PREPARED FOR
COMMUNITY LIVESTOCK DEVELOPMENT PROJECT
HARIHARBHAWAN, LALITPUR
NEPAL

IMPACT OF MILK PROCESSING SUPPORT OF COMMUNITY LIVESTOCK DEVELOPMENT PROJECT

(FINAL REPORT)

Prepared by

Centre for Empowerment and Development
Saibu-8, Lalitpur, Nepal
Phone: 977 1 5590842
E-mail: cednepal@yahoo.com

July 2009

Executive Summary

This study has assessed the impact of establishing chilling vats on improving the livelihood of livestock growers and analyzed the state of the art on milk production and marketing in 11 milk producers' cooperatives (MPCs) that own chilling vats. The operational performance of the chilling vats analyzed in this study represents from six districts of the three development regions. The information required for this study are collected both from secondary and primary sources.

The study uncovered that establishment of chilling vats has been instrumental to uplift the livelihood of shareholders of the MPCs owning the chilling vats through the creation of natural asset, social asset, human asset, physical asset and economic/financial assets. The study provides evidence that establishment/expansion of chilling vats has positive trend in milk production and marketing. Prior to the support to establish chilling vats, milk was locally consumed and/or processed for domestic consumption / sale in distance market. In all the sites, milk production and marketing has been expanded significantly with the operation and management of chilling vats by MPCs. The rate of growth on milk production and marketing was 34.5% in 2007/08 compared to 2006/07 and 2.5% in 2008/09 compared to 2007/08. Operation of chilling centres has injected capital at local level and contributed towards reducing the incidence of rural poverty.

On an average a chilling vat has served about 173 farmers. Capacity utilization of the chilling vats in 2009 was 78.1% in flush season and 55.9% in lean season. On an average, about 79.6% of the milk collected by MPC was sold to larger dairy industries and 20.4% are sold in local markets. On an average, a typical buffalo raiser has sold about 85% of the total milk and that of cattle raiser has sold 80% of the total milk produced to their MPC and rests are consumed within the households. In order to supplement animal feed locally, both buffalo and/or cattle growers have allocated part of their farm land on forage production and average area allocated for forage production has been estimated at 0.15 ha in April 2009.

Operation and management of chilling vats by MPCs has been supported by proper backward and forward linkages with different stakeholders to facilitate adoption of improved dairy production technology, which is one of the pre-requisites for promoting milk production and marketing. Further, successful operation of chilling vat requires increased supply of milk by farmers owning the MPC, which is a function of improved livestock breed, improved livestock husbandry, availability of balanced feed and fodders, and improvement on feeding practices. Other factors supporting the operation and management of chilling vats includes access to transport and communication, transportation networks, milk collection network, back-up electricity supply during load-shedding, local processing, health and hygiene, sanitation and increase in living standard of the local communities to facilitate improved demand for milk products, etc.

In order to sustain the operation of chilling vats while ensuring distributional equity, chilling vats must be operated and managed by organized entity than individual. MPCs have proven to be efficient and effective on managing chilling vats. Capacity of the MPCs need to be developed on aspects such as chilling vat operation and management, book keeping and accounting; financial management, governance and social capital formation.

In order to facilitate enhanced chilling vats operation and management, this study has recommended the need to strengthen backward and forward linkages on milk production and marketing, access to finance for commercial livestock farming, business linkages with large milk processing plants, product diversification, enhanced management capacity of MPCs on pricing of products and services and preparation and implementation of business plan. Such a support will be instrumental to ensure continuity and sustainability of milk marketing support provided to the MPCs.

Table of Content

Executive Summary i
Table of Content ii
List of Table iv
Study Team 4
Acronyms and Abbreviations 4
1. INTRODUCTION 1
1.1 Background 1
1.2 Objectives 2
1.3 Scope 2
1.4 Methodology 3
1.4.1. Data Sources 4
1.4.2. Data Collection Methods 4
1.4.3. Data Collection Tools 4
1.5 Limitations 4
1.6 Report Organization 4
2. OVERVIEW OF DAIRY SECTOR 5
2.1 Overview of the Dairy Sector 5
2.2 Status and the Structure of the Current Dairy Strategy 5
2.3 Policies affecting Dairy Sector 6
2.4 Major Constraints 6
2.5 Long Term Vision for the Sector 6
2.6 Marketing Channels and Intermediaries 7
3. OVERVIEW OF CHILLING VATS UNDER STUDY 7
3.1 Management of Chilling Vats 7
3.2 Governance System 8
3.3 Capacity Utilization 9
3.4 Support Received by Milk Producers Cooperatives on Chilling Vats 9
3.5 Physical Asset Ownership Status 10
3.6 Linkages and Networking 11
3.6.1. Linkages with Dairy Industries 11
3.6.2. Linkages with Other Agencies 11
3.7 Mode of Operation of Chilling Vats 12
3.8 Amount of Transaction 13
3.8.1. Trend on Milk Marketing 13
3.8.2. Place of Marketing 13
3.8.3. Seasonality on Milk Marketing 14
3.9 Employment Generation 15
3.10 Community Managed Livestock Insurance Scheme 15
4. IMPACT ON MILK PRODUCTION, MARKETING AND LIVELIHOOD AT FARM LEVEL 16
4.1 Technical Services on Milk Production 16
4.1.1. Veterinary Support 16
4.1.2. Training and Capacity Development 17
4.2 Animal Production System and Productivity 17
4.2.1. Livestock Production System 18
4.2.2. Herd Size and Composition of Species 19
4.2.3. Reproductive Performance 19
4.2.4. Forage Development 20
4.2.5. Feed Resource Base 21
4.2.6. Adoption of Improved Dairy Production Technology 21
4.2.7. Problems on Animal Husbandry 21
4.2.8. Suggestions for Improvement on Animal Husbandry 22
4.3 Support to Milk Marketing 22
4.3.1. Market Share of Total Production 22
4.3.2. Trends in Milk Marketing 23

4.3.3. Marketing Cost and Margin 23
4.4 Milk Marketing and Household Income 24
4.5 Changes in the State of Livelihood Resources 25
4.5.1. Natural Resource Base 25
4.5.2. Human Resources 25
4.5.3. Productive/Financial Resources 26
4.5.4. Social Resources 26
4.5.5. Physical Resources 26
4.6 Context of Expanding Livelihood Resources at Households and Community Level 27
5. Conclusions and Recommendations 28
5.1 Conclusions 28
5.2 Recommendations 29
Bibliography 30
Annex 1: Checklist Used During Field Studies 31

List of Table

Table 1: Chilling Vats support by DLSOs under CLDP in Selected Districts 2
Table 2: Chilling Vats Covered under this Study in the Selected Districts 2
Table 3: Status of Milk Producer's Cooperatives 7
Table 4: Composition of BODs by Sex, Caste System and Ethnic Group 8
Table 5: Current Capacity Utilization Status of Chilling Vats 9
Table 6: Support on Chilling vats Received by the MPCs 9
Table 7: Details of Physical resources of selected Chilling Vat Centre 10
Table 8: Linkages of Chilling Vats with Dairy Industries 11
Table 9: External Support received by the Chilling Centers 12
Table 10: Milk Marketing Services Provided by MPCs 13
Table 11: Amount of Milk Sold to Dairy Industries and Local Market (2007-2009) 14
Table 12: Average Milk Production in Flush and Lean Season by MPCs 14
Table 13: Direct Employment Generated by the Milk Producers' Cooperatives Managing Chilling Vats 15
Table 14: Amount of Treatment Services and Vaccination Services Provided by DLSOs in FY 2064/065 16
Table 15: Trainings and Exposure visits organized by DLSOs 17
Table 16: Sample Size and Family Size of the Households 18
Table 17: Livestock Production System in the Study Area 18
Table 18: Heard size and Composition of Species 19
Table 19: AI Carried Out by DLSOs in Study Districts in FY 2064/65 20
Table 20: Area under Improved Forage in Private Land 20
Table 21: Problems on Animal Husbandry 21
Table 22: Suggestions for Improvement on Animal Husbandry 22
Table 23: Market Share of Total Production of Milk by Farm Household 22
Table 24: Average Milk Sold to MPCs per Household 23
Table 25: Average Marketing Cost and Margins for Milk Marketing 23
Table 26: Impact of Milk Marketing Support on Household Income 24
Table 27: Types of Assets Created by Under Milk Marketing Support (Chilling Vats) 27

Study Team

Mr. Nara Hari Dhakal	Team Leader
Mr. Tirtha Raj Ghimire	Research Associate
Mr. Ramesh Adhikari	Research Associate
Mr. Deepak Dhakal	Research Associate

Acronyms and Abbreviations

ADB	:	Asian Development Bank
ADBL	:	Agriculture Development Bank Limited
CBO	:	Community Based Organization
CED/N	:	Centre for Empowerment and Development, Nepal
CLDP	:	Community Livestock Development Project
DAG	:	Dis-advantaged Groups
DDC	:	District Development Committee
DDC	:	Dairy Development Corporation
DLS	:	Department of Livestock Services
DLSO	:	District Livestock Services Office
EA	:	Executing Agency
FIs	:	Financial Institutions
FSPs	:	Financial Service Providers
GDP	:	Gross Domestic Product

ILP	:	Intensive Livestock Programme
LAT	:	Livestock Action Team
MFIs	:	Microfinance Institutions
MOAC	:	Ministry of Agriculture and Cooperatives
MOU	:	Memorandum of Understanding
NGO	:	Non Government Organization
PMU	:	Project Management Unit
PPP	:	Prioritized Production Pockets
TLDP	:	Third Livestock Development Project
VDC	:	Village Development Committee

1. INTRODUCTION

1.1 Background

Community Livestock Development Project (CLDP) started in December 2005 for five years with a US$ 20 million loan from the Asian Development Bank (ADB). The project is implemented by Department of Livestock Services (DLS) under the Ministry of Agriculture and Cooperatives (MOAC), Government of Nepal (GON). CLDP builds on the successes of ADB funded Third Livestock Development Project (TLDP) and other predecessor projects.

The overall objective of CLDP is to reduce poverty amongst rural poor through gender and socially inclusive approaches. Its purpose is to improve the levels of food security, nutrition, incomes and employment for 69,000 families (with an additional 95,000 indirect beneficiaries) through increased productivity of livestock sub-sector in an environmentally sustainable and socially equitable manner, while enhancing capacity of the people to manage an ongoing process of development by themselves. CLDP is being implemented through participatory processes involving concerned communities and executing agencies. The project function is guided by the principles such as market/demand led approach, gender mainstreaming, public/private partnership arrangements, flexible project management, capacity enhancement of local bodies and environmental management.

The project aims at increasing per capita income of target group by 50% (baseline NRs. 2,925 in 1995 price), animal productivity by 50% for milk and 30% for live animal off-take, and establishing 1,700 livestock enterprises thereby creating 5,000-6,000 new jobs.

The project has five components: community development and capacity building; livestock productivity improvement, livestock processing and marketing; livelihood pilot program for higher altitude districts; and project management services. The project is implemented in three modules: (i) intensive livestock production (ILP) programs in 22 districts and (ii) processing, marketing and commercialization mainly in 21 Tarai districts, in addition to emerging areas in the aforementioned ILP districts; and (iii) higher altitude livelihood pilot project in 5 districts.

Promoting processing and marketing of livestock products and support to scientific management of livestock markets are the important activities of CLDP. It provides training to entrepreneurs on milk and meat sub-sectors which mainly include hygienic production, processing and marketing, business plan development and enterprise / equipment operation. Further, it also provides chilling vats to Milk Producer Cooperatives (MPCs) to promote organised milk marketing and by the end of June 2008, CLDP has supported 39 chilling vats in the project districts and it is expending the further support in the same and other districts. In addition, it has also provided training in chilling vat operation and management and other milk production and marketing enhancing support programs to members of the MPCs, with the ultimate objective of providing safer milk marketing access to farmers for increased milk production and organized marketing through adoption of improved technology and support to improve their livelihood. The least is know on the outcomes and impacts of provision of chilling vats support on livestock promotion, improved livelihood promotion and socio-economic development. The CLDP has felt the need to systematically document the impact of support on different aspects of local economic development.

In view of above, the CLDP planned to undertake an independent study for detailed and systematic information on impact of project support on chilling vats, especially their contribution on improving the livelihood of the project beneficiaries. DLS/MOAC has entrusted Centre for Empowerment and Development, Nepal (CED-Nepal), a national

level non government organization (NGO) to undertake this study. This is the report prepared by CED Nepal.

1.2 Objectives

The main objective of the study is to access the impact of establishing chilling vats on improving the livelihood of project beneficiaries. Specific objective of the study are to:

- Assess the trends in milk production and marketing on establishment/expansion of chilling facilities;
- Assess the level of adoption of improved dairy production technologies at household and community level;
- Identify the context of expanding livelihood resources at household and community level;
- Document the enabling and constraining factors for expanding the milk market; and
- Recommend strategies for further refinement of modalities for to support milk marketing by promoting chilling vats for larger positive impact.

1.3 Scope

This study was conducted in 6 districts of 3 development regions. In consultation with the Project Management Unit (PMU) of CLDP, Morang, Sunsari (Eastern Development Region), Chitwan, Kavrepalanchok (Central Development Region), Nawalparasi and Palpa (Western Development Region) were selected for in-depth studies. CLDP has distributed number of chilling vats in these districts (Table 1).

Table 1: Chilling Vats support by DLSOs under CLDP in Selected Districts

Districts	Name of cooperatives	Capacity (Litres)
Morang	Rajghat Dugda Utpadak Sahakari sanstha Ltd. Urlabari	1000
	Dugda Utpadak Sahakari sanstha Ltd. Letang	500
Sunsari	Samudayik Cooperative Ltd., Barahachetra	1000
Chitwan	Milk Producers' Cooperative, Madi	1000
	Jiwan Dhara Dugda Utpadak Sahakari Sansta, Ratna Nagar	2000
	Amrit Dhara Dugda Utpadak Sahakari sanstahs	2000
	Panchyan Milk Producers Cooperative Ltd.	2000
	Jayamangala Dugda Utapadak Sahakari Sanstha Ltd.	2000
Nawalparasi	Ekikrit Dugda Bikas Sahakari Sanstha Ltd, Kawasoti	2000
	Harinarayan Dugda Utpadak Cooperative, Arun Khola	2000
Palpa	Dumre Dugda Utpadak Sahakari Sanstha Ltd.	2000
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	2000
Kavre	Dewrali Dugda Utpadak sahakari sanstha Ltd. Rabi Opi	1000
	Kavre District Milk Producers Cooperative Union	1000

Source: District Livestock Development Office, May 2009

From each district, two chilling vats representing the larger and the smaller were selected for study in consultation with the concerned District Livestock Development Office[1] (Table 2).

Table 2: Chilling Vats Covered under this Study in the Selected Districts

Districts	Name of cooperatives	Year of Registration	Capacity (Litres)	Year Chilling Vats Received
Morang	Rajghat Dugda Utpadak Sahakari sanstha Ltd. Urlabari	2059	1000	2060
	Dugda Utpadak Sahakari sanstha Ltd. Letang	2050	500	2064
Sunsari	Samudayik Cooperative Ltd., Barahachetra	2055	1000	2065
Chitwan	Jiwan Dhara Dugda Utpadak Sahakari Sansta, Ratna Nagar	2049	2000	2065
	Amrit Dhara Dugda Utpadak Sahakari sanstahs	2049	2000	2064

[1]Chilling centers with =< 1000 Litres capacity are classified as small and centers with =>2000 Ltr are classified as large.

Districts	Name of cooperatives	Year of Registration	Capacity (Litres)	Year Chilling Vats Received
Nawalparasi	Ekikrit Dugda Bikas Sahakari Sanstha Ltd, Kawasoti	2056	2000	2057/065
	Harinarayan Dugda Utpadak Cooperative, Arun Khola	2057	2000	2056/064
Palpa	Dumre Dugda Utpadak Sahakari sanstha Ltd.	2051	2000	2056
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	2051	2000	2062
Kavre	Dewrali Dugda Utpadak sahakari sanstha Ltd. Rabi Opi	2050	1000	2065
	Kavre District Milk Producers Cooperative Union	2049	1000	2057

Source: District Livestock Development Office, May 2009

Field studies focused on investigating the following.

Inputs and technical service delivery by service providers:
Inputs and technical service delivery by service providers are assessed. This encompasses assessment of quantity and quality of inputs and service such as training to beneficiaries, support to establish chilling vats and related materials, forage development, bull supply, training to chilling vat operators and farmers, drenching and treatment of animals and other follow up technical advisory services.

During field studies, information on training were compiled including information on type of training and number of participants, training venue and duration, significance of training on promoting marketing, participation of livestock growers on observation visits, and extent to which skill and knowledge acquired during training and exposure visits have been used for improved livestock production and marketing and/or institutional capacity building.

Further, utilization and relevance of other support including local contribution were also documented and analyzed including the services provided by the DLSO and other service providers.

Animal Production System and Productivity:
The study also assessed the livestock production system, herd size and herd composition (cattle, buffalo, etc.), breeding management and reproductive performance.

Milk Marketing and Household Income
The study documented the status of chilling centers, household income and various dimensions of livelihood resources in the households as follows.

Milk chilling centre: such as distance from village, number of collection centres, management of chilling centres, governance, employment record, capacity utilization, quantity of milk collection and milk collection frequency, selling price from chilling centers, other equipment installed and their utilization, major constraints faced on chilling centre operation, etc.

Household income: contribution of milk production on total household income, assets creation, etc.

Changes in the state of livelihood resources: such as natural resource, human resource, productive/financial resource, social resources and physical resource.

1.4 Methodology

The following methodology was adopted for this study.

1.4.1. Data Sources

The data required for conducting this study were obtained both from secondary and primary sources. The secondary sources includes review of relevant documents, progress report and other published and unpublished documents that existed in CLDP on aspects related to establishment of chilling vats for promoting of milk and milk products. The primary information was gathered through field survey and interview with key informants and stakeholders in six districts mentioned above.

1.4.2. Data Collection Methods

The following methods were used to collect the required data to undertake this study.

Review of relevant Documents

The progress report prepared by CLDP and annual report published by DLSOs were reviewed that helped to accomplish the objective of the study.

Focus Group Discussion
Focus group discussion was conducted with CLDP management in the centre and DLSO officials, chilling vat owners and farmers in the study districts.

Organizational Assessment
Both operational and financial performance of selected MPCs owning the chilling vats was assessed to ascertain the possibilities to scale-up their operation.

Individual interviews
Individual interviews were conducted with livestock owners and managers of MPCs to gather information on their opinion and concerns on operation and management of chilling vats.

Field studies
Field studies were done in six districts representing three development regions. In each districts two sites (only one site in case of Sunsari) were selected representing larger and smaller chilling centres and first hand information was collected on existing and potential impact of establishment of chilling vats on milk production and milk marketing.

1.4.3. Data Collection Tools

Three sets of checklist were prepared to administer with CLDP/CLDP Officials, management of chilling vats (i.e. MPCs in most cases) and livestock producers.

1.5 Limitations

The study covers only two chilling vats (one in Sunsari) supported by CLDP in six districts. Hence, the results reported are based on the response of the owners of the chilling vats (i.e. MPCs) and efficiency and effectiveness on their management. Hence, findings of this study may not be representative of the state of the art on operation and management of the chilling vats and their impact on livelihood.

1.6 Report Organization

The report is organized into five sections. After this introductory section, overview of dairy sector is discussed on section two. Overview of chilling vats covered by this study are provided in section three while impact on milk production, marketing and livelihood at farm level has been assessed in section four. The report concludes with summary of major findings and recommendations in section five.

2. OVERVIEW OF DAIRY SECTOR

2.1 Overview of the Dairy Sector

Livestock sector significantly contributes to national Agricultural Gross Domestic Product (AGDP) by nearly one third and the dairy sub-sector shares more than half of the livestock sector contribution. The annual production of milk is 1.35 million metric ton per year. Buffaloes contributes more than two third of the total production and rest by cattle. About 13 percent of the total population of cattle (0.9 million) and 26 percent of buffaloes (1.19 million) are in milking conditions. Crossbreeding with Jersey and Holstein Friesian cattle and Murrah buffaloes is the major breed improvement activity. There is predominance of small holder production system. Nearly 125 thousand farm families are engaged in milk production and are organized in about 1500 primary cooperatives.

Livestock production system is crop-livestock-forest integrated especially in hills. In the high mountains regions, *yak and chauries* are reared in transhumance system. There is seasonal fluctuation[2] in milk production and collection which affects supply of pasteurized milk in the market. Seasonal breeding pattern of buffaloes and availability of green forages in monsoon season are the main reasons for such a seasonal fluctuation.

Dairy development efforts started in early fifties with assistance from FAO. Initiatives were focused in Himalayan region with establishment of yak cheese factories. Besides FAO, bilateral assistance from the governments of Switzerland, New Zealand and Denmark has made remarkable contribution.

Dairy Development Corporation (DDC) was established under corporation Act in 1964. DDC started functioning from 1969. DDC is the pioneer in dairy development in Nepal a fully government state owned corporation. DDC was initiated for the economic advancement of the poor small milk producing farming communities. It is still one of the major players in the milk market and handles about half of the total milk marketed in the formal sector (about 13 percent of the total milk produced in the country is believed to be marketed through formal marketing channel.

Private sector investment in dairy has increased over the years and in past two decades their share has increased to nearly half of the total milk marketed in formal sector. Main operation area is in and around Kathmandu which is the major market for milk and milk products. The National Dairy Development Board (NDDB) was established as apex body to oversee that dairy sector in the country 1992. The DANNIDA Support Project funded by the Royal Danish Government supported to prepare and implement Ten Year Dairy Development Plan (1990-2000) and strengthened NDDB.

2.2 Status and the Structure of the Current Dairy Strategy

Promoting private sector investment in dairy sector has resulted in establishment of two milk powder plants with installed capacity to utilize nearly 200 thousand liter milk per day. Public-private partnership strategy promoted by the DLS in ADB supported TLDP and CLDP projects has been useful in expansion of milk collection networks, raising awareness in hygienic milk production, products diversifications, improving keeping quality of milk and strengthening management capabilities of dairy cooperatives and private dairies (small and medium scale).
MPCs involvement in milk processing and marketing (large scale) is constrained by limited investment capacity and technical capability. Provisions of the Agribusiness Policy

[2]There are two seasons: flush season ranging August-September to January-February and lean season comprising of rest of the months. The ratio of lean to flush season production is about 1:3 in most of the country and 1:1.5 in areas where the feed supply is better.

on promotion of dairy industry are not fully operational (for e.g. waiver of customs duties on import of dairy equipment, refrigerated vehicles and so on for first 10 years of establishment of the industry).

Human resources development in dairy sector have not received due priority there is lack of qualified professionals in the public as well as in the private sector. Forage based milk production system although found remunerative to the producers has not widely been expanded and is limited in some of the production pockets.

Adoption of code of practices in dairy industries and its monitoring/ regulation has not been implemented effectively. There are wide variations in the quality of milk and milk products in the market.

2.3 Policies affecting Dairy Sector

Dairy Development Policy 2008; main policy document of the government; guided by the provisions and the spirit of the Agriculture Perspective Plan (1995-2015), National Agriculture Policy 2004, National Milk marketing and Strategy Study 2001, Agri-business Promotion Policy 2006. The Three Year Interim Plan (2007-2009) of the Government of Nepal has also projected to have fairly higher growth rate in milk production (4.6 percent per annum). Policies of the government on meeting food security arising from the global food grain crisis and the priorities accorded for securing food grains production will affect the public sector investment in dairy sector. Improvement in access to institutional credit and the associated credit insurance/ livestock insurance schemes/policies of the financial institutions will have positive implications on dairy production.

2.4 Major Constraints

There are several constraints on milk production. Scientific milk pricing policy is lacking. A persistent problem the dairy industry faces is poor milk quality. This is associated with a lack of farmer awareness in clean milk production. Unhygienic milk production starts with the farmer and causes loss of income along the milk chain. Predominance of small holder producers or subsistence production systems and scattered production; no commercial orientation, higher production cost and also increased collection cost.

Large number of low producing animals; cattle produce about 400 liters milk per lactation and a buffalo produce about 834 liters per lactation. NDDB (2001) estimated that during the next decade, milk demand from the urban sector will grow by 11.1% per annum (NDDB, 2001). This indicates that the present growth rate in milk production must increase from 3% per annum to 17% per annum (when imports are excluded).

Problems in disposal of unproductive cattle on religious ground, weak in implementation of policy provisions and lack of human resources and technology support in private sector are prevalent in the area.

2.5 Long Term Vision for the Sector

Substitute the import of milk and milk products in the country through increased production and productivity of milk. Encourage private sector investment in dairy sector; product diversification, export of niche products. There should be emphasis on quality improvement in whole chain from farm to factory for processing and distribution through the introduction of code of hygienic practices, GMP, HACCP in dairy industries. There is a need to implement scientific milk pricing policies that encourage quality milk production as well as improve competitiveness of Nepalese dairy producers/entrepreneurs. There is a need to improve efficiency on animal breeding and veterinary services as well as promotion of forage based production. There is a need to strengthen farmers' institutions and improving their capabilities and continuously review and update the policies to make

Nepalese dairy sector competitive. Nationwide detailed market survey study on milk and milk products should be carried out to undertake appropriate dairy development strategies and program. NDDB has to formulate and recommend policies on import and export of goods necessary for production and promotion of milk and milk products and to or cause to implement approved policies.

2.6 Marketing Channels and Intermediaries

Milk marketing in Nepal is in general a government regulated market. The DDC is one of the key players in the milk marketing channel in Nepal. A large portion of the produce collected and distributed by the DDC; however, private sector is also emerging with rapid pace in the last few years. Also, most of the farmers from nearby market area sell milk directly to the consumers. Therefore, the marketing channels and market intermediaries involved in milk marketing in Nepal can be summarized as:

- Farmers - Consumers (households, institutions/hotel business);
- Farmers - Milk Producing Associations/Cooperatives - Chilling Centres - DDC/Private Dairies - Consumers;
- Farmers - Milk Producing Associations/Cooperatives - Consumers;
- Farmers - Milk Producing Associations/Cooperatives - Chilling Centres - Consumers; and
- Farmers - Vendors - Consumers.

3. OVERVIEW OF CHILLING VATS UNDER STUDY

In this study different aspects related to operation and management of chilling vats are analyzed and this section outlines an overview of the chilling vats covered by this study.

3.1 Management of Chilling Vats

All chilling centers studied are managed by MPCs. All these cooperatives except the one in Banepa, Kavre[3] are primary cooperatives. The working areas of these MPCs range between one to five Village Development Committees (VDCs). They are registered under cooperative act 1991, are the member based organizations and operate under cooperative principles (Table 3).

Table 3: Status of Milk Producer's Cooperatives

Name of Milk Producers' Cooperatives	Year of registration	Shareholders (No)	Share capital (Rs.)	Average share per member (Rs.)
Raj Ghat, Urlabari, Morang	2003	393	967,500	2,462
Dugda Utpadak, Letang, Morang	1992	258	629,500	2,440
Samudayik, Barahachettra, Sunsari	1998	125	2,100,075	16,801
Jiwandhara, Ratnanagar-12, Chitwan	1991	105	188,000	1,790
Amritdhara, Ratnanagar-1, Chitwan	1991	130	618,000	4,754
Ekikrit, Kawashoti, Nawalparasi	1999	240	137,000	571
Harinarayan, Arunkhola, Nawalparasi	2000	185	221,500	1,197
Dumre, Mashayam, Palpa	1993	75	33,300	444
Ramdi, Khanichhap, Palpa	1993	198	19,800	100
Dewrali, Rabo-opi, Kavre	1992	103	79,100	768
Banepa, Kavre	1991	87	87,000	1,000
Average		173	461,889	2,676

Source: Field Survey, May 2009

[3]Cooperative managing chilling vat in Banepa is secondary cooperative. It is managed by District Cooperative Union of the milk producers' cooperative in Kavre district.

These MPCs are registered long before and are working for collection and sale of milk and milk products over a decade. The oldest MPCs managing chilling vats and covered by this study was established in 1991 while that of the youngest one was established on 2003, implying that these MPCs are involved in managing dairy business for more than five years. Number of share holders in these MPCs ranges between 75 and 393 with an average of 173 members. Each shareholder has purchased share from their MPC and amount of share-capital ranges between Rs. 33,300 and Rs. 2,100,075 with an average of Rs. 461,889. The average share capital per member ranges between Rs. 100 and Rs. 16,801 with an average of Rs. 2,676.

These MPCs are primarily acting as an intermediary for dairy business between dairy producers and consumers either directly or through larger milk processing units. In order to support the member farmers on reducing their transaction cost on milk sale, these MPCs operate under decentralised structure with main office and several collection centres within them.

3.2 Governance System

All the chilling vats covered in this study are managed under cooperative structure. Each MPC is managed by a board of directors (BOD). Number of members in BOD is 11 in most of the cases and 9 in some cases. There are male and female as well as people of different ethnic groups in the BOD (Table 4). The participation of women, dalit and Janajati in the BOD of the MPCs covered by this study is very low.

Table 4: Composition of BODs by Sex, Caste System and Ethnic Group

Districts	Cooperative	Total	Male	Female	Dalit	Janajati
Morang	Raj Ghat Dughda Utpadak Sahakari Sansta Ltd.,Urlabari	11	11	0	0	0
	Dugda Utpadak Sahakari sanstha Ltd,Letang	9	9	0	0	0
Sunsari	Samudayik Sahakari Sanstha Ltd, Baraha	11	2	9	1	0
Chitwan	Giban Dhara Dugda Utpadak Sahakari Sanstha Ltd.,Ratnanager	9	8	1	0	0
	Amritdhara Dugda Utpadak Sahakari sanstha ltd. ,Ratnanager	9	8	1	0	1
Nawalparasi	Harinarayan Dugda Bebsayik Sahakari Sanstha Ltd., Arunkhola	11	8	3	0	1
	Ekikrit dugda utpadak Sahakari Sanstha ltd, Kawasoti	11	9	2	0	0
Palpa	Dumre Dugda Utpadak Sahakari sanstha .Ltd, Masyam	9	5	4	0	2
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.,	11	5	4	1	1
Kavre	Dewrali Dugd aUtpadak Sahakari Sanstha Ltd, Rabi Opi	11	11	0	1	1
	Kavre District Milk Producers Cooperative Union, Banepa	11	6	3	2	1
	Total	113	82	27	5	7

Source: Field Survey, May 2009

Owing to ineffective and inefficient governance system, one MPC is Kavre has provided the responsibility to manage their chilling vat to private sector on contract basis. Their operational performance has been improved significantly once private sector started managing the chilling vat.

BOD is a policy making body in each of the MPC and each MPC has appointed a competent person to act as a manager of their cooperative. Depending on the volume of transaction, there are number of office assistant and helpers working in these MPCs. All these MPCs adopt a simple book keeping and accounting system that is consistent to the cooperative acts and rules. The BOD meets every month to provide strategic direction managing and undertaking general assembly every year. There are several sub-committees: audit committee, account committee, marketing committee and other

committees as per the need to have closer look on the operation and management of these MPCs. They maintain the minutes of their decision and their book keeping and accounting system is upto the standard.

In general, sound governance and management system is in place in all the MPCs. Management capacity of these MPCs should be strengthened in order to enable them perform better and ensure continuity and sustainability on their operations in aspects such as financial management, operational risk management, product diversification, scale-up of their operation and providing technical and management support to milk producers towards increased milk production and marketing. Possibility of using these MPCs as a service provider for promotion of livestock production and marketing (inputs and outputs) for increased livestock development needs to be explored.

3.3 Capacity Utilization

The study shows that all chilling vats are operated below their capacity. There exists variation on capacity utilization both in flush and lean season (Table 5).

Table 5: Current Capacity Utilization Status of Chilling Vats

Districts	Name of cooperative/Chilling vat owner	Capacity utilization (%)	
		Flush season	Lean season
Morang	Rajghat Dugda Utpadak Sahakari sanstha Ltd. Urabari	89.6	63.8
	Dugda Utpadak Shahakari Ltd., Letang	69.6	50.1
Sunsari	Samudayeek Cooperative Limited	80.4	55.3
Chitwan	Jivan Dhara Dugda Utpadak Sahakai Sanstha, Ltd.	90.4	65.2
	Amrit Dhara Dugda Utpadak Sahakai Sanstha Ltd.	89.6	76.6
Nawalparasi	Harinaryan Dugda Bebsahi sahakari sastha Ltd.	80.4	58.4
	Ekikirt Dugdha Bikas Sahakari Ltd.	74.6	57.3
Palpa	Dumre Dugda Utpadak sahakari sanstha Ltd.	59.6	40.2
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	89.6	45.3
Kavre	Dewrali Dugda utpadak sahakari Sanstha. Ltd.	65.4	49.4
	Kavre District Milk Producers Cooperative Union, Banepa, Kavre	69.7	52.9
	Total	78.1	55.9

Source: Field Survey, May 2009

The proportion of the capacity utilization ranges between 65.4% and 90.4% in flush season with an average of 78.1%, which is quite encouraging and satisfactory. On the other hand, capacity utilization in lean season ranges between 40.2% and 76.6% with an average of 55.9%.

3.4 Support Received by Milk Producers Cooperatives on Chilling Vats

Ten out of 11 MPCs covered under this study have received external support for operating chilling vats. The one MPC that has not received external support for chilling vats operation has received other support for vehicles, cream separators, etc. from CLDP and other line agencies (Table 6).

Table 6: Support on Chilling vats Received by the MPCs

Districts	Name of cooperatives	Capacity (Litres)	Subsidy (Rs.)	Farmers Contribution (Rs.)
Morang	Rajghat Dugda Utpadak Sahakari sanstha Ltd. Urlabari	1000	0	445,000
	Dugda Utpadak Sahakari sanstha Ltd. Letang	500	75,000	100,000
Sunsari	Samudayik Cooperative Ltd., Barahachetra	1000	170,000	170,000
Chitwan	Jiwan Dhara Dugda Utpadak Sahakari Sansta, Ratna Nagar	2000	100,000	700,000
	Amrit Dhara Dugda Utpadak Sahakari sanstahs	2000	100,000	700,000

Districts	Name of cooperatives	Capacity (Litres)	Subsidy (Rs.)	Farmers Contribution (Rs.)
Nawalparasi	Ekikrit Dugda Bikas Sahakari sanstha Ltd,Kawasoti	2000	250,000	700,000
	Harinarayan Dugda Utpadak cooperative, Arun Khola	2000	250,000	350,000
Palpa	Dumre Dugda Utpadak Sahakari sanstha Ltd.	1000	300,000	600,000
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	2000	695,000	0
Kavre	Dewrali Dugda Utpadak sahakari sanstha Ltd. Rabi Opi	1000	160000	240000
	Kavre District Milk Producers Cooperative Union	1000	109,931	591,286
	Total	15500	2,209,931	4,596,286
	Average	1409	200903	417844
	Proportion		32.5	67.5

Source: District Livestock Development Offices, May 2009

Total capacity of the chilling vats managed by these MPCs was 15,500 litres with an average of 1409 litres per MPC. Average amount of subsidy was Rs. 200,903 (32.5%) and farmers' contribution was Rs. 417,844 (67.5%). This indicates that MPCs has been able to mobilise sizable amount to have the chilling vats of their own.

3.5 Physical Asset Ownership Status

In general all the MPCs are endowed with different equipments (physical assets) required to operate and manage their chilling vats. Some of them are even able to acquire vehicle to manage milk transport while other are also able to construct building of their own. Possession of these assets has been instrumental on their institution development and enabling them to provide better services to their shareholders (Table 7).

Table 7: Details of Physical resources of selected Chilling Vat Centre

Districts	Name of cooperatives	Available Physical Resources
Morang	Rajghat Dugda Utpadak Sahakari sanstha Ltd. Cooperative, Urabari	Vehicle, chilling vat, generator, deep freeze, milk pump, cream separators, cans, office furniture
	Dugda Utpadak Shahakari Ltd., Letang	Deep freeze, chilling vat, computer, cans, office furniture
Sunsari	Samudayeek Cooperative Limited, Barahachetra	Chilling vat, generator, deep freeze, milk pump, office equipment, cans
Chitwan	Jivan Dhara Dugda Utpadak Sahakai Sanstha Ltd,Ratna Nager	Land and building, chilling vat, cream separator machine, microscope, deep freeze, cans, generator, office furniture.
	Amrit Dhara Dugda Utpadak Sahakai Sanstha Ltd, Ratna Nagar	Land and building, chilling vat, cream separator machines, cans, office furniture.
Nawal Parasi	Harinaryan Dugda Bebsahi Sahakari Sastha Ltd., Arun Khola	Chilling vat, cream separator, micro scope, deep freeze, can, office furniture
	Ekikirt Dugdha Bikas Sahakari Ltd., Kawasoti	Chilling vat, generator, packaging machine, can, cream separator, rickshaw, office furniture, tanks
Palpa	Dumre Dugda Utpadak sahakari sanstha Ltd., Masyam	Chilling vat ,Deep freeze, cream separator machine, can
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	Chilling vat, generator, packaging machine, can, cream separator, rickshaw, office furniture, tanks
Kavre	Dewrali Dugda Utpadak Sahakari Sanstha. Ltd., Rabiopi	Chilling vat, steel hill-take, Plastic Hill Take, Generator, Can, Office furniture
	Kavre District Milk Producers Cooperative Union	Chilling vat, steel hill-take, Plastic Hill Take, Generator, Can, Office furniture

Source: Field Survey, May 2009

3.6 Linkages and Networking

The MPCs covered under this study have established linkages and networking with DDC, other milk processing plants, concerned DLSOs, District Cooperative Office (DCO), NGOs like Heifer International and financial institutions like Agriculture Development Bank Limited (ADBL), Laxmi Bank, Nepal Bank Limited and Rastriya Banijya Bank, etc. to expand and manage their business. More specifically, they have established functional linkages and networking with dairy industries and other agencies to expand and increased operational management.

3.6.1. Linkages with Dairy Industries

The study uncovered that these MPCs have established linkages with different dairy industries namely Dairy Development Corporation (DDC), other more organized dairy industries operated in distance market like Biratnagar, Kathmandu, Hetauda, Bharatpur, Pokhara and Butwal and small scale dairy processing industries operating in local commercial centres (Table 8).

Table 8: Linkages of Chilling Vats with Dairy Industries

Districts	Name of cooperative/Chilling vat owner	Linkages With Dairy Industry
Morang	Rajghat Dugda Utpadak Sahakari sanstha Ltd. Cooperative, Urabari	Local Market and DDC
	Dugda Utpadak Shahakari Ltd.-Letang	DDC
Sunsari	Samudayeek Cooperative Limited, Chatara	DDC
Chitwan	Jivan Dhara Dugda Utpadak Sahakai Sanstha Ltd,Ratna Nager	DDC and Himal Dairy Pvt. Ltd.
	Amrit Dhara Dugda Utpadak Sahakai Sanstha Ltd, Ratna Nagar	DDC and Sita Ram Dairy Pvt. Ltd.
Nawalparasi	Harinaryan Dugda Bebsahi sahakari sastha Ltd.,Arun Khola	DDC and Sita Ram Dairy Pvt. Ltd
	Ekikirt Dugdha Bikas Sahakari Ltd.,Kawasoti	DDC and Sita Ram Dairy Pvt. Ltd.
Palpa	Dumre Dugda Utpadak sahakari sanstha Ltd.,Masyam	DDC and Sujal Dairy Pvt. Ltd.
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	DDC and Sujal Dairy Pvt. Ltd.
Kavre	Dewrali Dugda utpadak sahakari Sanstha.Ltd.,Rabiopi	DDC and Sita Ram Dairy Pvt. Ltd.
	Kavre District Milk Producers Cooperative Union	DDC and Sita Ram Dairy Pvt. Ltd.

Source: Field Survey, May 2009

The linkages of the MPCs with organised dairy industries such as DDC, Sujal Dairy, Himal Dairy and Sita Ram Gokul Dairy have been functional and these cooperatives are able to receive technical, managerial and other support to promote marketing of milk collected. There are cases where some private dairy processing industries such as Sita Ram Gokul Dairy are providing interest free loans to enable them ensure access to cheap credit to their members for increasing improved cattle and buffalo breed while other private dairy like Sujal dairy is extending livestock loan to potential farmers in partnership with commercial banks like Laxmi Bank.

3.6.2. Linkages with Other Agencies

The MPCs managing milk chilling vats have established functional linkages with other government line agencies such as DLSO, Division Cooperative Office, etc. and local government [i.e. VDCs and District Development Committees (DDCs)], NGOs like Heifer International and financial institutions like Agriculture Development Bank Limited (ADBL), Laxmi Bank, Nepal Bank Limited and Rastriya Banijya Bank, etc. to expand and manage their business acquiring required technical, financial and managerial support required to scale-up operation and expand their market thereby providing services to larger number of unserved population and contribute on dairy promotion (Table 9).

Table 9: External Support received by the Chilling Centers

Name of cooperatives	Address	External support received	
		Support Received	Institution
Dugda Utpadak Sahakari sanstha Ltd.	Letang - 2, Morang	Training to farmers	HEIFER International
Rajghat Dugda Utpadak Sahakari sanstha Ltd.	Urlabari - 4, Morang	Vehicle	District Development Committee, Morang
Samudayeek Sahakai sanstha Ltd.	Baraha Chetrra -3, Sunsari	NA	NA
Jiwan Dhara Dugda Utpadak sahakari sanstha Ltd.	Ratna nagar Municipality - 12, Chitwan	Management Training Account Training	Division Cooperative Office
Amrit Dhara Dugda Utpadak sahakari sanstha Ltd.	Ratna Nagar Municipality - 1, Chitwan	Veterinary Training	National Dairy Development Board / District Milk Producer Cooperative Ltd.
Hari Narayan Dugda Utpadak sahakari sanstha Ltd.	Naya belani - 8, Arunkhola, Nawalparasi	Product diversification training Facilitation on Chilling vat and operation training Account and management training	National Dairy Development Board Danida and NDDB National Cooperative Development Board
Ekikrit Dugda Bikas Sahakai Sanstha	Shivamandir -3, Kawasoti, Nawal Parasi	Leadership development Training	District Milk Producer's Cooperative Federation
Dumre Dugda Utpadak Shahakari Sanstha Ltd.	Masyam-4,Palpa	Management and Account training	Division Cooperative Office
Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	Ramdi, Palpa	Management and Account training	Division Cooperative Office
Dewrali Dugda Utpadak Sahakari Sansta Ltd.	Rabiopi-1,Kavre	Interest free Loan	Dairy Development Corporation
Kavre District Milk Producers Cooperative Union	Banepa, Kavre	Product diversification training Facilitation on Chilling vat and operation training Account and management training	National Dairy Development Board Danida and NDDB National Cooperative Development Board

Source: Field Survey, May 2009

In addition to the support received from the CLDP and concerned DLSO, MPCs managing the chilling vats have received external support from the other agencies such as private dairies and other livestock promoting agencies (NGOs and INGOs). They have obtained the support basically on the areas of training and capacity building.

3.7 Mode of Operation of Chilling Vats

Chilling vats are operated under two modes: (i) direct operation and (ii) operation through private sector on contract basis. Of the 11 MPCs studied, 10 are operating chilling vats directly while one has provided chilling vat to private sector for operation and management. Owing to the management challenges, operational issues and technical difficulties, Kavre District MPC union has contracted the operation and

management of the vats and other accessories to private entrepreneurs. Further, Dumre Dugda Utpadak Sahakari Sanstha Ltd., Masyam has also received milk chilling vats and accessories owned by Palpa District MPCs, however, its operation has not be guided by the contractual process.

3.8 Amount of Transaction

Collection of milk from shareholders, either in head office or in the collection centres, storing in chilling vats, initial processing (cream separation, milk packaging, local sale, etc.) in some cases and sale to established dairy industries in local and national level in other cases is the main transaction undertaken by the MPCs owning the chilling vats.

3.8.1. Trend on Milk Marketing

These MPCs are involved on milk marketing business since their establishment. Availability of chilling vats and accessories has enabled them to store the milk collected at the time of blockade, bandas, etc. and sold later (Table 10).

Table 10: Milk Marketing Services Provided by MPCs

Name of Cooperatives	Amount of Milk Sold (Litres) Per Year		
	2006/07	2007/08	2008/09
Raj Ghat, Urlabari	362,725	370,267	372,172
Dugda Utpadak, Letang	147,286	164,270	117,154
Samudayik, Barahachettra	120,467	136,677	134,908
Jiwandhara, Ratnanagar-12	365,225	375,258	352,064
Amritdhara, Ratnanagar-1	466,804	491,194	419,578
Ekikrit, Kawashoti	289,277	370,938	459,993
Harinarayan, Arunkhola	264,673	338,613	342,738
Dumre, Mashayam	85,893	113,342	113,894
Ramdi, Khanichhap	103,466	129,537	115,303
Dewrali, Rabo-opi	269,489	277,628	276,691
Banepa, Kavre	84,699	675,003	825,517
Total	2,560,004	3,442,727	3,530,012
Percentage growth		34.5	2.5

Source: Field Survey, May 2009

Total amount of milk marketed by these MPCs over the last three years are: 2,560,004 litres in 2006/07, 3,442,727 litres in 2007/08 and 3,530,012 litres in 2008/09. Due to change in mode of operation in 2007/08, there has been significant growth in milk marketing by the Banepa Milk Producers Cooperative Union and Dumre MPC in Mashyam. Rate of growth in milk marketing was 34.5% in 2007/08 compared to 2006/07 and 2.5% in 2008/09 compared to 2007/08.

3.8.2. Place of Marketing

In general these MPCs sale the milk collected and stored in the chilling vats in the local market, DDC, private larger dairy industries and small scale dairy processing plants operated at local level (Table 11).

Table 11: Amount of Milk Sold to Dairy Industries and Local Market (2007-2009)

Name of Cooperatives	Amount of Milk Sold by Year and Places (Litres)					
	2007		2008		2009	
	Industries	Local market	Industries	Local market	Industries	Local market
Raj Ghat, Urlabari	261162	101563	264296	105971	259906	112266
Dugda Utpadak, Letang	94342	52944	116107	48163	79539	37615
Samudayik, Barahachettra	78303	42164	79409	57268	82283	52625
Jiwandhara, Ratnanagar-12	287809	79568	334694	42681	286414	65650
Amritdhara, Ratnanagar-1	426254	40550	453354	37840	377206	42372
Ekikrit, Kawashoti	151992	141935	205158	171380	249854	212438
Harinarayan, Arunkhola	176250	88422	233056	107548	239540	103198
Dumre, Mashayam	40943	44950	58663	54679	57947	55947
Ramdi, Khanichhap	82466	21000	108149	23295	92963	22340
Dewrali, Rabo-opi	250809	18680	260512	17116	261236	15455
Banepa, Kavre	84699	0	675003	0	825517	0
Total	1935029	631776	2788401	665941	2812405	719906
	75.4	24.6	80.7	19.3	79.6	20.4

Source: Field Survey, May 2009

Over the last three years, proportion of milk collected and stored by the MPCs and sold in local market ranges between 19.3% and 24.6%. There is decreasing trend on selling the milk in local market. Similarly, proportion of milk collected and stored by the MPCs and sold to the organised markets (processing industries) ranges between 75.4% and 80.7% and there has been an increasing trend on selling of milk collected in the milk processing industries.

3.8.3.Seasonality on Milk Marketing

There exists seasonality on milk marketing across these MPCs as guided by the two seasons that prevails in milk marketing namely flush season ranging August-September to January-February and lean season comprising of rest of the months (Table 12).

Table 12: Average Milk Production in Flush and Lean Season by MPCs

Name of Cooperatives	2007		2008		2009	
	Flush	Lean	Flush	Lean	Flush	Lean
Raj Ghat, Urlabari	195189	167536	200659	169608	217361	154811
Dugda Utpadak, Letang	82608	64678	86789	77481	68114	49040
Samudayik, Barahachettra	65495	54972	73938	62739	79949	54959
Jiwandhara, Ratnanagar-12	195589	169636	197014	178244	204541	147523
Amritdhara, Ratnanagar-1	244302	222502	256377	234817	226187	193391
Ekikrit, Kawashoti	146977	142300	199228	171710	266441	193552
Harinarayan, Arunkhola	136637	128036	176853	161760	193865	148873
Dumre, Mashayam	44379	41514	58720	54622	67995	45899
Ramdi, Khanichhap	56053	47413	70388	59149	76607	38696
Dewrali, Rabo-opi	142620	126869	147135	130493	157619	119072
Banepa, Kavre	48078	36621	375597	299406	369375	456142
Total	1357927	1202077	1842698	1600029	1928054	1601958
Percentage	53.0	47.0	53.5	46.5	54.6	45.4

Source: Field Survey May 2009

Available information indicates that there is some variation on amount of milk marketed by the livestock growers in the flush and lean season. Of the total milk collected and sold by the MPCs, about 55% are marketed in flush season and 45% are marketed in lean

season. The apparently less gaps on milk marketed during flush and lean season is mainly attributable to capacity constraints of the MPCs to purchase the milk compared to the total milk produced by the livestock growing shareholders in the area.

3.9 Employment Generation

These cooperatives have employed manager and support staff to properly operate and manage the chilling vats. The number of staff employed by these cooperatives ranged between 5 and 15 (Table 13).

Table 13: Direct Employment Generated by the Milk Producers' Cooperatives Managing Chilling Vats

Districts	Cooperative	Total (No)	Male (No)	Female (No)	Farmers selling milk (No)
Morang	Raj Ghat Dughda Utpadak Sahakari Sansta Ltd.,Urlabari	5	5	0	393
	Dugda Utpadak Sahakari sanstha Ltd,Letang	2	2	0	258
Sunsari	Samudayik Sahakari Sanstha Ltd, Baraha	7	6	1	125
Chitwan	Jiban Dhara Dugda Utpadak Sahakari Sanstha Ltd., Ratnanager	5	4	1	105
	Amritdhara Dugda Utpadak Sahakari sanstha Ltd., Ratnanager	9	8	1	130
Nawalparasi	Harinarayan Dugda Bebsayik Sahakari Sanstha Ltd., Arunkhola	9	9	0	240
	Ekikrit dugda utpadak Sahakari Sanstha ltd, Kawasoti	15	15	0	185
Palpa	Dumre Dugda Utpadak Sahakari sanstha .Ltd, Masyam	7	6	1	75
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	6	5	1	198
Kavre	Dewrali Dugd aUtpadak Sahakari Sanstha Ltd, Rabiopi	6	6	0	103
	Kavre District Milk Producers Cooperative Union	5	5	0	87
	Total	76	71	5	1899

Source: Field Survey, May 2009

The 11 MPCs have employed a total of 76 people directly. Majority of the people employed by these cooperatives are men and very few are women. The number of farmers selling milk in these MPCs ranges between 75 and 393 with an average of 173. A total of 1899 farmers sell milk in these cooperatives. Services provided by these cooperatives have been instrumental to address underemployment problems inherent in these families through increased access to market to their products and supporting to employment generation for the production of more numbers of local and improved cattle and buffalo. Further, such services have been instrumental to ensure improved management and marketing of milk products.

3.10 Community Managed Livestock Insurance Scheme

While the concept of livestock insurance scheme was implemented in some cooperatives, the scheme was yet to be implemented in other cooperatives. Two cooperatives in Nawalparasi districts namely Harinarayan Milk cooperative Ltd., Arun khola and Ekkikrit Dugdha Bikas Cooperative Ltd., Kawasoti have started livestock insurance among their members since 2062. Both cooperatives have obtained Rs. 50,000 from CLDP as seed money. Premium rate has been fixed 5% of value of livestock per year, which covers 80% of value of livestock in case of death. Other cooperatives are in the process of setting up livestock insurance scheme among their members. Provision of insurance has encouraged the farmers to increase the number of livestock in Nawalparasi district. While lack of livestock insurance service has been pointed out one of the discouraging factor for farmers to expand their business in some cooperatives; there are many

challenges to operate and manage the livestock insurance scheme at local level. In general it demands significant preparatory works for proper management.

4. IMPACT ON MILK PRODUCTION, MARKETING AND LIVELIHOOD AT FARM LEVEL

Chilling vats and accessories supports to MPCs are expected to impact at farm level on milk production and marketing. The impact of chilling vat support to MPCs on milk production, marketing and livelihood at farm level has been discussed below.

4.1 Technical Services on Milk Production

District Livestock Service Office (DLSO) and their networks such as livestock service centres and sub-centres are the main service providers and point of contact to livestock farmers in these districts. Farmers in these districts have received various services such as materials supply, capacity development, technical support and insurance schemes from these service providers that have contributed on livestock development and management.

4.1.1. Veterinary Support

Veterinary support services provided by DLSOs include vaccination, internal/external parasite control, treatment services, laboratory services and disease diagnosis services. DLSO has provided these services through concerned Livestock Service Centre and Sub-centre Office. The services are provided either at the door-step to farmers and from their own offices. Further, veterinary supports are also provided by the local agro-vet services located in these districts. There services has not been as efficient as it should be on the absence of local capacity and mechanism to extend veterinary services at cluster level, particularly in hill where it is quite difficult to bring the livestock at livestock offices. Amount of treatment services provided by concerned DLSO offices ranges between Rs. 22,026 and Rs. 32,896 and that of vaccination services ranges between Rs. 29,944 and Rs. 38,850 (Table 14). This is modest support provided by the DLSOs as far as the need and demand for these services are concerned.

Table 14: Amount of Treatment Services and Vaccination Services Provided by DLSOs in FY 2064/065

DLSOs	Treatment services	Vaccination services
Morang	27,679	29,944
Sunsari	26,602	32,180
Chitwan	28,677	37,187
Nawalparasi	32,896	38,850
Palpa	22,026	32,332
Kavre	28,540	34,970

Source: District Livestock Development Office, May 2009

The existing information system of the DLSO does not dis-aggregate information on amount of support provided to shareholders of the MPCs covered by this study. The focus group discussion conducted in different sites revealed that there are cases where some of the shareholders have received both treatment and vaccination services from the concerned DLSO and their decentralised units i.e. Livestock Service Centre and Livestock Service Sub-centres. Basically treatment services are related to handling of delivery services, stool test and general health check-up of the animals and vaccination services for disease of economic importance.

4.1.2.Training and Capacity Development

DLSOs have organized both short term and long term training on different areas such as chilling vat operation, dairy management, and product diversification to manager and staff of the MPCs and livestock growers. Similarly exposure visits are organized to management of MPCs and farmers in different part of Nepal (Table 15).

Table 15: Trainings and Exposure visits organized by DLSOs

DLSOs	Name of Trainings and Exposure visit	Duration (Days)	Participants (No)
Morang	Improved Cattle Farming	1	60
	Chilling Vat operation	3	2
	Product Diversification	2	1
	Milk Marketing	5	1
	Regional Level Dairy Farming	7	2
Sunsari	Cow farming	1	100
	Chilling Vat operation	3	2
	Product Diversification	2	1
	Milk Marketing	5	1
	Regional Level Dairy Farming	7	2
Chitwan	Chilling Vat Operation	7	5
	Marketing Dairy Production	3	5
	Workshop	1	5
Nawalparasi	Chilling Vat Operation	7	3
	Product Diversification	3	2
	Exposure Visit - Chitwan and Gorkha	-	40
Kavre	Chilling Vat operation	7	4
	Dairy entrepreneur training	15	8
	Interaction program	1	25
Palpa	Milk production Training	3	25
	Forage Seed Production Training	3	25

Source: District Livestock Development Offices, May 2009

The existing information system of the DLSO does not include dis-aggregate figure on amount of capacity development support provided by the concerned DLSO to these MPCs. The focus group discussion conducted in different sites revealed that there are cases where some of the shareholders have participated in several capacity development support provided by concerned DLSO, Livestock Service Centre and Sub-centres and through their livestock groups and committee. The training and exposure visits programmes organized by DLSOs are instrumental to develop local capacity to operate and mange milk collection and operation and management of chilling vat for improved efficiency and effectiveness as well as ensure general cleanliness and livestock holding among farmers. Training and exposure visits are conducted as per norms provided by the DLSO and farmers do not pay anything for training.

4.2 Animal Production System and Productivity

Access to reliable marketing services is expected to influence on animal production system and productivity. There are instances where improved milk marketing system has influenced production and productivity of live animals, increased heard size and reproductive performance and forage development. The information was collected through household survey of purposively selected livestock growing households. A total of 65 households were surveyed intensively besides doing focus group discussion (Table 16).

Table 16: Sample Size and Family Size of the Households

District	Sample Size	Family Size		
		Male	Female	Total
Morang	10	3.4	3.0	6.4
Sunsari	5	3.2	3.0	6.2
Chitwan	10	3.1	3.6	6.7
Nawalparasi	20	3.0	3.0	6.0
Palpa	10	2.9	3.0	5.9
Kavre	10	4.0	3.6	7.6
Total	65	3.2	3.2	6.4

Source: Field Survey May 2009

The number of sample per district ranges between 5 and 20 per district. Average family size of the sample households surveyed was 6.4 persons which have been slightly more than the national average family size of 5.3 persons per households. It has been found that households with more family members are involved on commercial livestock raising in their attempt to find supplementary sources of income and address their un-employment and underemployment problems.

4.2.1. Livestock Production System

There has been significant change in livestock production system with access to reliable marketing services to livestock growers from CLDP. There are cases where farmers have shifted from free grazing to stall feeding (Table 17).

Table 17: Livestock Production System in the Study Area

District	Name of Cooperatives	Sample Size (No)	Livestock Management System	
			Grazing System	Stall Feeding
Morang	Rajghat Dugda Utpadak sahakari sanstha Ltd.	5	0	5
	Dugda Utpadak Shahakari Limited	5	0	5
Sunsari	Samudayik Cooperative Ltd., Barahachetra	5	0	5
Chitwan	Jivan Dhara Dugda Utpadak Sahakai Sanstha Ltd	5	0	5
	Amrit Dhara Dugda Utpadak Sahakai Sanstha Ltd	5	0	5
Nawal Parasi	Harinaryan Dugda Bebsahi sahakari sastha Ltd.	10	0	10
	Ekikirt Dugdha Bikas Sahakari Ltd.	10	0	10
Palpa	Dumre Dugda Utpadak Sahakari sanstha Ltd.	5	0	5
	Ramdi Dugda Utpadak Sahakri Sanstha Ltd.	5	0	5
Kavre	Dewrali Dugda utpadak sahakari Sanstha.Ltd.	5	0	5
	Kavre District Milk Producers Cooperative Union	5	0	5
	Total	65	0	65

Source: Field Survey, May 2009

Community forest used for grazing in past is now used for forage and fodder plantation. One can notice such an instance in Nawalparasi district where sizable land under community is used for forage and fodder plantation. Typical forage plantation supported by the project for forage promotion includes Napier, Stylo, Molato etc. DLSO has provided/distributed forage seeds among the farmers for plantation. This system has helped to improve the forest condition. Findings of the focus group discussion conducted in each chilling centre sites revealed that free grazing of the improved cattle and buffalo is not a common practice among livestock producers. There are cases where farmers have shifted from traditional grazing system to stall feeding mainly due to labor problem

and due to restriction imposed by the community forest on control of free grazing practices. Since most of the milk animals are improved cattle and buffaloes, they are not suitable for free grazing. Almost all the household surveyed raise cattle and buffalo under stall feeding condition.

4.2.2. Herd Size and Composition of Species

Availability of milk marketing services has influenced on herd size and their composition (Table 18). There has been significant decrease in local animal breed and same leading to increase in number of improved cattle among livestock growers. There is tendency among farmers to decrease the number of local cattle and buffaloes compared to the past and increase the number of improved cattle. They have started to keep few but more productive (improved) cattle and buffaloes. The labour problem was pointed out as major reason behind reducing number of cattle in some cases. Trend of retirement of animal once they dry out or after lactation are very high. Farmers are encouraged towards raising cattle than buffalos.

Table 18: Heard size and Composition of Species

District	Average Number of Animal Head											
	April 2007				April 2008				April 2009			
	Buffalo		Cattle		Buffalo		Cattle		Buffalo		Cattle	
	Impr.	Local	Impr.	Local	Impr.	Local	Impr.	Local	Impr.	Local	Impr.	Local
Morang	0.2	1.5	0.7	1.2	0.2	1.5	0.7	1.1	0.8	0.3	0.7	0.4
Sunsari	0.4	1.0	1.2	1.0	0.4	1.0	1.2	0.4	0.8	0.2	1.2	0.2
Chitwan	0.6	0.7	1.3	0.9	0.6	0.6	2.0	0.4	0.7	0.4	2.7	0.2
Nawalparasi	0.6	1.1	2.0	0.9	0.8	1.0	2.6	0.5	1.1	0.4	3.3	0.3
Palpa	0.4	1.6	1.6	1.4	0.7	1.5	1.6	0.7	1.0	0.1	1.6	0.1
Kavre	0.5	0.6	1.0	0.5	0.8	0.5	1.0	0.3	0.9	0.1	1.0	0.1
Total	0.5	1.1	1.4	1.0	0.6	1.0	1.7	0.6	0.9	0.3	2.0	0.2

Source: Field Survey, May 2009
Note: Impr. = Improved

In general, it is the common practices among livestock growers to raising cattle and one buffalo in the households as a transition from subsistence farming to semi-commercial initiatives. Number of cattle raised by these households ranged between 0 and 5 with an average of 2.2 cattle per household. Similarly, number of buffalo raised by these households ranged between 0 and 3, with an average of 0.93 buffalo per household. In general farmers are found raising 1-2 improved cattle and 1 improved buffalo to supplement their farm income and ensure balance in milk production and supply.

4.2.3. Reproductive Performance

Reproductive performance of cattle and buffaloes differs significantly in all the study districts. The calving interval of cattle is 15 months and that of the buffalo is 2 years. Similarly, the lactation period for cattle is 9-10 months and that of buffalo is 10-14 months. The problem of infertility is gradually emerging and it is more serious among buffalo than cattle. Further, milk production is a seasonal activity with more milk production per cattle and buffalo in summer, rainy and autumn season compared to winter and spring season. All these features have been instrumental for the significant difference in flow of milk in all chilling centers during different time of the year.

Artificial insemination (AI) is most common method adopted by the farm households for breed improvement. In general, it has been found that farmer's awareness towards AI has increased in all the study districts. The success rate of AI ranges between 60% and 70% with an average of 65%[4]. Farmers are not very satisfied with AI services provided by DLSO and service centres. Number of animal with AI services ranges between 412 and 8,233 (Table 19). Neither the existing information system of the DLSO nor the

[4]Interview with DLSO in Nawalparasi, Chitwan, Kavre and Palpa districts.

concerned MPCs maintain the information on number of farmers adopting AI technology in their cattle.

Table 19: AI Carried Out by DLSOs in Study Districts in FY 2064/65

DLSOs	Livestock under AI
Morang	7,360
Sunsari	5,031
Chitwan	8,233
Nawalparasi	2,611
Palpa	412
Kavre	996

Source: District Livestock Development Office, May 2009

The above information indicates that AI technology is popular in Tarai or accessible districts compared to relatively inaccessible districts. Output of AI has been mixed in terms of success rate and its impact on breed improvement. There is a need to revisit AI policy for breed improvement for efficiency and effectiveness. AI service has not been easily accessible to the livestock growers in these districts due to unavailability of semen and lack of required skill and expertise in concerned DLSO, service centres and sub-centres. This has provided wrong perception among livestock growers as to the efficiency and effectiveness of the AI technology for breed improvement.

The focus group discussion conducted in different sites revealed that there are cases where some of the livestock growers have adopted AI technique to improve their cattle and buffalo breed and some have raised concern on the effectiveness of the AI technology for animal breeding. MPCs lack information on number of shareholder adopting AI technology as such a service is delivered through concerned Livestock Service Centre and through their livestock group and committee.

4.2.4. Forage Development

Farmers' awareness towards the significance of the improved grasses for increased milk production, improve animal health and animal productivity has increased tremendously and there are cases where farmers have allocated part of farm land for forage and fodder production (Table 20).

Table 20: Area under Improved Forage in Private Land

District	Area Under Improved Forage in Private Land (ha)		
	April 2007	April 2008	April 2009
Morang	0.07	0.07	0.08
Sunsari	0.10	0.09	0.10
Chitwan	0.11	0.14	0.18
Nawalparasi	0.14	0.18	0.23
Palpa	0.13	0.14	0.13
Kavre	0.09	0.10	0.10
Total	0.11	0.13	0.15

Source: Field Survey, May 2009

The above information indicates that areas under improved forage in private land have been at an increasing trend over time. Average area under forage is estimated at 0.11 ha in April 2007 which has been increased to 0.13 ha in April 2008 and 0.15 ha in April 2009. Forage plantation in private land is highly popular in Nawalparasi and least popular in Morang district. Depending upon the size of their land holdings (farm size); these farmers allocate part of their farm land for forage and fodder production. Besides private land, community forest and public land such as beach of cannels, rivers, road, etc are also used for fodder and forage plantation. They have also shifted from free grazing

system to stall feeding system. Market for grasses has been emerging gradually with the increase knowledge on significance of forage for improved animal husbandry management and high correlation on milk production. There are farmers who sale green forage and forage seed. Forage seed production has been emerging as a new income generating activities among farm households in Nawalparasi and Palpa districts.

4.2.5. Feed Resource Base

Focus group discussion conducted with the livestock growing farmers in different districts revealed that there has been significant improvement in the feed resource base among farm households. Further, there has been significant improvement on feeding practices for livestock through enhance knowledge on improved feeding practices. In general, farmer maintains feed resources at home or purchase from market or follow the combination of local and marked feeds. The study reveals that in addition to available items at home, farmers used to purchase feed like barns, minerals, vitamins, etc. to feed their cattle and buffalo in addition to green forage and fodder that is grown in their farm land or communal land. It has been estimated that about 50% of the income received by the farmers from sale of milk is spent on feeding the cattle.

4.2.6. Adoption of Improved Dairy Production Technology

Adoption of improved dairy production technologies at household and community level is one of the pre-requisites for promoting milk production and marketing through the support for establishing/expanding chilling vats in any areas. Further, access to chilling vats services has enabled households for adopting improved dairy production technologies. Success of chilling vat operation requires increased level of milk production and marketing which is a function of improved livestock breed, improved livestock husbandry, access to balanced feed and fodders and improvement on feeding practices. Thus establishment/expansion of chilling vats has supported for the adoption of improved dairy production technology.

4.2.7. Problems on Animal Husbandry

During household survey farmers expressed that they have experienced several problems to promote improved livestock husbandry (Table 21).

Table 21: Problems on Animal Husbandry

District	Problems on Animal Husbandry (% of responses)					
	Price	Feed supply	Technical support	Mastitis	Infertility	Labour
Morang	70.0	70.0	80.0	0.0	20.0	40.0
Sunsari	20.0	60.0	100.0	0.0	20.0	60.0
Chitwan	100.0	90.0	100.0	0.0	40.0	80.0
Nawalparasi	100.0	100.0	95.0	0.0	0.0	35.0
Palpa	90.0	100.0	100.0	90.0	0.0	30.0
Kavre	100.0	100.0	100.0	20.0	40.0	50.0
Total	87.7	90.8	95.4	16.9	16.9	46.2

Source: Field Survey, May 2009

The problems on animal husbandry realized by the farmers are: low price, lack of reliability on feed supply, quality of the technical support, incidence of disease like mastitis, infertility and labour. Availability of technical support (95.45) is the most serious problems, followed by feed supply (90.8%), price (87.7%), labour supply (46.2%), mastitis (16.9%) and infertility (16.9%). While the problems like price, feed supply, technical support and availability of labour is quite general that prevails in all the MPCs studies, problem on mastitis incidence is quite common in Palpa and Kavre and

that of infertility is a problem expressed by farmers in Morang, Sunsari, Chitwan and Kavre districts.

4.2.8. Suggestions for Improvement on Animal Husbandry

During household survey and focus group discussion, farmers were inquired to suggest the solutions to the problems encountered by them on improving animal husbandry as a business (Table 22).

Table 22: Suggestions for Improvement on Animal Husbandry

District	Suggestions (% of responses)			
	Technical Advice	Business support	Finance/Insurance	Breed
Morang	100.0	100.0	100.0	0.0
Sunsari	100.0	100.0	100.0	0.0
Chitwan	100.0	100.0	60.0	10.0
Nawalparasi	100.0	100.0	100.0	20.0
Palpa	100.0	100.0	100.0	0.0
Kavre	100.0	100.0	60.0	0.0
Total	100.0	100.0	87.7	7.7

Source: Field Survey, May 2009

The suggestions provided by the farmers to improve animal husbandry are: improvement on technical advice (100%), business development support (100%), strengthen access to finance and more workable insurance scheme (87.7%) and access to pure and reliable improved animal breed through the development of the animal supply resource centre (7.7%).

4.3 Support to Milk Marketing

In order to strengthen the livestock development and improvement, DLSOs through CLDP has provided various equipments that helped on milk marketing. These supports have been instrumental to promote milk marketing.

4.3.1. Market Share of Total Production

During this study market share of total milk production is estimated (Table 23). It is evident that of the total milk produced more proportion of buffalo milk is sold to the MPCs compared to cattle milk. Proportion of cattle milk sold over the last three years was 84.2% in April 2007, 81.3% in April 2008 and 19.1% in April 2009 while proportion of buffalo milk sold over the last three years was 85.2% in April 2007, 85.3% in April 2008 and 86.5% in April 2009.

Table 23: Market Share of Total Production of Milk by Farm Household

District	April 2007		April 2008		April 2009	
	Buffalo	Cow	Buffalo	Cow	Buffalo	Cow
Morang	87.0	88.5	87.0	88.2	91.4	85.9
Sunsari	84.6	89.1	84.6	87.9	88.2	87.5
Chitwan	83.9	88.1	83.3	91.5	84.4	93.5
Nawalparasi	93.8	93.8	95.0	95.1	95.8	96.0
Palpa	87.5	89.5	90.7	88.6	90.2	87.7
Kavre	88.5	88.0	91.9	87.5	91.9	87.0
Total	85.2	84.2	85.3	81.3	86.5	79.1

Source: Field Survey May 2009

4.3.2. Trends in Milk Marketing

All the milk produced by the cattle and buffalo growers are not sold to MPCs and some portion are used for household consumption (Table 24).

Table 24: Average Milk Sold to MPCs per Household

District	April 2007		April 2008		April 2009	
	Buffalo	Cattle	Buffalo	Cattle	Buffalo	Cattle
Morang	2.3	4.4	2.3	4.3	3.5	3.6
Sunsari	2.6	6.4	2.6	5.8	3.4	5.6
Chitwan	3.1	6.8	3.0	9.4	3.2	12.4
Nawalparasi	3.3	9.6	4.0	12.2	4.8	15.1
Palpa	3.2	8.6	4.3	7.9	4.1	7.3
Kavre	2.6	5.0	3.7	4.8	3.7	4.6
Total	2.9	7.3	3.5	8.3	4.0	9.4

Source: Field Survey May 2009

More amount of cattle milk are sold compared to buffalo milk over time and there has been gradual increment on amount of both buffalo and cattle milk sold by the farmers to MPCs. Amount of buffalo milk sold over the last three years was 2.9 litres in April 2007, 3.5 litres in April 2008 and 4.0 litres in April 2009 while proportion of cattle milk sold over the last three years was 7.3 litres in April 2007, 8.3 litres in April 2008 and 9.4 litres in April 2009.

4.3.3. Marketing Cost and Margin

In this study, an effort has been made to estimate milk marketing cost and margin (Table 25).

Table 25: Average Marketing Cost and Margins for Milk Marketing

S.N.	Description	Without Farmers' Labor Cost			
		Cow Milk		Buffalo Milk	
		Rs. per Lt.	Percentage	Rs. per Lt.	Percentage
A	Farmers				
	Cost of Production	16.5	41.2	15.5	35.1
	Other costs	0.7	1.7	0.7	1.6
	Margin	1.4	3.5	6.7	15.2
	Sale Price	18.6	46.5	22.8	51.9
B	MPA/MPC				
	Transportation	3.5	8.8	3.5	8.1
	Salaries	1.0	2.4	1.0	2.2
	Other cost	0.2	0.6	0.2	0.6
	Margin	1.5	3.9	0.8	1.8
	Sale Price	24.8	62.1	28.4	64.5
C	Chilling Centres				
	Salaries	0.3	0.8	0.3	0.7
	Storage and Processing	0.2	0.6	0.2	0.5
	Other costs	0.8	2.0	0.8	1.8
D	DDC / Private Dairies				
	Transportation	0.9	2.3	0.9	2.1
	Salaries	1.2	3.0	1.2	2.8
	Storage and Processing	6.0	15.0	6.0	13.7
	Other costs	3.3	8.3	3.3	7.6
	Dealers' commission	0.9	2.4	0.9	2.2
	Margin	1.5	3.7	1.8	4.1

S.N.	Description	Without Farmers' Labor Cost			
		Cow Milk		Buffalo Milk	
		Rs. per Lt.	Percentage	Rs. per Lt.	Percentage
	Sale price to consumer (adjusted at fat percentage)	40.0	100.0	44.0	100.0

Source: Field Survey Data, May 2009

Average cost of milk production is estimated at Rs. 16.5 per liter for cattle and Rs. 15.5 per liter for buffalo milk without accounting family labor incurred. However, while accounting family labor, the cost incurred to produce one liter of milk were Rs. 25.5 per liter for cattle milk and Rs. 26.6 per liter for buffalo milk. The assessment indicates that farmers receive the highest price following the first channel of milk marketing (i.e. direct sale to the consumers). The highest price received was Rs. 35 per liter for cattle milk and Rs. 38 per liter for buffalo milk. However, such opportunities are strictly limited to the farmers living nearby markets only. Farmers living nearby chilling centers receive Rs. 18.6 per liter for cattle milk and Rs. 22.8 per liter for buffalo milk. Similarly, some farmers sell their milk to vendors and receive Rs. 30 per liter for cattle milk and Rs. 32 per liter for buffalo milk.

4.4 Milk Marketing and Household Income

Support for milk marketing has directly impacted in household income. Emergence, growth and development of milk producers' cooperatives as well as provision of chilling vats have enabled livestock growers to increase cash income in their households. All the milk produced by the farm household has been sold and this has been instrumental for increased cash income to them. In order to assess the impact of marketing support on household income, incremental average income earned by the households with different number of milk animal raised has been computed. Average net income of the farm households ranged between Rs. 6,750 and Rs. 84,375 per year depending on number of cattle and buffalo raised (Table 26). This implies that provision of milk chilling vats has contributed on increasing farm income among the farm households. Contribution is more among the commercial growers compared to subsistence growers.

Table 26: Impact of Milk Marketing Support on Household Income

Livestock Model	Gross Income	Total Cost	Net Income
1 Cattle	33,750	23,625	10,125
2 Cattle	67,500	43,875	23,625
3 Cattle	101,250	60,750	40,500
4 Cattle	135,000	74,250	60,750
5 Cattle	168,750	84,375	84,375
1 Buffalo	27,000	20,250	6,750
2 Buffalo	54,000	37,800	16,200
3 Buffalo	81,000	52,650	28,350
4 Buffalo	108,000	64,800	43,200
5 Buffalo	135,000	74,250	60,750
1 Cattle + 1 buffalo	60,750	42,525	18,225
2 Cattle + 1 buffalo	94,500	61,425	33,075
3 Cattle + 1 buffalo	128,250	76,950	51,300
1 Cattle + 2 Buffalo	87,750	57,038	30,713
1 Cattle + 3 buffalo	128,250	83,363	44,888

Source: Field Survey, May 2009

Note: The cost and return on model that combines the cattle and buffalo is not the simple summation of individual cost and return of individual model. There are cases of scale economics and dis-economics in the combination model.

The net income from livestock production varies depending on the number of heads of livestock raised by farm household. More the number of cattle raised more is the net income earned from the production and marketing. The study uncovered that those households raising cattle earn more than those raising buffalo. Raising few heads of cattle and buffalo provide best combination that maximize the farm income compared to raising buffalo alone.

4.5 Changes in the State of Livelihood Resources

There has been a positive trend associated with assets held by farm households benefiting from milk marketing support provided under CLDP. Provision of chilling vats managed by MPCs has increased access to assets such as chilling vats, utensils, grass, savings, loans, group unity and more choices, whereby the quality of life has improved over time. However, there are critical issues in asset status and access for the households which have to cope with a loss in asset/s due to lack of appropriate institutional support, compensation and/or insurance arrangements.

4.5.1. Natural Resource Base

Farmers have started to give importance on growing grass in their own land as well as in community forest. Past practices of free grazing have been decreased. Similarly beach of roads and cannels and river as well as land slide areas have also been used for the plantation of fodder trees and grass. All these practices have contributed to improve in the forest condition and natural base in the selected districts.

In terms of natural assets most of the study villages have community forestry and some of them have national forests in the vicinity. Those study villages located on hills have hill terraces for cultivation, prone to erosion and landslides. Those villages with rivers near-by have an added advantage in terms of water supply. However, local people are adversely affected when rivers flood and cause extensive damage to their livelihoods and on occasions loss of life. Most of the study villages are rich in forest produce but national forests are richer in terms of biodiversity and provide wild food and other items used by poor households. One noticeable trend is the lack of protection of community forestry in the *terai* region and scaling up of timber harvesting, thereby adversely affecting the stock of natural capital. The marginal lands bordering villages are often productive in terms of growing seasonal grasses for grazing and sale.

4.5.2. Human Resources

Chilling vat owners and farmers of the study areas have been trained on the areas of vat operation and management, product diversification, management and accounting, forage development. Similarly they have been participated in inter and intra districts visit and observation. These programs have enhanced the capability of vat owners and the farmers to improve the condition of chilling vat and livestock business.

People in the study villages are generally hard working and have a variety of traditional skills such as farming, carpentry, brick laying, mid-wifery, etc. Villages have better human assets where government organisations and/or NGOs are actively engaged in capacity building. However, the value added in terms of human capital has been enormous and distinctly different. Beneficiaries have acquired both social and technical skills in the management of grass land, livestock, funds and markets. They have acquired skills in farming, livestock husbandry, treatment and rearing livestock. The habit of making regular savings has also become established amongst them. They have learnt to form and maintain self-help groups and federate them to cooperatives.

4.5.3. Productive/Financial Resources

The study reveals that apart form chilling vat support received the project, the cooperatives have purchased other equipments on their own such as deep freez, generator, computerized quality test/pricing equipment, cream separator, digital balance, milk cans, microscope etc. Similarly, there are practices of saving collection and loan mobilization among the members of cooperatives. Loan has been given to farmer to buy livestock, feed and construction of shed. Hence, the operation of chilling vats in the study area has also helped the farmers to have access on credit.

In the study villages poor groups lack funds. Saving as a regular habit is uncommon among food deficit households. The hard-core poor do not normally access investment funds because they find it risky and have no collateral against which to borrow. Although a few of the moderate poor borrow from the banks, most poor have no access to formal credit and do not have the courage to borrow. Borrowing from informal sources implies higher interest rates and difficult conditions of repayment. The regular savings of farm households is a significant source of the revolving funds managed by the cooperatives in most places. Although credit is a constraint and many are not inclined to borrow, they have borrowed from local institutions. For the some farmers, livestock, trees and grass are sources of income. Lack of funds held by the cooperatives, delay in loan recovery and weak financial practices require attention to improve the management of these grassroots institutions.

4.5.4. Social Resources

The project has played significant role on building up the network and linkages with private dairy industries and input suppliers. It has also helped the people to work in an organized way to address their common problem such as organization of health check up of livestock, treatment and vaccination programme. Feeling of collective efforts to address the common concern has been found increased in all cooperatives.

Social assets are gradually degenerating in many villages, especially in the *terai* region. The hill communities are better placed in this regard for they have closer social ties. The socio-economic disparities amongst hill communities are generally less than those found in the *terai*. Although many study villages have community forests, social assets are not necessarily high. With limited community participation, control and decision-making lie in the hands of elite group/s and poor groups generally remain at the margin. CLDP with its focus on poor households makes for better social inclusion of the poor especially in those areas where participants are well targeted. Group solidarity is also better due to the process of group mobilisation and unity against external pressures from non-participants.

4.5.5. Physical Resources

During the study, an attempt was also been made to document the physical recourse base of chilling vat centers. It is observed that physical resource base of chilling vat centers has been improved after the implementation of CLDP. In addition to chilling vat some cooperatives have their own land and building, while others are in the process of having their own land, building.

There are different social groups with various types and quantities of assets and residing in houses made with roofs of tin, tile and thatch. The thatched huts of poor households need periodic maintenance and hence are relatively troublesome. Many of the hard core poor have no land. Some have huts with homesteads while a few have 1-2 *ropani* upland and 1 *ropani* low land. Livestock ownership tends to vary with social groups. Depending on the social group a range of livestock (buffaloes, cows, oxen, poultry, pigs and goats) are reared. In general, the better the socio-economic condition the greater is the ownership of livestock. Poorer households own very few livestock. Villages located near

highways enjoy better physical assets such as sealed roads, drinking water supplies, bridges etc. as compared to the remote villages. For the beneficiaries of CLDP, livestock ownership has increased sharply although quality of these livestock has yet to improve. In many cases CLDP groups has brought about a process of enrichment in physical capital, e.g. an increase in livestock holdings, improvement in housing and other physical assets (in some cases acquisition of gold jewellery). There are cases where milk producers' cooperatives have also created physical assets.

4.6 Context of Expanding Livelihood Resources at Households and Community Level

There is a need to expand livelihood resources at households and community level. There exist evidences that asset has been either created, or improved or degraded (Table 27).

Table 27: Types of Assets Created by Under Milk Marketing Support (Chilling Vats)

Type of Assets	Evidences of Assets	Evidence of Asset Improvement(s)	Evidence of Asset Degradation
Natural Assets	Fodder and forage in private and community land.	Plantation of forage and fodder in community forest areas and improvement on availability of forage and fodder.	Forage and fodder not always available.
Physical Assets	Chilling vats, accessories and livestock.	Increased sale of milk, higher sale price for grass produced.	Livestock fall sick, death of livestock, poor veterinary services.
Human Assets	Skills to prepare land, grow *stylo* and molasses grass, harvest grass seeds; skills to rear livestock; skills to form and run groups to form a cooperative.	Rise in the savings habit, increase in confidence and courage of women participants; increase in ability to take loans and repay them; increased understanding of group-activities and improving performance of group members; increase in technical know-how, etc.	Difficulties in finding employment, lack of training opportunities and poor quality of training and follow up; poor accounting skills of cooperative officials.
Social Assets	Social customs and practices, group activities, and cooperatives; community activities under cooperatives, feeling of solidarity, group cooperation, network with government and NGOs, network with research institute, network with markets.	Greater support for livestock groups by livestock departments; increase in group cohesion, greater transparency in working of groups, and cooperatives; improved gender equity, decrease in intra-household inequities, establishment of network with NGOs.	Conflict between participants and non-participants of program, managerial and financial weakness of group, and cooperatives;
Financial Assets	Savings, loans, livestock, access to bank loans, sales from marketing.	Increase in savings of group and cooperatives, loans repaid on time, income from sale of heifer, rise in the volume of milk sold and an increase in the price.	Cooperatives lack funds, low creditworthiness of poor in the eyes of micro-finance institutions and inability to borrow etc.

Source: Field Survey, May 2009

In order to expand the livelihood resources through an intervention on chilling vats, the above assessment indicates that availability of forage and fodder resources should be expanded, there should be adequate services for animal health services, efficient livestock system in place to cover death risk of live animals, promote employment,

access to training opportunities and follow up; capacity development for improved accounting skills of cooperative officials, reducing the conflict between participants and non-participants, improve managerial and financial weakness of group and cooperatives; ensuring access to finance to cooperatives, increase creditworthiness of poor through building social capital and increase ability to borrow.

5. Conclusions and Recommendations

This study assessed the impact of establishing chilling vats on improving the livelihood of livestock growers. The study has assessed the trends in milk production and marketing on establishment/expansion of chilling facilities and level of adoption of improved dairy production technologies at household and community level; identify the context of expanding the livelihood resources at household and community level, and document the enabling and constraining factors for the expansion of milk market.

5.1 Conclusions

Chilling vats are managed by the MPCs and access to services of the chilling vats has been instrumental for uplifting the livelihood of the shareholders of the MPCs through the creation of natural asset, social asset, human asset, physical asset and economic/financial assets.

There exist evidences that establishment / expansion of chilling facilities has positive trend in milk production and marketing. Prior to the support to establish the chilling facilities, milk was locally consumed or processed for domestic consumption / sale in distance market. Chilling vats are operated in two modes: directly by MPCs and by private sector on contract basis. Operation by private sector is more efficient than direct operation by MPCs.

In all the 11 MPCs, milk production and marketing are increased significantly overtime. On an average a chilling vat serve about 173 farmers. Not all the milk collected by MPCs is sold to dairy industries. About 79.6% is sold to industries and 20.4% is sold in local market. Capacity utilization of the chilling vats is 78.1% in flush season and 55.9% in lean season in 2009. The rate of growth on milk production and marketing has been estimated to range between 34.5% in 2007/08 compared 2006/07 and 2.5% in 2008/09 compared to 2007/08. The access to chilling vats has been instrumental to inject capital at the local level thereby reduce the incidence of rural poverty.

Establishment/expansion of chilling vats has supported by proper backward and forward linkages that ensures adoption of improved dairy production technology. Adoption of improved dairy production technologies at household and community level is one of the pre-requisites for promoting milk production and marketing through support for establishing/expanding chilling vats in any areas. Further, access to chilling vats has enabled households for adopting improved dairy production technology including allocation of some land for forage plantation. Success of chilling vat operation requires increase in milk production and marketing which is a function of improved livestock breed, improved livestock husbandry, access to balanced feed and fodders and improvement on feeding practices.

About 85% of the total buffalo milk and 80% of the cattle milk produced by the farm households are sold to MPCs and rest are consumed in the households. Average quantity of milk sold by the farm households in 2009 was 4.0 litres of buffalo milk and 9.4 litres of cattle milk per household. Improved breed of cattle and buffaloes, availability of feed, forage and fodders, adoption of improved animal husbandry practices, access to transport and communication, transportation networks, milk collection network, chilling vats and back-up for electricity load-shedding, local processing, health and hygiene, sanitation, increase in income of the consumers thereby leading to varied demand for

milk products, access to financial services, etc. are the enabling factors for expanding milk markets in any areas for the expansion of milk market in any areas.

In order to expand the livelihood resources through an intervention on chilling vats (i.e. support to milk marketing), availability of forage and fodder resources should be expanded. There should be adequate animal health services, efficient system in place to cover death risk of live animals, promote employment, access to training opportunities and follow up; capacity development for improved accounting skills of MPC officials, reducing the conflict between participants and non-participants, improve managerial and financial weakness of group and cooperatives; ensuring access to finance to cooperatives, increase creditworthiness of poor through building social capital and increase ability to borrow and ensuring access to finance to livestock growers from financial institutions.

5.2 Recommendations

On the basis of the study findings and conclusions outlined above, the study have suggested following strategies for further refinement of modalities for to support milk marketing by promoting chilling vats for larger positive impact.

Ensure backward and forward linkages: There should be proper backward and forward linkages for proper operation of chilling vats. Proper care should be provided both for supply and demand side management. There should be adequate focus on livestock development, improvement on collection system and management of the supply of milk and milk products.

Access to finance for livestock growers: Livestock growers should have access to financial services in order to enable them increase the number of cattle and buffalo in their farm. Financial services should be accessed in time and at reasonable rate.

Business linkages with milk processing plants: For the successful operation of the chilling vats, there should be their business linkages with reliable milk processing plants. Though all the 11 milk processing plants are able to maintain business linkages with milk processing plants, it is not strong and reliable. There is a need to strengthen the linkages creating win-win situation.

Product diversification: Staff of the MPCs should be trained on identifying local demand for different milk products and process the milk so as to prepare different types of milk products. There is a need to enhance their skill and capacity to process the milk locally and produce different milk products such as packaged milk, curd, ghee, churpi, ice-cream, sweats, etc. that has local demand.

Management capacity of milk producers' cooperatives: Management capacity of MPCs should be enhanced in aspects related to improved and efficient governance, decision making, marketing of their products (inputs and outputs), financial management, pricing of products and services, book keeping and accounting, ensure efficiency on savings mobilisation and institutionalization of microfinance services, etc. Unless their management capacity has been enhanced, it is less likely that they can manage milk processing in cost and time effective way.

Training on pricing of products and services: Most MPCs lack scientific basis for pricing of their products and services. They should be trained or coached on scientific basis of pricing of their products and ensure that they can operate on continuous and sustainable level.

Business plan for milk producers' cooperatives: All the MPCs managing the chilling vats are operating without proper business plan and in an ad-hoc basis. They should

have their own business plan to operate in cost effective manner. Their business plan should act as a road map to expand their business.

Bibliography

ADB, "Loan NO. 2071-NEP (SF): Community Livestock Project: Project Administration Memorandum" January 2005.
MOAC, DLSO/CLDP, "Project Operation Guidelines", November 2007.
MOAC, DLSO/CLDP, "Annual Progress Report (FY 2006/07)" November 2007.
MOAC, DLSO/CLDP, "Annual Progress Report (FY 2007/08)" December 2008.
DLSO, "Annual Progress Report" 2065/65.

Annex 1: Checklist Used During Field Studies

Checklist for Milk Chilling Centre Owner

Name of Interviewer: .....
Name of Respondent: .....

S.N.	Name of persons	Position

Date: .....

A. General Information:

Name of Owner of the Chilling Centre: .....
Address: .....District .....V.D.C. ward no ..... Tole .....
Date of Establishment…
Capacity of Chilling Centre: .....Ltr./day
Area covered : .....VDCs

B. Management and Governance system:

Managed as Private / Cooperative:.....
Beneficiaries: Livestock groups (no): ..... Livestock of committee (no): .....
Management committee exist (yes/no): .....
Membership in Management Committee: .....male ..... female .....total
..... Dalit ..... Janajati

C. Record of Employment:

Total staff: ..... Male ..... Female..... Total
Permanent staff: ..... Male ..... Female..... Total
Part time staff: ..... Male ..... Female..... Total
Staffs *Dalit and Disadvantage group) (if any): ..... Male ..... Female..... Total
Total Monthly salary expenses: Rs.....

D. Capacity Utilization and installed Equipment:

S.N.	Type of equipments	Year installed	Market value	Capacity	Capacity utilisation	Remarks
1						
2						
3						
4						
5						

Major Constraints for capacity utilization:
1.
2.
3.
4.
5.
6.

E. Details of Milk Collection:

1. Quantity of Milk collected over last three years (Ltr.):

S.N.	Months	Amount Collected (litres)					
		2063/64		2064/65		2065/66	
		No. of farmers	Amount (Lit.)	No. of farmers	Amount (Lit.)	No. of farmers	Amount (Lit.)
1	Sharvan						
2	Bhadra						

S.N.	Months	Amount Collected (litres)					
		2063/64		2064/65		2065/66	
		No. of farmers	Amount (Lit.)	No. of farmers	Amount (Lit.)	No. of farmers	Amount (Lit.)
3	Ashwin						
4	Kartik						
5	Mangsir						
6	Poush						
7	Magh						
8	Falgun						
9	Chaitra						
10	Baisak						
11	Jestha						
12	Ashad						
	Total						

Milk collection Frequency: Morning / Evening / Both

E. Linkages with Dairy Industry

Name of dairy industry	Amount sold			Price (Rs./lit.)		
	2063/64	2064/65	2065/66	2063/64	2064/65	2065/66

F. Financial Information over last three years (As per attached income statement and Balance sheet of last three years)

G. External support received:

S.N.	Types of support Received	Institutions

H. Other services provided by the Chilling Centre, please specify .
.....
.....
.....

I. Major constraints faced:
.....
.....
.....
.....
.....
.....

J. Some specific recommendations for the further improvement of chilling centre: .....
.....
.....
.....

Checklist for District Livestock Service Office

Name of Interviewer: .....
Name of Respondent: .....
Designation:.....
Date: .....

A. Chilling Vat Distributed by DLSO

S.N.	Location	Capacity	Subsidy	Farmers contribution	Total

Select two sites for intensive studies:

- **Small (<=500 litre): .....**
- **Large (=> 2000 litre): .....**

B. Types of supplementary support provided by DLSO in selected chilling vat sites

S.N.	**Details of Input**	**Quantity**		**Amount (Rs.)**	
		Small	Large	Small	Large
1.	Accessories				
2.	Forage seeds				
3.	Bull				
4.	Insurance Fund				
5.	Veterinary Drug Management Fund				
6.	Others				

B. Training and Capacity development support organized by DLSO:

S.N.	**Name of Training /Program**	**Duration**	**No .of participants**	**Venue**
A	Training			
B	Exposure visits			
C	Material support			

C. Support for institutional development provided by DLSo (Please specify)

S.N.	Particulars	Information by Chilling Centre type	
		Large	Small
1			
2			
3			
4			

D. Support for the expansion of Forage

S.N.	Particulars	Information by Chilling Centre type	
		Large	Small
1	Area covered		
2	HH involved		

E. AI Carried Out:

S.N.	Particulars	Information by Chilling Centre type	
		Large	Small
1	AI carried-out		
2	HH involved		
3	Success rate		
4			

F. Details of other support provided by the DLSO (please specify)

S.N.	Particulars	Information by Chilling Centre type	
		Large	Small
1			
2			
3			
4			

G. Details about milk production over last three years As per the record of DLSO

S.N.	year	Milk Production (Ltr.)
1.	First year	
2.	Second year	
3.	Third year	

H. Changes observed by DLSO after the implementation of project:

……
……
……
……

I. Major problems encountered during the implementation of project

……
……
……..

J. Any specific recommendation for the further improvement

……
……
……

Checklist for Milk Producer Farmers

Name of Farmer: .....
Address:.....
Name of interviewer: .....
Date: .....

A. General Information:
Familily Members: Male: Female: Total:…….
Area of land Holding :
No of Livestock holding:
Milking Cows:……..Nos.
Milking Buffalos:……..Nos.
Others:……Nos.

B. Milk Production and Selling:
Average Monthly Milk production: ……..Ltr.
Average Monthly slaes: ……Ltr.
Average Price (Per Ltr .) :…….Rs/Ltr
Average Monthly Income From the sale of Milk: Rs…….
Average monthly income from the sale of ghee /others ; Rs. ……..

C. Expenses Detail (per month)

S.N.	Particulars	Qty	Rate	Amount
1.	Feed			
2.	Forage			
3.	Medicine			
4.	Labour			
5.	Veterinary service			
6.	Insurance (If any)			
7.	Interest on loan (If any)			
	Total			

D. Average monthly saving /Deficit: Rs.....

E. Details of Credit /Loan:

Have you taken loan from any institution /informal sources? Y/N

If yes, Please specify the amout and source.
Amount of Loan:Rs……..
Source of Loan:……

F. Contribution of Milk on house holds income

1. What are the other sources of income other than milk production?

- Agriculture
- Employment
- Business

2. Share of Milk production on house hold income (%)……

H. Change in assets holding:

Have you increased any assets from the income of milk production? If yes , Please specify
……
……
……

I. Membership:

Have you taken the membership of any cooperatives/ other organization? If yes, please specify..... .....
.....

J. Major problem faced:

What are the major problems that you are facing with this business?
.....
.....
.....

K. Recommendations for further improvement :

In your opinion, what else should be done for the promotion of milk production ?
.....
.....
.....
.....

IMPACT OF MILK MARKETING SUPPORT OF COMMUNITY LIVESTOCK DEVELOPMENT PROJECT

Location:.....District.....VDC, ward.....Tole:.....
Name of collection/chilling centre: .....

S.N.	Name of farmers	Family size			No of livestock (no)		Daily Milk production (litre)		Daily milk sale (litre)		Problems of milk production	Suggestion for improving milk production	Remarks
		Male	Female	Total	Buffalo	Cow	Buffalo	Cow	Buffalo	Cow			
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													
11													
12													