Society, Shrimp Culture Society and others.

In 2014, this farmer met with the Team Leader of Bangladesh Dairy Enhancement Project ("BDEP") and discussed whole farm management; frankly, he could not believe that his existing shed design and the ration used for cows were inappropriate. BDEP Team Leader provided a lot of suggestions for change to achieve better cow comfort and better nutrition, which lead to higher milk production. The BDEP Team Leader also deputed one of his Dairy Development Officer (DDO) for 3 months to the farm for continuous advisory services on-farm regarding whole farm management. In a win-win approach, this also enabled the BDEP DDO to build his knowledge and skills with the support of the BDEP Team Leader.

The advisory service started with a ration formulation and trial for only one milking cow for better understanding. The milk production and Body Condition Score (BCS) of the trial cow increased dramatically which led him to apply the BDEP approach to all other cows in his herd within 1½ months. Over time, a DDO of BDEP increased the numbers of indicators regarding whole farm management and finally Farmer #1 started to build a new dairy shed with free space where cows have free access to water for 24 hours and no cows are tied up evert. As a result he is receiving tremendous benefit as he has recounted to CRDS survey team member.

He has described the benefit of free space and four side open sheds. There are numerous benefits and huge difference in case of before and after keeping the cows in the shed with free space. Also of vital importance is the benefit of the enhanced nutrition as recommended by BDEP.

Before BDEP	After BDEP
Monthly antibiotic cost was 2000-2500 BDT for various purposes	None.
Lameness of cows found every day	None from the introduction of BDEP farm management practices until now.
It had been decided to cull one cow (Cow ID 522) due to age (5th lactation) and lameness.	The cow (ID 522) just seems to have become young again, with brighter coat color, no lameness and producing more milk. Farmer #1decided to keep the cow as long as it produces a good yield.
Feed trough was always wet and the number of instances of foul orders from feed was high	No feed trough, cows are eating dry feed from ground and zero foul order.
Time and labor used for cleaning feed trough was high	Time and labor used for cleaning feed trough nearly zero as cow eats from the floor and finishes all dry feed.
Water trough used and supplied water to cow 2-3 times a day with no water at night as a result cows suffered for water insufficiency	Water trough is set at the free space area with gate valve, so no need to supply water manually to the animals. Cow can drink water as and when thirsty.
It was very difficult to determine heat of cow as all cows were tied up all the day.	Easy to detect heat as cows are free to demonstrate natural animal behavior by jumping over each other (bulling) during pro-estrus of heat.
Less appetite showed by the cows and less time found in rumination/ mastication	Higher appetite shows and cows are eating more and more. Cow shows chewing/rumination all their resting time.
There were huge lack of cow comfort and low milk production	Higher cow comfort and higher milk production
Only Napier and Jumbo are the fodder used for dairy feeding	More weight given to Lucerne and Maize cultivation as main green fodder for dairy feeding; less weight on napier and Jumboo which have lower crude protein content.
No balance concentrate ration was used for dairy cows except Usha[1] cattle feed.	Concentrate ration is making at farm yard using BDEP formula and no Usha ready feed are used.
Boiled rice and other concentrated mixed and unbalanced ration was diluted by water, offered to cow as wet	Total Mix Ration feeding is used and offered to cow as dry
No initiatives taken for rumen development for the calf	Early rumen development procedure followed, using maize powder at around seven days after calving.
No Calf Milk Replacer is used for calf feeding rather calf suckling milk directly from udder for more than 6 months.	Calf Milk Replacer is used for calf feeding for first 60 days which leads to wean calf at early age with proper rumen development.
No soil pH measured for fodder cultivation	Proper soil pH maintained for higher fodder production
There were huge lack of cow comfort and lower milk production of 72L perday	Higher cow comfort and higher milk production of 110L perday, with reduced costs. This was achieved just one month after following BDEP recommendations fully.
No record was kept in any form	All record regarding milk production of individual cows, breeding record and genetic record are being maintained in appropriate manner.

Note 1: Usha is the trade name for what is known as “ready cattle feed”.

Farmer #1has made a connection with a milk processing company for establishing a milk chilling center (MCC) through its own investment at in the village which ensures market linkage at the doorstep of milk producers. This allows him and other farmers to focus on better dairy farming rather than having to worry about milk marketing. The processing company has already made a survey to start their MCC.

Now he is acting as a mentor for four other farmers in his neighborhood, who are taking advice from him and wish to follow the BDEP approach to whole farm management. To date, around 12 local farmers have visited his farm (without any support from BDEP) to see his shed and open space for his cows. It is noted that the Chief Operating Officer (CEO) of a company in the Khulna Region has a town (nearby the h i s farm) last week of January 2016. After the meeting the CEO (Army Officer) had an interest to see dairy cow as CEO has seen uncommon type cowshed from meeting place. The CEO was surprised to see the shed design and it benefits known from the farmer. He has shown an interest to start dairy farming in his native village.

Still Farmer #1 needs to apply more indicators for whole farm management which will be implemented shortly, gradually shifting his farming practices towards mechanical operation rather than manual. In the meantime, however, he states “I believe dairy farming will be highly profitable, if undertaken in proper manner”.

Case Study-2 **Farmer #2, Bolpur, Jessore**

Inspiring Legend - Life of Freedom

Farmer #2, a widow, is an inspiration to self-dependent women. She lives in a hard-to-reach area in Jessore Sadar upazila. She is 68 years old. Her husband died few years ago. She has 4 sons and 4 daughters. But all her children are married and live separately except the youngest son. When her husband was alive they used to live together and with the income of her husband and sons they used to live a well-off life. Her family also earned money from their agricultural land.

She had been rearing an indigenous cow for a long time. She was illiterate and was insufficiently knowledgeable about cattle rearing. The health condition of her cow was not good and it used to suffer from many diseases. She had to spend a lot of money for veterinary treatment. The milk production was very low and she used to collect 1- 3 liters of milk daily. Sometimes, a lot of fodder was wasted. As a result, she gradually was losing her interest in cattle rearing. When her calves reached the age of 6 to 9 months, she used to sell them to avoid unnecessary trouble.

But the scenario changed when the BDEP team met with her and enlisted her one and a half years ago. The BDEP provided her with “whole farm management training” and she started to follow better methods of cattle rearing. At the beginning, she did not have much trust in the methods; but gradually she observed some positive changes in the health condition of her cow. Now she has full confidence in the BDEP team and she follows the new methods they have demonstrated.

At present, she follows the proper techniques of feeding. She feeds her cow, maize, concentrate, rock salt, some rice straw (a lot less than previously) and a lot of water. She uses separate troughs for fodder and water. She bathes her cow regularly twice a day and keeps the cow at night in a place with proper ventilation. After taking these types of care, the health condition of the cow significantly improved and started to give 7.5 liters of milk daily. At present, her cow is about to calve. Hoping the cow gives birth of a calf naturally; it does not face any obstacle. Whenever, she faces any problem regarding cow rearing, she goes to MAB for suggestion.

The training of BDEP has increased not only her knowledge and skill of cattle rearing, but also her confidence. Now she has knowledge on cattle feed, nutritional value of feeds, importance of clean water, vaccination, deworming, bio-security and proper insemination. She knows what type of fodder is needed for the cow and at what time. Sometimes, she also provides natural treatments herself to her cattle. When her cow suffers from loose motion, she feeds her green bananas. Sometimes she feeds black cumin to the cow, as BDEP has recommended this to boost fertility.

With the income of her youngest son and her own, she is living a comfortable life. She was only 13 years old when she got married. After that she led a life of a simple housewife for a long time. She did not have the chance to study and never played any direct role in any family or community matter. But now, she participates in different social activities and the people of her village listen to her advice.

Previously, she had to depend financially on others. But now, she has her own income and can spend for her own needs. She doesn’t need to borrow money from others. She feels that at the age of 68, she has begun to taste a life of freedom.

Mini-Agribusinesses – a successful concept for dairy sector improvement in Bangladesh

Case Study 3:
Name: MAB #1 Dumuria, Khulna.

Exposed MAB – Motivation and Hard Work Make a Successful Entrepreneur

(Note from CRDS: this success story is based on one prepared by BDEP quite recently. CRDS interviewed the concerned individual at his location in Khulna, and his story is verified by CRDS).

Undoubtedly the greatest impediment to more productive and profitable dairy farming in Bangladesh is the lack of adequate nutrition provided to dairy cows. In the first instance, there is a very real lack of awareness about nutritional needs, among both farmers and professionals working in the sector, and secondly even if farmers were more aware of the need to provide better nutrition, sources of such enhanced nutrition are generally not available. BDEP is addressing the lack of knowledge through its on-farm training and whole farm management approach, while to address the issue of lack of availability, BDEP has introduced its Mini-Agribusiness ("MAB") concept.

In locations where "Village Milk Chilling Centers", generally 500- 2,000 liters capacity, are being established by BDEP's processor partners, BDEP has identified young entrepreneurs who are prepared to work with it, indeed to *work hard* with it. Through a small-grants (in-kind) process, but most importantly through technical assistance provided by the BDEP field team, these entrepreneurs are assisted to grow fodder with superior nutritional value, blend concentrate of better quality and value, and offer other products and services needed by the farmers being trained by BDEP or its partners.

From the remote village of Dumuria, Khulna in southwest part of Bangladesh, is one such BDEP MAB. This entrepreneur has sold twelve tonnes of concentrate (BDEP formulated ration for cows) since the establishment of his business late in October 2015 through to the end of January 2016; this was with initial BDEP supportof only one ton of ingredients. His customer list is now close to 100 nearby farmers.

In addition, he has sold 5.7 tonnes of chopped maize, and made silage with a further 4.5 tonnes of maize. This is from just his first harvest, from one acre of land. BDEP supported him in the lease of his initial plot of land, but very rapidly he realized the potential, and on his own initiative he quickly leased additional land.

His's sales revenue for the month of January 2016 was BDT 142,000 and profit after his own labor charges of BDT 7,800, was BDT 29,700 (US$380) which is an outstanding performance for this kind of small business. To put this in context, a monthly income of BDT 5,000 is considered quite good in rural Bangladesh.

He is very hardworking and sincere. One of BDEP's criteria for MAB selection is that entrepreneurs must be prepared "to get theirs hands dirty"; only if the entrepreneur does the work himself/herself, will he or she learn, and hence achieve sustainability. A further criterion is honesty, in order to ensure on-going supply of good quality fodder, concentrate and other products/services. Quality of goods and services offered to Bangladesh dairy farmers is often unsatisfactory, but without appropriate quality there is reduced value, and farmers will not purchase in the medium term.

MAB #1 demonstrates the necessary personal characteristics, in addition to an entrepreneurial drive to expand his business. Since signing the small grant agreement with him, BDEP field staff have provided Sukanto with on-farm training on improved and scientific knowledge on concentrate formulation, soil testing & treatment, the sourcing of good quality ingredients, and other essential services such as California Mastitis Test, Calf Milk Replacer, etc.

One of his farmer clients comments "We have learned that green fodder is essential for cows which we did not know before BDEP; we have wasted a lot of money buying rice straw. It is good that we can buy good quality green feed from him".

Importantly, he has reinvested all of his profit so far to expand his business. One spillover of benefit to his

local community is the employment of part time labor in his business. His quality inputs and respectful manners have created huge demand among the farmers in the area. BDEP now uses him as a model for training other newly selected MABs, and the field staff of sub-grant partners.

CHAPTER VII: CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED

Objective-10: Provide relevant and actionable recommendations that follow logically from the findings and conclusions of the evaluation that the project needs to take into account in rolling out the approach in the last half of the project

7.1 Conclusions

Conclusions have been prepared under the following groupings: on-farm impact, MAB component, processor partnerships, training of DDOs, DRS, some gaps in the program, expanding future impact, and overall status.

On-Farm Impact

BDEP beneficiaries are achieving good results by applying the BDEP approach. Milk production has increased, cows are much more healthy with corresponding decrease in treatment costs, fertility is much improved with heat being shown in line with international norms (quite different from the normal scenario in Bangladesh, where extended dry periods are common), and calves are healthier and bigger, too. Innovations such as the use of calf milk replacer, while not being practiced to a large extent yet, auger well for future development of both this project and the dairy sector of Bangladesh. In line with these achievements, farmers are very happy to be associated with BDEP.

The on-farm location for direct farmer training is to be commended, and certainly it brings training to the doorstep of the female farmers of Bangladesh. There is no doubt that this enables much greater depth to the scope of training. It requires, however, trainers to be practioners, and in the dairy sector, at least, there are very few of them. This supports the emphasis placed by BDEP on locating Advisory Services within the dairy companies; it is such businesses, 100% engaged in the sector, who have the long term presence to ensure full return on the effort put into training the DDOs.

While they are difficult to measure, spillover effects are occurring, and neighboring farmers are eager to join this project.

This survey strongly supports BDEP's belief that it has correctly identified the most important factors which limit productivity, and that BDEP is addressing these.

On-farm impact – Issues or Clarifications

Farmers do not keep records for farm management purposes. Sometimes the impact of this occurs in what may be a surprising manner: farmers do not know their costs and incomes; in turn this means that when BDEP challenges traditional practices farmers are not in a good position to understand the net benefit. Accordingly, some farmers believe that the ration recommended by BDEP is too expensive. When measured against increased milk production this is not accurate, but when measured against a ration that may be based around own supply rice straw (perceived to be of zero cost for own supply), the BDEP ration may be more expensive. BDEP will need to continue to build its evidence for reasonable cost and higher milk production in order to convince the far larger set of farmers still to be assisted.

Some but not all farmers report that their work load has increased under the BDEP system. Most of the farmers who consider this to be the case thought that the better animal health and higher milk production more than justified the higher word load. Nevertheless, BDEP is requested to consider how it might streamline it program to reduce workload.

Also, there may be an issue with initial capital, to afford higher ration costs for a period while milk production is yet to build (BDEP notes that in the first instance, better nutrition goes to better condition rather than higher milk yield).

MAB Component

This is a highly innovative concept introduced by BDEP, and while in its infancy, results to date are impressive.

Sales of BDEP concentrate to non-BDEP linked farmers are a form of spillover effect, and reflect the contribution of BDEP's superior formulation to higher and more profitable milk production. Business records from the MABs show them to be profitable, while performance varies according to the entrepreneurial skills and overall effort of the individual MAB.

Sales to non-BDEP linked farmers and the profit of these mini-businesses strongly suggest that this new concept will prove to be sustainable.

MAB Component – Issues and Clarifications
In terms of overall project effectiveness, it is wondered whether the target of 90 MABs is too low compared to the needs of the sector. In future, as knowledge which has originated within BDEP disseminates, there is no reason that any person in rural Bangladesh cannot become a producer of good quality fodder, but until that time arrives, the technical (much more than the financial) support of BDEP and its partners is very important. This suggests that in future, more funding should be applied to this important component which has the potential to provide significant and positive change to the first step in the dairy value chain, enhanced animal nutrition.

BDEP teaches its MABs that they can only survive if they continue to purchase quality ingredients and provide quality products and services to the dairy farmers of Bangladesh. This understanding must be totally entrenched before BDEP ends its association with the concerned businesses.

There is a balance between ensuring that individual businesses are sustainable and the broader good of the dairy sector. In this regard, BDEP intends to include its concentrate formulation in project documents for public release and use by the sector. The formulation is not the full picture, however: the quality of ingredients is critical and this will ensure a training need for a lengthy period. Partner dairy companies will be trained in this very important aspect of successful concentrate production.

Dairy Company Partnerships
BDEP is involving dairy companies in its project for several reasons:

- Genuine development of the sector requires reducing the role of middlemen; the only possible replacement is a dairy company.
- Genuine development also requires linkage to the formal market.
- Dairy companies, by definition, will be involved in the sector on a permanent basis, and hence their involvement brings sustainability.
- Especially given their anticipated longevity in the sector, dairy companies are the logical home for competent Advisory Services. Self-interest suggests they will invest in farmer training in order to procure more milk, more geographically concentrated milk, and better quality milk.
- Dairy companies are bringing between $3 and $4 million to this project.

The above represent an excellent achievement by BDEP, one that is unique in Bangladesh. This achievement reflects the dairy industry background of the project managment.

Dairy Company Partnerships – Issues and Clarifications
Being private companies and especially ones bringing significant capital to the partnership with BDEP, these companies may be considered to have “more rights” than traditional NGO partners. It has taken a long time to achieve full contract agreements, aggravated by the unofficial status of modification approval. Hence, progress towards project goals is too slow. In the case of one partner, MDF, an improvement in the rate of progress was noted as from the last couple of months of 2015; for one partner, progress has quickened only in 2016. While from BDEP’s perspective, more progress towards project goals through 2015 would have been welcome, the financial commitments with equipment suppliers now entered into by all dairy company partners support the view that targets will be reached.

Training of DDOs
DDOs are the future trainers of the sector as far as whole farm management is concerned. No other group of individuals apart from BDEP field staff themselves have the knowledge to assist the dairy farmers of Bangladesh in this innovative and effective new manner. The success of BDEP is correlated to a high degree with the in-depth training of sufficient numbers of DDOs.

To date, the extent of practical knowledge transferred to DDOs is impressive. In many ways, they are the future for the development of the sector at field level.

Training of DDOs- Issues and Clarifications
This survey has identified two issues with regard to training of DDOs:

- Better training in DRS is needed.
- Higher numbers of DDOs need to be recruited by dairy company partners and assigned to BDEP for training.

Dairy Recording System
DRS seems to have excellent potential.

DRS – Issues and Clarifications
Land O' Lakes is requested to complete the development of DRS as soon as possible, and to ensure all DDOs are sufficiently trained in its use.

Further development is required in the Cloud Database and analytical component of DRS.

Some Gaps in the Program
The Agreement with USDA states that BDEP will work with DLS, BLRI and the Standards Organization. Project staff indicated why this has not happened with DLS to date, and why it may not happen with the Standards Organization. Nevertheless, greater effort is recommended.

Expanding Future Impact
BDEP is in the process of bringing a new and more productive system of dairy farm management to Bangladesh. While it may be out of the scope of the present project, BDEP is encouraged to consider training not only DDOs and farmers, but the future professionals working in the sector. In this regard, partnership with a tertiary institute involved in education in the field of animal husbandry would be of huge long term benefit to this country and its dairy sector.

Overall Status
BDEP is a blend of fantastic achievement and unsatisfactory results. The innovative thinking and concepts of BDEP, the on-farm results being achieved, the MAB component and the budding partnerships with dairy companies which will bring sustainability and private sector capital to the project are unparalleled and excellent.

On the other hand, the intended private sector capital is only just starting to be committed to a meaningful, tangible degree (as opposed to contractual, one could say paper commitment). This has restrained BDEP from selecting more MABs, as the integrated design of this project requires MABs to be located in the vicinity of MCCs being established by the dairy companies. Dairy companies are yet to provide the full complement of DDOs to BDEP for in-depth training on whole farm management.

DRS has the potential to be an excellent innovation, but to a large degree this initiative remains as potential rather than tangible.

The overall status of BDEP could perhaps be described as achieving previously unseen depth, while not achieving necessary status.

7.2 Recommendations

Given the conclusions reached by the survey team, our recommendations are as follows:

Scale
The lack of scale is far and away the biggest challenge to meeting the targets agreed between USDA and Land O' Lakes. As of the time this MTE was researched and reported, the biggest obstacle is dairy company performance.

Dairy company partners must be motivated to achieve their targets. The number of MCCs being established could be described as a leading indicator. While partners are now reporting that financial commitments with equipment suppliers have been entered into, until MCCs are on the ground and operational, the project cannot achieve scale. On the other hand, it is reasonable to expect that once MCCs are operational, or even before that date, self-interest will drive dairy company partners to undertake all necessary steps to make their investments profitable. This means linking to farmers and boosting milk production and procurement. BDEP, while far from being able to relax, may be able to take some comfort from this fact.

One issue which does need immediate action from dairy company partners is recruitment of DDOs and assignment to BDEP for on-farm and in-depth training. Pressure needs to be placed on dairy companies to ensure this happens very soon.

On-Farm
BDEP must continue to build evidence of higher milk production and reasonable costs of its recommended ration, and that this combination is more profitable.

Some farmers may not have the capital to afford any initial higher cost of the BDEP ration. BDEP should consider building links to financial institutions in order to be able to assist farmers in this matter.

Some farmers report a higher work load under the BDEP farm management approach. This could impact both adoption rates and sustainability. BDEP is encouraged to seek more data on this matter, and seek to reduce any unnecessary work.

MAB Component
The main recommendation arising from this survey is that the project may not have a sufficiently high target (and corresponding time and funding) to meet the needs of 9,625 farmers. Certainly in this case, more is better.
BDEP must continue to emphasize the quality aspect of MAB offerings to farmers.

Knowledge relating to BDEP concentrate formulation and superior fodder crop production is likely to be a great legacy of BDEP. BDEP must ensure this knowledge in entered into the public domain in an actionable manner.

Tertiary Level Education
BDEP could multiply its long term impact if it could enter into a meaningful partnership with a tertiary institute involved in animal husbandry education and agribusiness.

Summary
- Drive dairy company performance.
- Drive dairy company recruitment and assignment of DDOs.
- Ensure BDEP has the data to convince farmers that its methods result in higher profit.
- Build links with financial institutions in case working capital is required to meet higher initial costs of a BDEP ration.
- Consider how to streamline the BDEP whole farm management system to reduce unnecessary workloads.
- Seek to increase the number of MABs established through the project, or supported via technical assistance.
- Emphasize the necessary quality standards to MABs.
- Record details of BDEP concentrate formulation and quality standards for broader use by the sector.
- Drive completion of the whole DRS system.
- Pursue collaboration with public sector entities named in the Agreement between USDA and Land O' Lakes.
- Seek the support of USDA to partner a university to significantly enhance the education of animal husbandry and agribusiness at a professional level.

7.3 Lessons Learned

Objective – 11: Develop lessons learned and good practices to date that will inform similar or future projects in the dairy sector.

1. BDEP has brought an entirely new approach to dairy development, and while the scale achieved to date is not satisfactory, the combination of BDEP's whole farm management and the MAB concept is having very positive impacts at the farmer level. This innovative approach needs to be supported into the future.

2. Conversely, the highly innovative approach required a significant redesign and hence modification approval from USDA. The time taken to achieve this approval has negatively impacted the project. It is considered that parties such as Land O' Lakes International Development and USDA need to find a way to negotiate such modifications in a more rapid manner to mitigate negative impact on the project. It is recognized that significant modifications should not be the norm, but it must be wondered how innovative new approaches can ever be brought to the development world if implementing agencies must react to what might be termed standard project outlines when they bid for an award.
3. BDEP has suffered from a fall in its expected budget, owing to a decline in commodity prices. Land O' Lakes should consider how it can shorten the time between awarding of the Agreement by USDA and actual monetization, in order to reduce market risk. Also, is it worth investigating whether commodity volumes offered by USDA could vary to reflect changing prices, rather than a project being hamstrung by significant change in anticipated funding?
4. The very significant role for dairy companies in BDEP is a great example of private sector engagement and is to be encouraged. Dairy company partners are bringing much needed capital to the project, and the concept of aligning sources of training (i.e. processor Advisory Services) with milk supply will substantially boost the prospects for sustainability.
5. Conversely, private sector engagement takes a degree of control of the pace of progress away from the implementing agency, in this case Land O' Lakes. To a large extent, the innovative approach of BDEP and perhaps especially the responsibility placed on the processors in terms of financial contribution has caused delay from the companies. This does not mean that private sector engagement is to be avoided, rather it means that such in-depth private sector involvement in development projects is new to Bangladesh, and some understanding might be called for.
6. The experience of the BDEP project management is of interest, with a background in the sector rather than a development professional. Is it likely that the innovative approach of BDEP, and the major private sector engagement and financial contribution could have occurred if there was not this senior sector experience? The project management commented that in his view, "dairy projects should be led by dairy people" owing to the complex nature of the sector. Others may disagree, but it is worth reflecting upon.
7. BDEP has demonstrated that poor nutrition (indeed malnutrition is probably an apt description of the dominant situation in Bangladesh) is a major limiting factor. Sector experts, including an Australian consultant (with considerable experience in the livestock sectors of Pakistan and Bangladesh) engaged early in the project by BDEP, advice that malnourished calves will never reach their genetic potential. This malnourishment commences in the womb (calves born to cows managed under the BDEP system have much higher birthweights than is the norm in Bangladesh), and continues throughout the life of the poor cow. Accordingly, it will be very interesting to track the productivity of "BDEP calves" as they reach puberty and commence their lives as milking animals. The impact of this early intervention will not be evident for perhaps another three years. This suggests that the term of BDEP, at 3.5 years, is too short to reveal its full potential impact. Lactation effects also support the view that longer term projects are needed for the dairy sector. Local cows which have been managed with BDEP's support for a reasonable period of time have provided increases in milk production, from less than two before BDEP, to seven and even up to nine liters of milk per day. Given the description above, it is recognized that these cows, malnourished all their lives from in the womb to immediately before BDEP, will not reach their genetic potential. Despite this, the significantly improved milk production achieved under BDEP farm management practices, likely with further gains to be made as future generations come into the herd, completely upsets received wisdom about the reasons for poor productivity within the Bangladesh dairy sector. As noted, this warrants prolonged support to be able to track such gains.
8. The development of DRS is a great concept but with deployment yet to be demonstrated. The application of modern technology to data capture and analysis should be encouraged.
9. The MAB component, while in its early stages, looks to have a promising future. This reflects sound understanding of the issues of the Bangladesh dairy sector and the identification of genuine business opportunity which can both be profitable for the entrepreneur and contribute to meeting the real needs of dairy farmers. Demonstrable sector expertise has enabled this virtuous position to be reached.

Annexure 1: Individual Report of the Focus Group Discussions (FGDs)

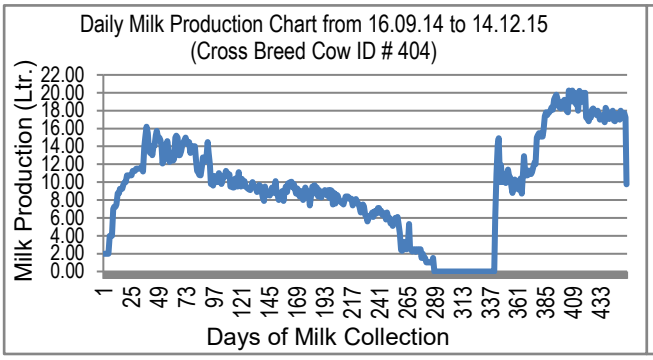
REDACTED

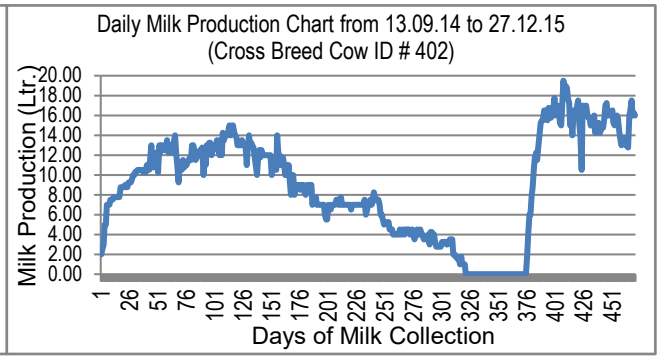
Annexure 2: Individual Report of the Key Informant Interviews (KIIs)

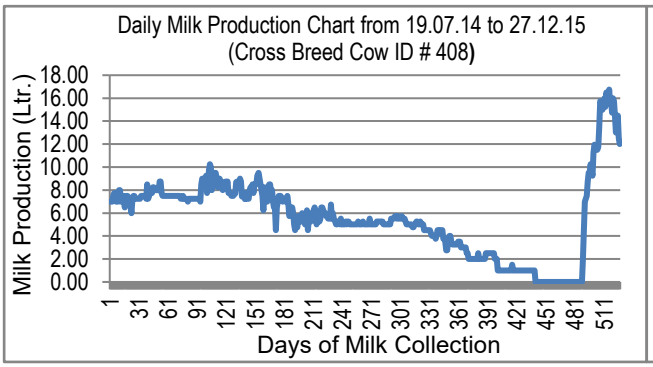
REDACTED

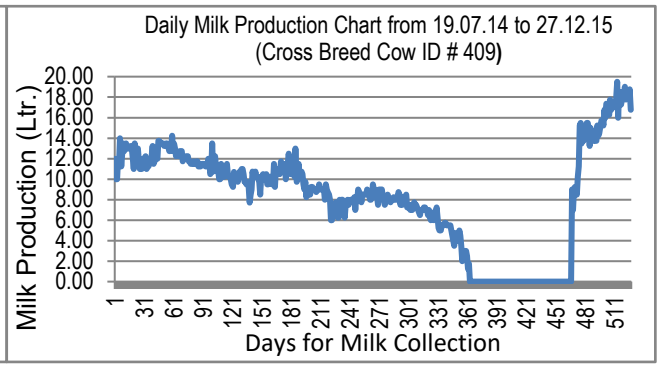
Annexure 3:Trends of daily milk production of individual cows

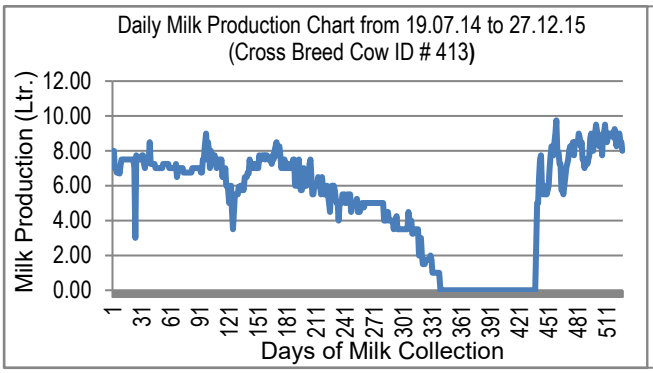
The below charts illustrate another fairly common management practice which needs to be addressed: farmers milking too long, not allowing cows to recover and build up condition for the next lactation.

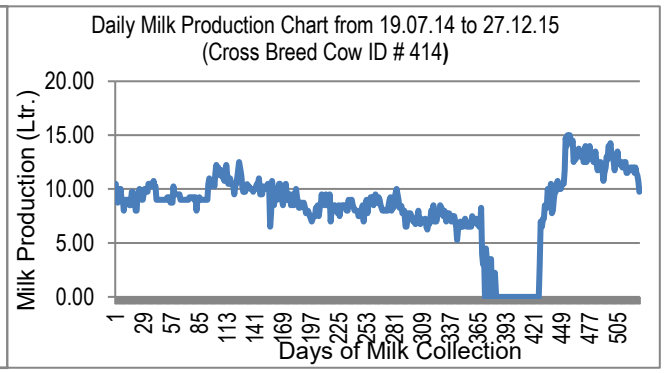


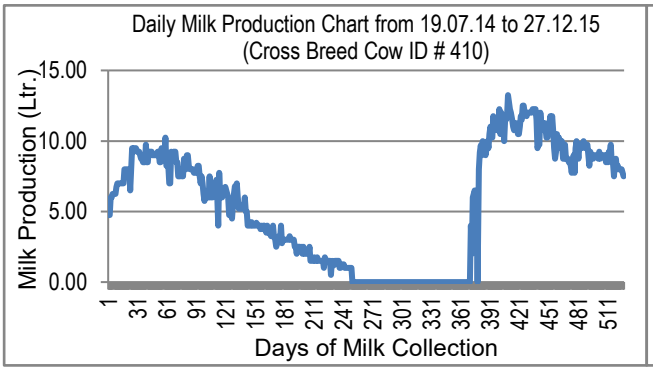


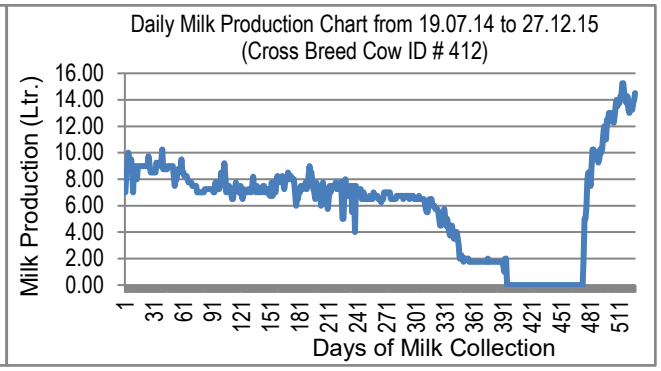




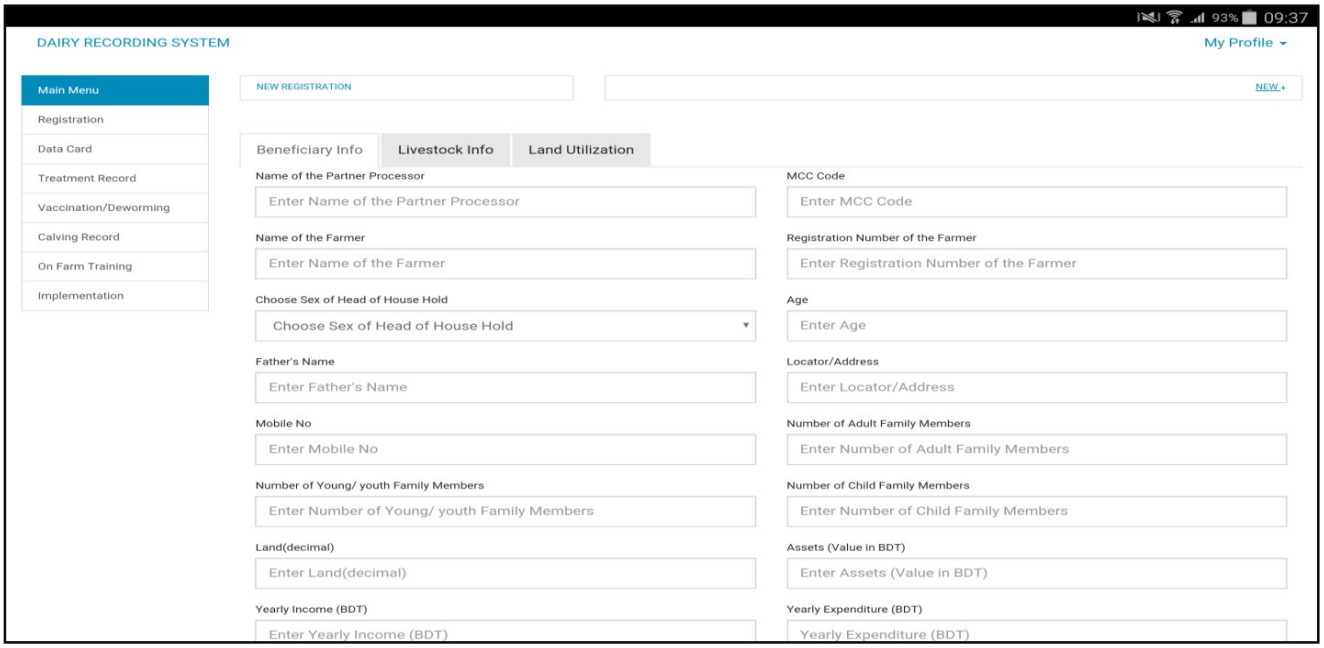


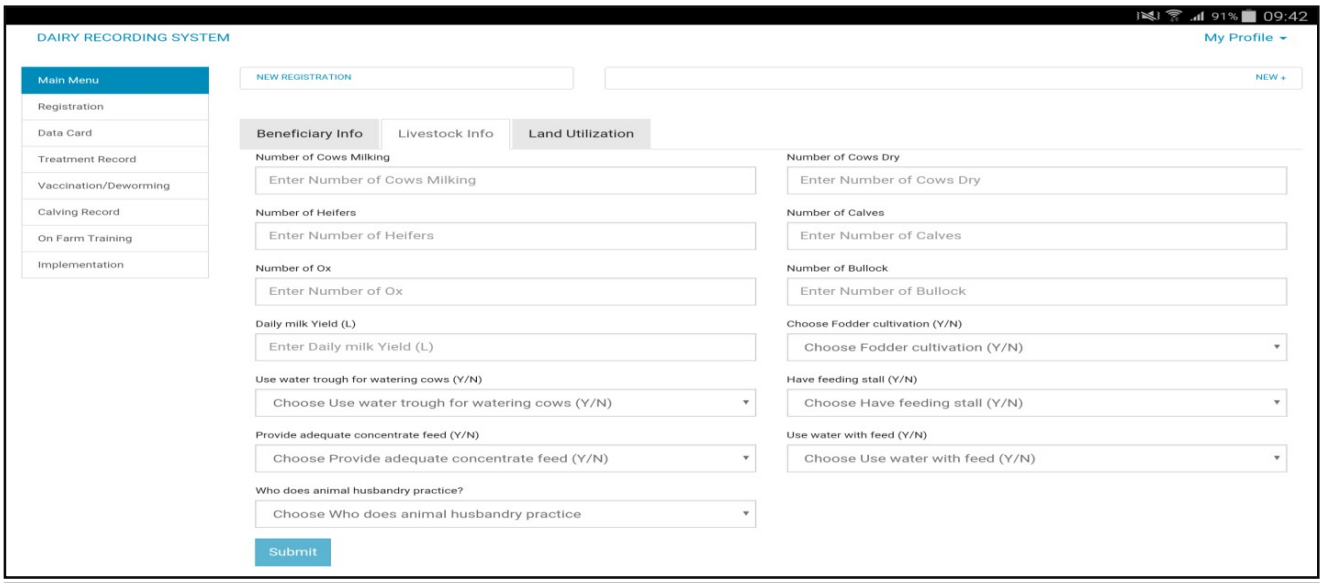


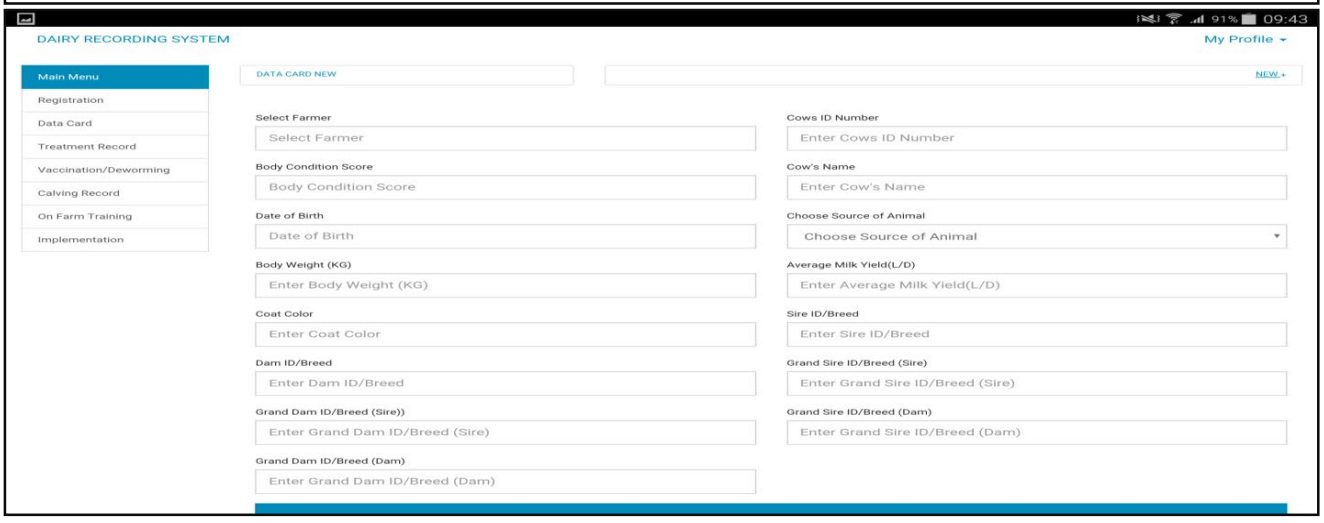




Annexure 4: Screenshots of DRS







Annexure 5: Household Questionnaire for Livestock Producers

Mid-Term Evaluation for Bangladesh Dairy Enhancement Project (BDEP)
Land O'Lakes Inc.

Q NO.	Questions	Response	Response code
1.	**Respondent's Serial No.**		
2.	**Respondent's Name**		
3.	**Village**		
4.	**Upazila**		
5.	**District**		
6.	**Division**		
7.	**BDEP Farmer?**		**Yes = 1, No = 2**
8.	**Respondent's Mobile Number No.**		

9. Household Information

ID No	Name of HH Members (Start from HH Head)	Relation with HH Head (Code-1)	Age		Sex Male=1, Female=2	Marital Status (Code-2)	Education (Highest class passed) (Code-3)	Occupation (based on highest income)		Monthly Average Income (Tk.)
			Year	Month				Primary (Code-4)	Secondary (Code-4)	
1	2	3	4	5	6	7	8	9	10	11

Code-1: Relation with HH head	Code-2: Marital Status	Code 3: Education	Code-4:Occupation Code		
Household head=1 **Household head's spouse=2** **Son/daughter=3** **Father/mother=4** **Brother/sister=5** **Daughter/son-in-law=6**	**Unmarried=1** **Married=2** **Widow/widower=3** **Divorced=4** **Separated/ Deserted=5**	**Never attended school=99** **Reads in class I=0** **Completed class I=1** **Completed class II=2** **Completed SSC/Dakhil=10** **Completed HSC/Alim=12** **BA/BSC=13** **MA/MSC/Kamil=14**	**Farmer=1** **Sharecropper=2** **Agriculture day labor=3** **Day labor=4** **Housewife=5** **Work in others house=6** **Rickshaw/Van puller=7** **Boatman=8** **Fisherman=9** **Milk trader=10**	**Handicraft=15** **Blacksmith=16** **Potter=17** **Carpenter=18** **Mason=19** **Plumber=20** **Goldsmith=21** **Hair cutting=22** **Tailor=23**	**Livestock's rearing=29** **Seasonal Trader=30** **Driver=31** **Village Doctor=32** **Others (Specify)=33** **Not applicable=99**

Grandson/Daughter=7 Uncle's son/Daughter=8 Other (Specify)=9		**Preschool class (general/mosque) =15**	**Meat trader=11 Vegetable trader=12 Shopkeeper=13 Service holder=14**	**Electrician=24 Retired=25 Begging=26 Student=27 Unemployed=28**	

10. Ownership and operation of land

Code	Description	Total Area (decimal)
1	**Homestead land**	
2	**Own land and share agriculture crop land**	
3	**Area under Cultivation of own land**	
4	**Fallow land**	
5	**Fodder land**	
6	**Others land (Specify)**	

11. How many cattle and type of breed did you have your household at present?

Cattle type	Milking	Dry	Pregnant	Milking & Pregnant	Calves	Calves	Bull	Ox
Local breed								
Cross breed								

12. Did you receive any training on cow rearing? ☐ (**Yes = 1, No = 2)**

13. If yes, what was result of the subject and sources of training?

Topics of training	Code	Results from training (code)					
		BDEP	Gov. Livestock office	Partners company/ NGO	Others company	Others NGO	Local specialist
The importance of washing clean water	**1.**						
Providing food rules	**2.**						
Food protein is calculated	**3.**						
Food energy value is calculated	**4.**						
Screening and prevention of disease mastitis	**5.**						
Identification and management of other diseases	**6.**						
Regular health check	**7.**						
Dairy Farm Management	**8.**						
Food preparation and food system	**9.**						
Provide vaccination and de-worming	**10.**						
kept farm clean	**11.**						

Topics of training	Code	Results from training (code)					
		BDEP	Gov. Livestock office	Partners company/ NGO	Others company	Others NGO	Local specialis t
Shed the house	**12.**						
Bathing	**13.**						
Bull calf 's growth management	**14.**						
Development of beef breast	**15.**						
Stable at room temperature and Ventilation	**16.**						
Measuring cow's body condition	**17.**						
Cow weight measurement	**18.**						
Whole milking and hygiene status	**19.**						
Concentrate Food Management	**20.**						
Grass / fodder management	**21.**						
Weaning calves and rearing	**22.**						
Options for the use of calf milk	**23.**						
Heating period identification and Insemination techniques of breeding cows	**24.**						
Calf management	**25.**						
Colostrums feeding	**26.**						
The use of water and separate large earthen manger	**27.**						
3-4 weeks of age calves special care	**28.**						
Utility of soil cultivation land	**29.**						
Green grass / fodder type , features , and quality	**30.**						
The land for the cultivation of green fodder and the use of compost	**31.**						
Grass / fodder to the cows pieces	**32.**						
Preparation of silos	**33.**						
Green fodder cultivation and care of the land application of fertilizer	**34.**						
Accounting	**35.**						
His firm Accounting	**36.**						

Topics of training	Code	Results from training (code)					
		BDEP	Gov. Livestock office	Partners company/ NGO	Others company	Others NGO	Local specialis t
Their income and expenditure accounts	**37.**						
High quality animal identification	**38.**						
Communication	**39.**						
Improve the quality of cow's milk collection	**40.**						
Artificial insemination - facility – benefits unbenefits	**41.**						
Business Plan	**42.**						
Breeding improvement	**43.**						
Fattening	**44.**						

Results from training (code): Highly unsatisfied=1, Unsatisfied=2, Satisfied/ Unsatisfied (None) =3, Satisfied=4, Highly satisfied=5

14. Where was the place of the training? (pls tick the marks)

1= Home, 3= Class room

2= Other village, 4=Others

15. What were the Sources of investment for Dairy farm management?

Code	Sources of investment	Credit received(Tk)
1	**From Savings**	
2	**From sale of Assets**	
3	**From Mortgaged of assets**	
4	**Income from dairy farm**	
5	**From Youth Development**	
6	**From cooperatives**	
7	**Loan**	

16. Credit facilities

Code	Sources of credit	Credit received (Tk)	Dues of Credit (Tk)
1	**From relatives**		
2	**From Neigher**		
3	**From Bank**		
4	**Middle man/Goala**		
5	**Milk Collector/Processor of company Income from dairy farm**		
6	**NGO**		
7	**Other (specify)**		

17. Income and expenditure of household

Code	Sources of Income	Total (Tk.)
1	**Income from agricultural production (yearly)**	
2	**Income from Dairy rearing (yearly)**	
3	**Income from Fish production (yearly)**	

Code	Sources of Income	Total (Tk.)
4	**Income from poultry (yearly)**	
5	**Income from Trade and Commerce (yearly)**	
6	**Income from Service (yearly)**	
7	**Others (Specify)**	

Code	Sources of expenditure	Total (Tk.)
1	**Expenditure on food (weekly)**	
2	**Fuel/ lighting (monthly)**	
3	**Transportation (monthly)**	
4	**Communication /mobile (monthly)**	
5	**Clothing (yearly)**	
6	**Education (yearly)**	
7	**Health care (yearly)**	
8	**House construction and repair (yearly)**	
9	**Repayment of loan (yearly)**	
10	**Payment for bank/ cooperative deposit (yearly)**	
11	**Social/ function/ marriage/festivals (yearly)**	
12	**Expenditure on livestock's(yearly)**	
13	**Others (specify)**	

18. How many cattle do you have before being part of this project?

Cattle No. (Descending)	**Gender Male=1, Female =2**	**Age**		**Dry Yes = 1, No = 2**	**Pregnant Yes = 1, No = 2**	**Milking Yes = 1, No = 2**	**Milking & Pregnant Yes = 1, No = 2**	**# of Lactation**	**Local =1 Cross =2**	**BDEP= 1 Non-BDEP= 2**
		Year	**Month**							
Cattle-1										
Cattle-2										
Cattle-3										
Cattle-4										
Cattle-5										
Cattle-6										
Cattle-7										
Cattle-8										
Cattle-9										
Cattle-10										

19. How many cattle do you have at present?

Cattle No. (Descending)	Gender **Male=1, Female =2**	Age		Dry **Yes = 1, No = 2**	Pregnant **Yes = 1, No = 2**	Milking **Yes = 1, No = 2**	Milking & Pregnant **Yes = 1, No = 2**	# of Lactation	Local =1 Cross= 2	BDEP= 1 Non-BDEP= 2
		Year	**Month**							
Cattle-1										

Cattle No. (Descending)	Gender **Male=1, Female =2**	Age		Dry **Yes = 1, No = 2**	Pregnant **Yes = 1, No = 2**	Milking **Yes = 1, No = 2**	Milking & Pregnant **Yes = 1, No = 2**	# of Lactation	Local =1 Cross= 2	BDEP= 1 Non-BDEP= 2
		Year	**Month**							
Cattle-2										
Cattle-3										
Cattle-4										
Cattle-5										
Cattle-6										
Cattle-7										
Cattle-8										
Cattle-9										
Cattle-10										

20. How was milk production of your cows over the lactation period before being part of this project?

Milking Cows No.	Age	BDEP= 1 Non-BDEP =2	Production yesterday (Day/Ltr.)		Production normally (Day/Ltr.)		lactation period (Days)	Heat time interval of e (Days)	Maximum Production (Day/Ltr.)	Minimum Production (Day/Ltr.)
			Morning	Evening	Morning	Evening				

21. How is milk production of your cows over the lactation period at present?

Milking Cows No.	Age	BDEP=1 Non-BDEP=2	Production yesterday (Day/Ltr.)		Production normally (Day/Ltr.)		lactation period (Days)	Heat time interval of e (Days)	Maximum Production (Day/Ltr.)	Minimum Production (Day/Ltr.)
			Morning	Evening	Morning	Evening				

22. What is your opinion, calves how much milk consumed daily? Liters

23. How were milk sales of your cows over the lactation period before?

Before joining of BDEP Normally Sale (Day/Ltr.)			After joining of BDEP Yesterday Price (Tk./ Liter)		
Processor	Goala	Farm gate	Processor	Processor	Goala

24. How are milk sales of your cows over the lactation period at present?

Sale (Ltr.) Yesterday			Yesterday Price (Tk. / Liter)			Average Sale (Day/Ltr.) Normally			Average Normal Price (Tk. / Ltr.)		
Processor	Goala	Farmgate	Processor	Goala	Farmgate	Processor	Goala	Farmgate	Processor	Goala	Farmgate

25. How much of your cows' milk did you consume?

Before joining BDEP	After joining BDEP	
Consumed normally (Day/Ltr.)	Consumed yesterday (Ltr.)	Daily Consumed normally (Ltr.)

26. What food feed ingredients did you feed your cattle daily before being part of this project?

Cattle No. (Descending)	Age		daily Food Ingredients (kg or L)												Others	Fodder Sources
		Straw	Fodder		Others company's Concentrated	Wheat Bran	Pulse Bran	Rice Bran	Molasses	Mustard Oil Cake	Sesame Oil Cake	Salt	Boiled Rice /Rice Water	Water		
			Code	Kg.												
Cattle-1																
Cattle-2																
Cattle-3																
Cattle-4																
Cattle-5																
Cattle-6																
Cattle-7																
Cattle-8																
Cattle-9																
Cattle-10																

Fodder Code: Napier=1, Para=2, Maize=3, Jumboo=4, Others=5

Fodder Sources Code: Own Land=1, Leased land=2, Purchased from other source=3, MABs=4

27. What feed food ingredients do you feed your cattle daily now after being part of this project?

Cattle No. (Descending)	Age		daily Food Ingredients (kg or L)												Others	Fodder Sources
		Straw	Fodder		BDEP's Concentrated Ration	Wheat Bran	Pulse Bran	Rice Bran	Molasses	Mustard Oil Cake	Sesame Oil Cake	Salt	Boiled Rice /Rice Water	Water		
			Code	Kg.												

Cattle-1																
Cattle-2																
Cattle-3																
Cattle-4																
Cattle-5																
Cattle-6																
Cattle-7																
Cattle-8																
Cattle-9																
Cattle-10																

Fodder Code: Napier=1, Para=2, Maize=3, Jumboo=4, Others=5
Fodder Sources Code: Own Land=1, Leased land=2, Purchased from other source=3, MABs=4

28. What were the costs cost of food feed ingredients you feed your cattle daily before being part of this project?

Cost of Food Ingredients (Tk. / Kg.)												
Sources	Straw	Fodder	Concentrated Ration	Wheat Bran	Pulse Bran	Rice Bran	Molasses	Mustard Oil Cake	Sesame Oil Cake	Salt	Boiled Rice / Rice Water	Water
Purchase												
Own												

29. What are the costs of food feed ingredients you feed your cattle daily after being part of this project?

Cost of Food Ingredients (Tk. / Kg.)												
Sources	Straw	Fodder	BDEPConcentrated Ration	Wheat Bran	Pulse Bran	Rice Bran	Molasses	ustard Oil Cak	Sesame Oil Cake	Salt	Boiled Rice / Ric Water	Water
Purchase												
Own												

30. Since last calving how man attempts have you made to inseminate your cows for conception?

Cattle No. (Descending)	Age	# of attempt	Insemination Types **[1=Natural,** 2 **= Artificial]**	Total Cost of Insemination (Tk.)	Result [1= Successful, 2 = Failed]	Types of cow [1 = BDEP, 2 = Non-BDEP]	Remarks
Cattle-1							
Cattle-2							
Cattle-3							
Cattle-4							

Cattle-5							
Cattle-6							
Cattle-7							
Cattle-8							
Cattle-9							
Cattle-10							

31. In the last 1 year, how many times have you provided preventive care for your cattle?

Cattle No. (Descending)	Age	# of vaccine (No.)	Disease	Vaccine provider	Cost of vaccine (Tk.)	# of de-worming	Provider of de-worming	Cost of de-worming (Tk.)
Cattle-1								
Cattle-2								
Cattle-3								
Cattle-4								
Cattle-5								
Cattle-6								
Cattle-7								
Cattle-8								
Cattle-9								
Cattle-10								

32. Before last 1 year, how many times have you provided preventive care for your cattle?

Cattle No. (Descending)	Age	# of vaccine (No.)	Disease	Vaccine provider	Cost of vaccine (Tk.)	# of de-worming	Provider of de-worming	Cost of de-worming (Tk.)
Cattle-1								
Cattle-2								
Cattle-3								
Cattle-4								
Cattle-5								
Cattle-6								
Cattle-7								
Cattle-8								
Cattle-9								
Cattle-10								

33. What were other new treatments you provided for your cattle after being part of this project?

Cattle No. (Descending)	Age	Last 1 year (2015)				Before 1 year (2014)			
		# of Treatment	Disease	Treatment provider	Total Cost (Tk.)	# of Treatment	Disease	Treatment provider	Total Cost (Tk.)
Cattle-1									
Cattle-2									

Cattle-3									
Cattle-4									
Cattle-5									
Cattle-6									
Cattle-7									
Cattle-8									
Cattle-9									
Cattle-10									

Is there any change of cattle with BDEP concentrate technology? **=1, No=2**

Sl No.	**If yes, what type of change**	**If there is no change, why not?**
1		
2		
3		
4		
5		

Do you applying BDEP concentrate technology for other cows? **Yes=1, No=2**

Sl. No.	**If No, why are not applying for other cows**
1	
2	
3	
4	
5	

Ques. #	Question	BDEP Cow (pls tick the marks)	Non-BDEP Cow(pls tick the marks)
34.	**Is there any fertility differences / improvement of local/cross breed cattle?**		

Ques. #	Question	BDEP Cow (pls tick the marks)	Non-BDEP Cow(pls tick the marks)
35.	**How do you face this problem?**		
36.	**What management practices did you apply earlier for your cattle?**	**a. Feeding - Scavenging / Grazing / Both** **A1 Water mixed / Not mixed** **A2 Chopped / Non-chopped** **b. # of bathing per week---** **c. Early weaning practice –- Yes / No** **d. Hand washed before milking --- Yes / No** **e. Cow comfort system/ --- Yes / No** **f. Better housing --- Yes / No** **g. Shed Cleaning --- Yes / No**	**a. Feeding - Scavenging / Grazing / Both** **A1 Water mixed / Not mixed** **A2 Chopped / Non-chopped** **b. # of bathing per week---** **c. Early weaning practice –- Yes / No** **d. Hand washed before milking --- Yes / No** **e. Cow comfort system/ --- Yes / No** **f. Better housing --- Yes / No** **g. Shed Cleaning --- Yes / No**
37.	**What management practices do you apply presently for your cattle?**	**a. Feeding - Scavenging / Grazing / Both** **A1 Water mixed / Not mixed** **A2 Chopped / Non-chopped** **b. Cow comfort system/ ---** **c. # of bathing per week---** **d. Cleaning --- Yes / No** **e. Early weaning practice –- Yes / No**	**a. Feeding - Scavenging / Grazing / Both** **A1 Water mixed / Not mixed** **A2 Chopped / Non-chopped** **b. Cow comfort system/ ---** **c. # of bathing per week---** **d. Cleaning --- Yes / No** **e. Early weaning practice –- Yes / No**
38.	**What changes can you mark about access to livestock services?**	**a. Facilities available at locality - Yes / No** **b. Govt. service available - Yes / No**	**a. Facilities available at locality - Yes / No** **b. Govt. service available - Yes / No**
39.	**How do you spend your earnings from dairy?**	**a. Purchased furniture** **b. Kitchen expenses** **c. Cattle feed** **d. Children's education** **e. Others (Specify)**	**a. Purchased furniture** **b. Kitchen expenses** **c. Cattle feed** **d. Children's education** **e. Others (Specify)**
40.	**How women are engaged/ Involved in dairy rearing?**	**a. Cattle shed cleaning** **b. Cattle feeding** **c. Fodder / straw chopping** **d. Bathing** **e. Milking** **f. Others (Specify)**	**a. Cattle shed cleaning** **b. Cattle feeding** **c. Fodder / straw chopping** **d. Bathing** **e. Milking** **f. Others (Specify)**
41.	**What do you think about BDEP?**		

42. Factors influencing in Dairy farming performance

Sl No.	Do you think that Dairy farming influence by	Highly Disagree=1	Disagree=2	Either agree or disagree=3	Agree=4	Highly Agree= 5
	Environmental factor					

Sl No.	Do you think that Dairy farming influence by	Highly Disagree=1	Disagree=2	Either agree or disagree=3	Agree=4	Highly Agree= 5
1.	**Heavy rainfall**					
2.	**High temperature**					
3.	**disease**					
4.	**Climate Change**					
5.	**Perish ability**					
	Social Factors:					
6.	**Religion**					
7.	**Education**					
8.	**Ethnicity**					
9.	**Family size**					
10.	**Culture**					
11.	**Political system**					
	Economic Factors:					
12.	**Poverty**					
13.	**Family member**					
14.	**Market price**					
15.	**Inflation rate**					
16.	**Lower product price**					
17.	**High input price**					
18.	**Low Capital need**					
19.	**Credit availability**					
20.	**Milk sale availability**					
21.	**Labor wages**					
22.	**Market structure**					
	Marketing Factors					
23.	**No. of consumer**					
24.	**Consumer choice**					
25.	**Demand of product**					
26.	**Product variety**					
27.	**Location of the market**					

Sl No.	Do you think that Dairy farming influence by	Highly Disagree=1	Disagree=2	Either agree or disagree=3	Agree=4	Highly Agree= 5
28.	Number of traders					
29.	Price of milk					
30.	Different marketing policy					

Name of Enumerator:_____Signature:_____
Date:_____

Name of Supervisor:_____Signature:_____
Date:_____

Annexure 6: Qualitative Data Collection Tools

a. FGD guideline for dairy farmers (Women)

Key Objectives:

1. **Understand whether BDEP approach serves women farmers.**
2. **Understand whether BDEP approach of whole farm management is working (productivity and if possible profitability).**
3. **Understand whether BDEP approach of whole farm management is creating more or less work for the farmer.**
4. **Determine to what extent female farmers are discouraged by male members of the household, and recommend, if this is an issue, what can be done.**
5. **If your neighbours are not involved in the BDEP trial, do you think they are interested in learning from BDEP and its partners?**

Number of participants :
GPS Coordinates :
Land Mark :
District : **Upazila:**
Union : **Village :**
Details of the participants :

S/N	Name	Village	Union	Upazila	Mobile
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Check list

1. What was your normal practice for managing your cows and calves before working with BDEP?
2. What changes have you made to manage your cows and calves since working with BDEP?
3. Have these changes been beneficial – any increase in milk production, cow health, veterinary costs, profitability, and fertility?
4. Have the changes proposed by BDEP increased or decreased your work load? Is the increase or decrease significant? If there is a significant increase in workload, is the increased effort justified in terms of additional milk production and profitability?
5. Do you purchase inputs from one of BDEP's MABs? What products and services are you buying? Do you consider these to represent good value? If you are not buying from the MAB, why not?
6. Are all your cows in the BDEP trial? If not, have you spread the BDEP system to your other cows? If not, why not? (Note: if the answer here is no, the data collector needs to probe further to try to gain understanding of why not, and what would encourage the farmer to use BDEP system across all cows).
7. If you have to travel other village for training, would you be able to do that? If not, why not?

8. Who do the families (male or female members) consult before making the decisions related to dairy business (can be a community leader, knowledge person, relatives etc.)? What can they influence?
9. If woman has been trained, does husband allow implementation?
10. To what extent husband's education influences women training efficiency?
11. Are you pleased to be working with BDEP, and do you wish to continue?
12. Are your neighbors involved in the BDEP trial? If not, do you think they are interested in following the BDEP system? Have any of these farmers made changes to their traditional practices?
13. Do you suggest to your neighbors for implementing the BDEP trial and joining with the BDEP system? If suggest, why and if not, why not?
14. What are the overall observation for effectiveness, efficiency and sustainability of the BDEP system?
15. SWOT analysis

- Problem
- Challenge
- Risk/Threat
- Recovery
- Strength
- Weakness
- Opportunity

b. FGD guideline for dairy farmers (Male)

Key Objectives:

1. Understand whether BDEP approach of whole farm management is working (productivity and if possible profitability).
2. Understand whether BDEP approach of whole farm management is creating more or less work for the farmer.
3. Appreciate whether farmers are satisfied with the work BDEP is doing.
4. Understand why farmers won't apply BDEP promoted technologies for all of his cows.

Number of participants :
GPS Coordinates :
Land Mark :
District : **Upazila:**
Union : **Village :**
Details of the participants :

S/N	Name	Village	Union	Upazila	Mobile
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Check list

1. What was your normal practice for managing your cows and calves before working with BDEP?
2. What changes have you made for managing your cows and calves since working with BDEP?
3. Have these changes been beneficial – any increase in milk production, cow health, veterinary costs, profitability, fertility?

4. Have the changes proposed by BDEP increased or decreased your work load? Is the increase or decrease significant? If there is a significant increase in workload, is the increased effort justified in terms of additional milk production?
5. Do you purchase inputs from one of BDEP's MABs? What products and services are you buying? Do you consider these to represent good value? If you are not buying from the MAB, why not?
6. Are all your cows in the BDEP trial? If not, have you spread the BDEP system to your other cows (If any)? If not, why not? (Note: if the answer here is no, the data collector needs to probe further to try to gain understanding of why not, and what would encourage the farmer to use BDEP system across all cows).
7. If you have to travel other village for training, would you be able to do that?
8. What you think, BDEP training facilities is enough for efficient farming practice. If not , then why?
9. Who do the families (male or female members) consult before making the decisions related to dairy business (can be a community leader, knowledge person, relatives etc.) What can they influence?
10. If your wife has been trained, do you allow implementation? If not, then why?
11. Are you pleased to be working with BDEP, and do you wish to continue?
12. Are your neighbours involved in the BDEP trial? If not, do you think they are interested in following the BDEP system? Have any of these farmers made changes to their traditional practices?
13. Do you suggest to your neighbors for implementing the BDEP trial and joining with the BDEP system? If suggest, why and if not, why not?
14. What are the overall observation for effectiveness, efficiency and sustainability of the BDEP system?
15. SWOT analysis

- Problem
- Challenge
- Risk/Threat
- Recovery
- Strength
- Weakness
- Opportunity

c. Checklist for Key Informant (Specific for different informant groups)

(Separate for MAB, DDO, BDEP staff, Dairy Company field staff and management staff, Govt. official)

Dairy Company Management

Key Objective:

Understand whether the dairy company will be able to achieve its commitments with respect to MCC numbers, farmers linked to new MCCs, and establishment of an Advisory Service with the support of BDEP.

1. Can you describe your relationship with BDEP?
2. What strengths do you consider BDEP is bringing to dairy development in Bangladesh?
3. How many MCCs you are committed to establish and what is the total capacity of that new milk collection infrastructure? Do you consider you will be able to meet this commitment within the contract period to 31 December, 2016?
4. What is your target for the number of farmers you will register and actively procure milk from, through the newly established MCCs? Are you confident of being able to achieve this within the contract period?
5. If are not confident, than what kind of problem you may face?

6. How is progress on the establishment of an Advisory Service?
7. What do you know of the training which BDEP is offering for DDOs?
8. What do you know of the impact the BDEP whole farm management approach is having on milk production and profitability?
9. What do you know of DRS? Do you think this is going to be of value? Do you have any suggestions to expand its usefulness?
10. DRS will provide some data but what other reports except DRS can be produced for progress reporting and monitoring the activities
11. How do you think the BDEP project could be enhanced?
12. SWOT analysis

- Problem
- Challenge
- Risk/Threat
- Recovery
- Strength
- Weakness
- Opportunity

Dairy Company Field Staff (other than DDOs under BDEP training)

Key Objectives:

1. Determine the extent of the understanding of dairy company field staff of the BDEP whole farm management approach.
2. Determine whether dairy company field staff believes the BDEP whole farm management approach is working in terms of higher milk production, profitability and farmer satisfaction.
3. Determine whether dairy company field staff believes the BDEP whole farm management system will result in farmers supplying more milk to their companies.

Questions

1. What is the extent of your contact with BDEP?
2. Have you seen for yourself the implementation of the BDEP whole farm management system, on-farm?
3. What do you think has been the impact of BDEP whole farm management to date?
4. Do you consider that, if your company can be trained in the whole farm management approach, this will be good for your company?
5. Do you believe that farmers are positive towards the BDEP whole farm management system?
6. What do you know of BDEP's DRS system? Do you think this is a good concept? Do you have any suggestions for enhancing its usefulness?
7. What you think, level of education of farmers has any effect on DRS system?
8. Have you any experience of the BDEP MAB concept? What do you think of the BDEP MAB concept? Will it be good for the farmers supplying milk to your company? Do you have any suggestions on how to enhance the value of the MABs?
9. SWOT analysis

- Problem
- Challenge
- Risk/Threat
- Recovery
- Strength
- Weakness
- Opportunity

DDOs

Key Objectives

1. Learn about the training that BDEP has provided.Learn about whether this DDO (or master) training is of value when training farmers.
2. Understand DRS.

Questions

1. Do you think BDEP trained has helped you in terms of understanding dairy farm management, and for communicating enhanced farming practices to Bangladeshi farmers?
2. What are the most important things that you have learned?
3. Has your training equipped you to communicate more efficient farm practices to the farmers?
4. How do you consider farmers feel about BDEP?
5. Can you convince them easily to join BDEP or its partners?
6. Are you using DRS? What do you think of this system? Could it be improved? How or where / what needs to improve?
7. What proportion of your time is spent in the field with farmers?
8. How many farmers can you provide support to, given your understanding of whole farm management? (Note, the assumption here is that the DDO is to support a new group of farmers when a new MCC is established. Another way of asking the same question in a different way is as follows: "How long do you think it might take to influence 170 farmers around a new MCC?).
9. SWOT analysis
   - Problem
   - Challenge
   - Risk/Threat
   - Recovery
   - Strength
   - Weakness
   - Opportunity

Team Leaders, BDEP

Key Objectives

1. Understand the key differences between BDEP and standard development approaches.
2. Understand the key factors being addressed by BDEP through its whole farm management approach.
3. Understand the overall impact on productivity and profitability.
4. Ask whether Team Leaders consider the project and its whole farm management approach can be improved.
5. Understand DRS.

Questions

1. Does BDEP use a different approach from other dairy development projects operating in Bangladesh? If yes, what are these key differences?
2. Are the farmers accepting the changes that BDEP is recommending? How easy is to convince the farmers? Are the farmers pleased with the interaction they have with BDEP?

3. What is the impact of the BDEP whole farm management system on productivity and profitability?
4. What are the key things you have learned since joining BDEP?
5. Do you consider that the BDEP whole farm management approach could be improved, and if so, how?Describe DRS. Are you using DRS? What do you think of this system? Could it be improved?
6. Do you believe the project activities and philosophies to be sustainable? If not, why not?
7. What challenges are you facing in implementation? What are your strategies to overcome these challenges?
8. SWOT analysis

- Problem
- Challenge
- Risk/Threat
- Recovery
- Strength
- Weakness
- Opportunity

Project Management

Key Objectives

1. Understand the BDEP approach with respect to partner selection, whole farm management and DRS.
2. Understand the risks to the project
3. Does the project management consider the project could be enhanced?
4. What would the project management do differently if starting again?
5. How would the project management expand the project if this were possible?

Questions

1. What are the criteria for selecting beneficiaries, MABs, Processors and NGO?
2. Does BDEP use a different approach from other dairy development projects operating in Bangladesh? If yes, what are these key differences?
3. Do you consider that the BDEP whole farm management approach could be improved, and if so, how? Describe DRS. Are you using DRS? What do you think of this system? Could it be improved?
4. What is the impact of the BDEP whole farm management system on productivity and profitability?
5. What kinds of risks are associated for implementing project? What measures do you suggest to reduce or overcome of the risks?
6. Do you satisfy with the progress of project implementation according to the project plan? If satisfy, why, if not, why not?
7. What steps do you suggest for further enhancing the project activities?
8. What are the key things you have learned since joining BDEP?
9. Do you believe the project activities and philosophies to be sustainable? If not, why not?
10. What challenges are you facing in implementation? What are your strategies to overcome these challenges?
11. SWOT analysis

- Problem
- Challenge
- Risk/Threat
- Recovery
- Strength
- Weakness
- Opportunity

Checklist for MABs

Name :

Mobile :

Shop Name :

Address :

Education : Illiterate-1, Primary-2, SSC-3, HSC-4, Graduate-5, Above Graduate-6

1. For how long a time have you operated as an MAB?
2. How many clients do you have at present?
3. How many of those are involved with BDEP?
4. What services / items do you provide to the dairy farmers?
5. What is the demand of your products or services? Is it increasing? Please rank the products and services based on the market demand.
6. How many villages do you cover? If only one, why are you not trying to cover more?
7. Can you fulfill the requirement of the farmers?
8. What are the challenges you face to provide services or products?
9. How can you overcome the challenges?
10. From where do you collect of raw materials / inputs to run your business?
11. Do you get consistent supply of raw materials / inputs to run your business? If not, how do you manage those?
12. Are all farmers in your village area aware of your services?
13. What are the important tips / advice do you give to the dairy farmers?
14. What are the opportunities you have seen?
15. Is your business profitable? If not, how do you think it can be made profitable?
16. SWOT analysis
    - Problem
    - Challenge
    - Risk/Threat
    - Recovery
    - Strength
    - Weakness
    - Opportunity