DAIRY CO-OPERATIVES IN BHUTAN

Understanding Potentials towards Co-operative Chain Development









Thesis submitted to the University of Applied Sciences in partial fulfilment of the requirements for the Masters Degree on Agriculture Production Chain Management with specialization on Livestock Chains.

Dawa L Sherpa

September 2010

University of Applied Sciences
Van Hall Larenstein
The Netherlands

The Netherlands

PERMISSION TO USE

In presenting this research project in partial fulfilment of the requirement for a Postgraduate degree, I agree that the Library of this University may make it freely available for inspection. I further agree that permission for copying of this research project in any manner, in whole or in part, for scholarly purposes may be granted by Larenstein Director of Research. It is understood that any copying or publication or use of this research project or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the University in any scholarly use which may be made of any material in my research project.

Request for permission to copy or make other use of material in this research project in whole or part should be addressed to:

Director of Research
University of Applied Sciences
Van Hall Larenstein
Part of Wageningen University
P.O. Box 9001
6880 GB Velp
The Netherlands
Fax: 31 26 3615287

Contact: sherdruk@hotmail.com

ACKNOWLEDGEMENT

Many people have been instrumental in bringing this thesis to its present form. I would like to appreciate and credit each of them for their unfailing help, support and cooperation.

Firstly, I would like to take this opportunity to thank the Netherland Fellowship Program (NFP) for the generous funding to pursue my MSc study at the University of Applied Sciences, Van Hall Larenstein, part of Wageningen University, the Netherlands. I am also thankful to the Ministry of Agriculture and Forests and Royal Civil Service Commission for approving my study and granting leave to pursue and complete my studies.

I would also like to thank my supervisor, Mr. Johan Meinderts, Lecturer in the University of Applied Sciences for his excellent guidance, support and supervision. I also owe him my appreciation for his personal concern of my wellbeing during my stay in the Netherlands.

I would like to acknowledge my gratitude to the Program Director, RNR-RDC, Jakar for rendering me with superb transport arrangement and a staff to assist despite the busy schedule. I would like to thank Mr. Prasad Bhujel, Research Assistant for assisting me during the entire field research. Without his help, I would not have completed my field research on time.

I am also thankful to the District Livestock Officer for informing and arranging my fieldwork in spite of his busy schedule in his office. I would like to thank the Livestock Extension staff of Chokhor, Chumey and Tang geogs for their assistance in informing the farmers. I am also indebted to the dairy farmers of Chokhor, Chumey and Tang and the workers in the Milk Processing Units for their presence during the survey interview, their hospitality and cooperation.

Last but not the least, I would like to acknowledge the lecturers and Management staff at Van Hall Larenstein who taught, supported and guided me during the entire period of my stay. I owe my special thanks to my fellow colleagues who have been very nice to me and made my stay enjoyable and memorable. I will cherish these memories throughout my life.

Tashi Delek!

DEDICATION

I would like to thank my beloved mom Karkimo Sherpa, wife Lhakpa Deki, son Dodrup and twin daughters Chimi Eden and Chimi Selden for bearing with my absence. They have endured my absence a lot and in the process also learnt to cope with difficulty. I would like to dedicate this thesis to them and what good may come out of it.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

AI	Artificial Insemination
AIDS	Acquired Immune Deficiency Syndrome
AMEPP	Agriculture Marketing and Enterprise Promotion Programme
AMZ	Australian Milking Zebu
BAFRA	Bhutan Agriculture & Food Regulatory Authority
BDFC	Bhutan Development Finance Corporation
BS	Brown Swiss
CIS	Co-operative Identity Statement
CoRRB	Council for RNR Research of Bhutan
DAMC	Department of Agriculture and Marketing Cooperative
DDD	Dairy Development Division
DLG	Department of Local Government
DLO	District Livestock Office(er)
DoL	Department of Livestock
EU	European Union
F1	First filial generation
FAO	Food and Agriculture Organisation
FYP	Five Year Plan
GCMMF	Gujrat Co-operative Milk Marketing Federation
GDP	Gross Domestic Products
GoI	Government of India
HAADP	High Altitude Area Development Project
HACCP	Hazard Analysis Critical Control Point
HIV	Human Immune Virus
HLDP	Highland Livestock Development Project
ICA	International Co-operative Alliance
masl	metre above sea level
MDG	Millennium Development Goal
MoA	Ministry of Agriculture
MoAF	Ministry of Agriculture & Forests
MoHCA	Ministry of Home and Cultural Affairs
MPU	Milk Processing Unit
NFFDP	National Feed & Fodder Development Program
NGO	Non-Government Organisation
NLBP	National Livestock Breeding Programme
Nu	Ngultrum
OGTP	One Geog Three Products
RGoB	Royal Government of Bhutan
RLDC	Regional Livestock Development Programme
RNR RDC	Renewable Natural Resources Research & Development Centre
SAPTA	South Asian Free Trade Area
SAARC	South Asian Association for Regional Co-operation
SNF	Solid Not Fat
Sq. km	Square Kilometre
UN	United Nations

US	United States
USD	US Dollar

BHUTANESE TERMS

Dzongkhag	District
Dzongkha	National language of Bhutan
Datshi	Soft cheese
Emadatshi	Chilli-cheese curry
Geog	Block
Gup	Block administrative head
Ngulturm	Bhutanese currency (1US Dollar = Nu. 45)
Nublang	Highest quality of Siri bull
Thrabam	Female Siri cow
Torma	Edifice made of flour and fresh butter for religious ceremonies
Tsamdrog	Community grazing land

ABSTRACT

The aim of this thesis was to explore and understand the potentials for dairy co-operative in Bumthang, a dairy potential district in the east-central part of Bhutan.

The past dairy development in Bhutan were focussed mostly on breed improvement, pasture development, introduction of artificial insemination and infrastructure development to improve support services of the dairy sub-sector. Only about 19.6% of the dairy breeds are Jersey and BS crosses with Siri breed (65%) still dominating the cattle population. The national per capita milk consumption was 34kg against the total milk production of 22,882MT in 2008. The per capita milk consumption in Bumthang was one of the highest in Bhutan (89kg) with increasing trend of milk production.

There are 483 dairy farmers as members from the seven different groups, roughly representing 20 percent of households in Bumthang. About 56% of the dairy farmers' group members had 1-3, 35% had 4-6 and 9% had 7-9 milking cows. Forty seven percent supplied 1-3litres, 38% 4-10litre and 15% supplied 11-20litres of milk on daily basis to the MPU. The dairy breeds were mostly Jersey and Brown Swiss Crosses and Siri. Of the total 34 respondents, only 25% were semi-literate who can read and write dzongkha. In most cases, literate members worked as board representative in the MPUs.

The MPUs processed milk into butter and soft cheese but the production volume differed due to differences in milk supply. The MPUs have the basic processing equipment. Based on the current situation, three MPUs produced 275MT of milk, 74,620 balls of cheese and 15.5MT of butter annually worth Nu. 113.34 million. The products were sold directly from the MPU without any difficulty in marketing. Selling prices for milk, cheese and butter are Nu. 25/litre, Nu. 25/ball and Nu.245-250/kg respectively. The milk price (Nu. 16, 18 and 21/litre) paid to the members varied among the MPUs. The monthly operational cost of the MPUs was Nu. 24000-34000. There is 50% drop in milk supply in winter, which all three MPUs expressed was a common problem.

Potentials

The respondents came up with ten strong potentials of the dairy co-operative for Bumthang. Seventy seven percent (n=27) of the respondents strongly agreed and 23% (n=8) agreed that dairy co-operative can bring positive changes. None of them disagreed. The respondents thought that changes are beneficial and can impact positively. The ten potential factors of dairy co-operative were:

Product diversification: The product diversification was necessary to make efficient use of available small volume of raw materials and compete in the national market flooded with cheaper imported dairy products from India.

Income generation: The respondents expected the dairy co-operative to be the continuous source of milk market locally and provide them with uninterrupted flow of income, which they needed for mitigating other household needs.

Quality enhancement: In line with product diversification, enhancing product quality was equally important for the respondents both for marketability and profitability.

Poverty reduction: The respondents felt that dairy co-operative can provide equal opportunity for the economic growth of both rich and poor through their unfailing and unbiased supports. They believe they can generate income regularly through the sale of milk to the co-operative and pull themselves out of poverty in the long run.

Employment opportunity: The respondents expected dairy co-operative to create employment opportunities as workers and members.

Expand market: The respondents needed dairy co-operative to offer worry-free milk market locally and cater to local, regional and national market's need for milk and milk products.

Capacity building: They also looked for the opportunity to up-grade their knowledge and skills on improved dairy husbandry and technology through regular trainings, workshops and study tours.

Packaging, labelling and branding: The absence of proper packaging, labelling and branding is causing Bhutanese dairy a major set-back. The new co-operative is expected to introduce appropriate packaging technology to suit the needs of the Bhutanese customers.

Offer equal opportunity: Respondents want the dairy co-operative to provide equal opportunity to all those who are willing to be members irrespective of distance, difficulties and volume of milk produced.

Growth and development of dairy sector: Instituting a new dairy co-operative is expected to become a milestone in the history of dairy development in Bhutan.

Facilitating Factors

Feasibility: The most pre-requisites for instituting a new dairy co-operative are in place in Bumthang.

By-laws: Seventy one percent of the respondents thought that legal protection of dairy co-operative was essential. The respondents felt that by-laws, rules and regulations were needed to guide the members during the time of conflicts and misunderstanding.

Members' working experiences: About 71% respondents felt that the members of the existing farmers' groups have the experiences and commitment. Members with such experiences and commitment would contribute towards development of new dairy co-operative.

Members' interest and motivation: Eighty percent of the respondents were motivated to have new dairy co-operative instituted. The respondents (83%) also showed that there is a desired level of attitude, interest and co-operation among members.

Tier structure: Most members expressed their concern to retain the present MPUs as milk collection centre (MCC) and establish a new dairy co-operative separately.

Challenges

Sustainability: Sustainability of the dairy co-operative was uncertain to most respondents. They pointed out the co-operative needs to be sustainable economically through the spontaneous supply of the raw materials and making profits. It needs to be viable economically.

Input support: Cent percent (n=35) of the respondents opted for inputs support as one of the roles the dairy co-operative needed to take-up.

Funds for Infrastructure development: There was no expectation of financial support from the members. There is a need to outsource funds either from external donors or RGoB.

Enhance optimum production volumes: Respondents guaranteed a minimum of 1000litres of milk for the co-operative on daily basis.

The finding from the Warana Co-operative Milk Union showed that the incentives and support services to the members were the key to co-operative's success.

Dairy chain analysis: The absence of formal dairy chain in Bumthang was the reason for disorganised and disintegrated actors and supporters leading to weak links in the chain.

SWOT and Force Field analysis: SWOT analysis led to the understanding that there are more strength, opportunities and pressure for changes (dairy co-operative development). With these two different analysis, a decision was reached that dairy co-operative has potentials and is feasible in Bumthang.

1. INTRODUCTION

1.1 Introduction to the Topic

This thesis research is designed to study potentials and scopes of dairy co-operative in Bumthang, a district in the east-central part of the country with seven functional dairy farmers' groups and four operational milk processing units (MPUs). The study is also an initiative towards co-operative chain development.

This study targeted key actors (dairy farmers and MPUs) and supporters (program heads of Dairy Development Division, RNRRDC, DLO, BDFC, BAFRA) involved in support services and input supplies for the production and marketing of milk and dairy products. Their involvement for study was to interact closely with each of these groups and individuals to understand their views and opinions on dairy co-operative development. Further, the study was also aimed to understand the challenges of dairy co-operative development to manage and eliminate for its successful inception.

The study was initiated for the private dairy sector since dairy co-operative in Bhutan is non-existent till date. This study was of interest to all stakeholders involved in dairy sector development including dairy farmers themselves and the ministry as a whole to spark dairy co-operative development on knowing its potentials and scopes. Therefore, this study had dwelled specifically on identifying the potentials and scopes on dairy co-operative.

1.2 Background

1.2.1 Country's Background

Bhutan is a landlocked country in south Asia bordered in the south, east and west by India and north by Tibet (Fig. 1.1). The country's landscape ranges from sub-tropical plains in the south and alpine in the north exceeding 7000m. The state religion is Buddhism with Hinduism as second religion. Bhutan was an absolute monarchy for centuries and became a constitutional monarchy after the first historic election in March 2008. Among other international association, Bhutan is a member nation to UN, SAARC and SAPTA.

Fig. 1.1 Map of Bhutan

Bhutan has a total surface area of 38,816 sq. km and a total population of 691,141 and population density of 16 persons per sq. Km. Bhutan has a forest cover of 72.5 percent and agriculture area of 7.8 percent (Fig. 1.2) (LUPP, 1995 cited in PPD, 2008). The climate in Bhutan varies with rising altitude

with subtropics in the south to temperate in the north.

The economy of Bhutan is one of the smallest in world. However, it has grown speedily in recent years by eight percent in 2005 and 14 percent in 2006. Bhutan had achieved the second fastest growing economy in the world with an annual economic growth rate of 22.4 percent in 2007. Such an achievement became possible mainly due to the commissioning of the Tala Hydroelectricity project. As of March 2006, Bhutan's per capita income was US$1,321. Unarguably, the economy of Bhutan is based on agriculture, forestry, tourism and hydroelectricity. Agriculture provides the main livelihood for more than 80 percent of the population. Agricultural practices consist largely of subsistence farming and animal husbandry.

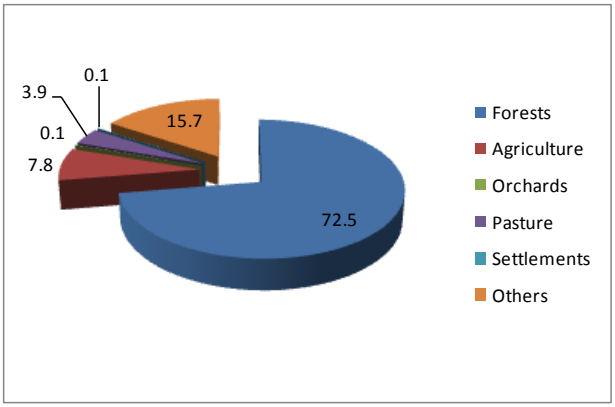


Fig. 1.2 Land cover/land use in Bhutan

Principal exports from Bhutan include cardamom, gypsum, timber, handicraft, fruit, stones and spices worth €128 million. The main imports are fuel, lubricants, grain, machinery, vehicles, fabric and rice amounting to about €164 million. The exporting partners are India (58.6%), Hongkong (30.1) and Bangladesh (7.3%). India (74.5%), Japan (7.4%) and Sweden (3.2%) are the import partners. (Bhutan, 2010. http://en.wikipedia.org/wiki/Bhutan)

1.2.2 Dairy Sub-sector's Background

A cattle farming is an integral part of Bhutanese farming systems. It is closely integrated with agriculture and forests. Cattle provide draught and farm yard manure to support crop production and similarly cattle depend on crop by-products and forests grazing, fodder and bedding materials. Cattle are kept for benefits like milk, cheese, butter and meat for consumption and income generation, draft and manure for crop production.

Cattle are the most important livestock owned by 90 percent of the households (DoL, 2008). As of 2008, the population of cattle was 325,625 heads out of which 65 percent was local Siri, 19.6 percent Jersey and Brown Swiss crossbreds and 15.4 percent Mithun cross.

The livestock sector's share of national GDP was 6.6 percent and 30.8 percent to RNR sector's contribution in 2006 where the RNR sector's share of national DGP was 21.4 percent (PPD, 2008). In 2008, the dairy production in Bhutan was 22882.59MT, 4463.39MT and 1348MT of milk, cheese and butter respectively (DoL, 2008). The per capita consumption of milk was 34kg in 2008.

Dairy development in Bhutan with government initiative started as early as 1961 (Derville, 2006). In about 50 years' time, the achievement made in dairy sector is still insignificant. Unlike Bhutan, there are success stories about the dairy sector in India. Amul, milk marketing federation in Gujrat and its pouched milk brand is the world's largest with an annual turn-over of US$ 1050 million (2006-07). It is a state level apex body of milk co-operatives that aims to provide remunerative returns to the farmers and also serve the interest of consumers by

providing quality products of high value. The co-operative has the capacity of handling 11.22 million litres of milk per day with a daily average collection of 8.4 million litres and total collection of 3.05 billion litres in 2008-09. (Amul, 2010. www.amul.com)

1.3 Problem Statement

The existing farmers groups are not performing well despite unfailing support and assistance from the government. An assessment of farmers' groups by Subedi (2009) also reported on the poor performances of the existing farmers' groups due to unclear roles of actors and supporters and poor competency of facilitators. It has become apparent that potential to empower and raise the incomes through increased production of pro-poor smallholders is not considered by group formation. The poor are disadvantaged in group formation. The group formation has not considered farmers at different level with equal opportunity and level playing fields. The successful groups formed among the poor excluded the poorer, particularly those associated with market functions. It is the political function of groups that is of primary importance in helping to overcome marginalization and social exclusion experienced by the poorest. The comprehensive understanding of the existing farmers groups and future co-operative's potentials and ground realities are yet unknown. Despite the increasing number of farmers' groups, their productivity performances and growth is insignificant and poor that calls for inevitable need for dairy co-operative to scale-up dairy sector to new dimension and healthier growth. Thus, one of the reasons associated with the stagnated growth of dairy sector in Bhutan today is certainly due to nonexistence of dairy co-operatives at various levels.

1.4 Research Objectives

- Explore potentials of dairy co-operative for co-operative chain development with farmers' groups in Bumthang at district level by September, 2010 and recommend accordingly.

1.5 Research Questions

What are the potentials of dairy co-operative?
- What possible changes is dairy co-operative capable of bringing onto the existing farmers' groups?
- What innovation functions should the dairy co-operative perform for greater benefits?
- What factors are essential for a sustainable farmers' co-operative establishment?
- What benefits and opportunities can the co-operative provide for their members?
- What existing and future market conditions and opportunities facilitate an economically vibrant dairy co-operative?

What factors facilitate smooth transition to dairy co-operative chain development?
- What supportive and enabling legal environment or legislation is essential?
- What strengths of the existing farmers groups contribute forming dairy co-operative?
- What is the level of members' motivation for a new dairy Co-operative?
- What tasks commitment or experiences of the members within the organisation are required to serve in boards, committee or working groups?

What are the main challenges to setting up dairy co-operatives?
- What co-operative models are ideal for Bumthang's conditions?

- What important needs and level of interest among the existing actors and supporters contribute to organizing an effective dairy co-operative?
- What institutions (government/private) are pivotal in forming a dairy co-operative?
- What existing and additional infrastructures and equipment are necessary for the dairy co-operative?
- What inputs mechanisms including fund sources enable co-operative to become more resourceful and competitive?

2. METHODOLOGY

2.1 Research Framework

The outcome of this study was based on the literature review and field research. The research framework (self-explanatory) is as presented in Fig. 2.1 below.

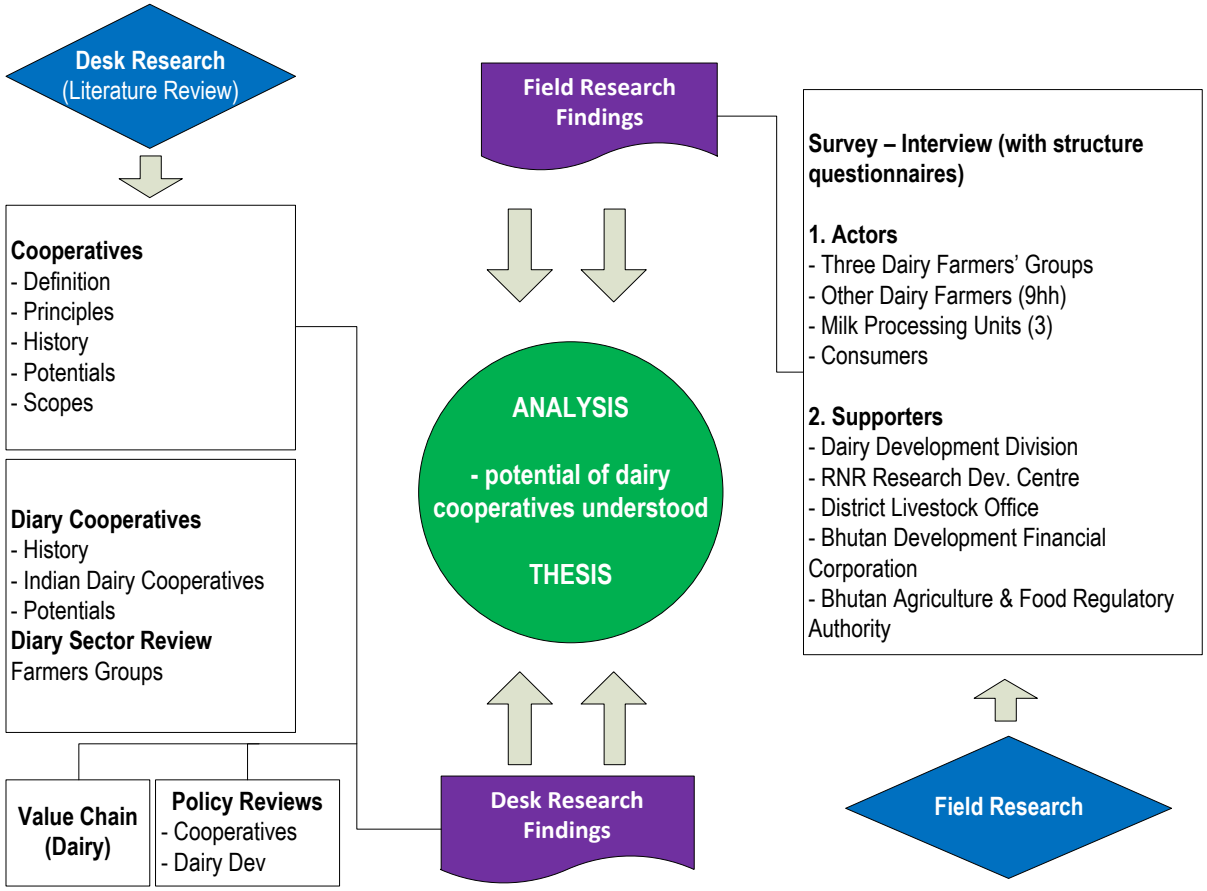


Fig. 2.1 Research framework

2.2 Conceptual Framework

The field research of study was strategized on value chain concept. Therefore, two of the key actors and relevant supporters of the dairy chain in Bumthang (study area) were focussed as the key respondents (Fig. 2.2)

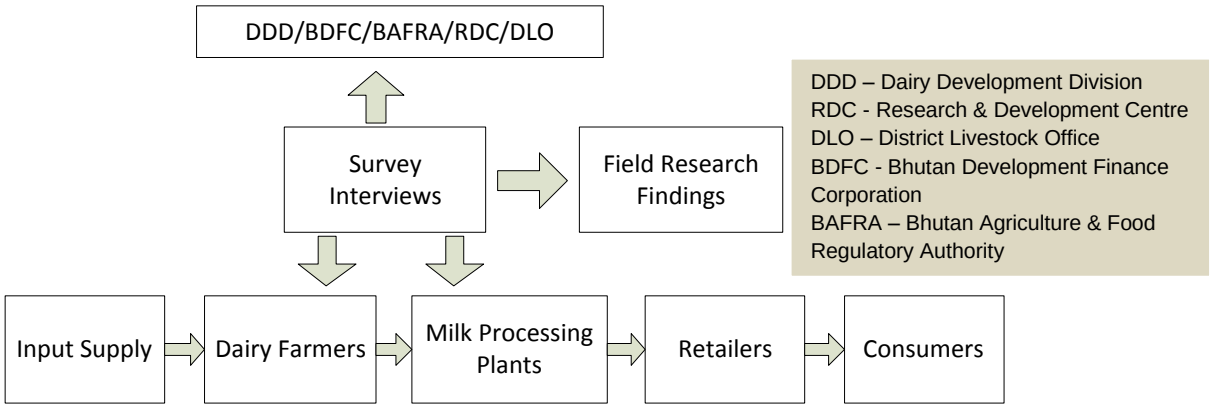


Fig. 2.2 Conceptual Framework

2.3 Selection of the Study Area

Bumthang, a district in the east-central part of Bhutan was selected for this study. It is a small district with four blocks (Fig. 2.3). It is located at an altitude of 2650masl. It has temperate climate. It has a human population of 16116 (urban-26.1%, rural-73.9%) (NPHC, 2005). The total cattle population of Bumthang is 10884 heads (DoL, 2008).

Bumthang was selected because the livestock farming is predominant. The favourable climatic conditions and landscape make this district most ideal for dairying compared to other districts. Most farmers are dependent on livestock for livelihood and only few grow high altitude crops. This district also has five dairy farmers' groups with three community owned and one privately operated, which was essential for the study. All four *geogs* (blocks) in the district receive door-to-door artificial insemination (AI) services. Further, the presence of major livestock development institutions (research centre, feed and fodder development programme, breeding farms) necessary for inputs and technical support services makes this district feasible for dairy development. This district is also known for its best tourist destination in Bhutan.

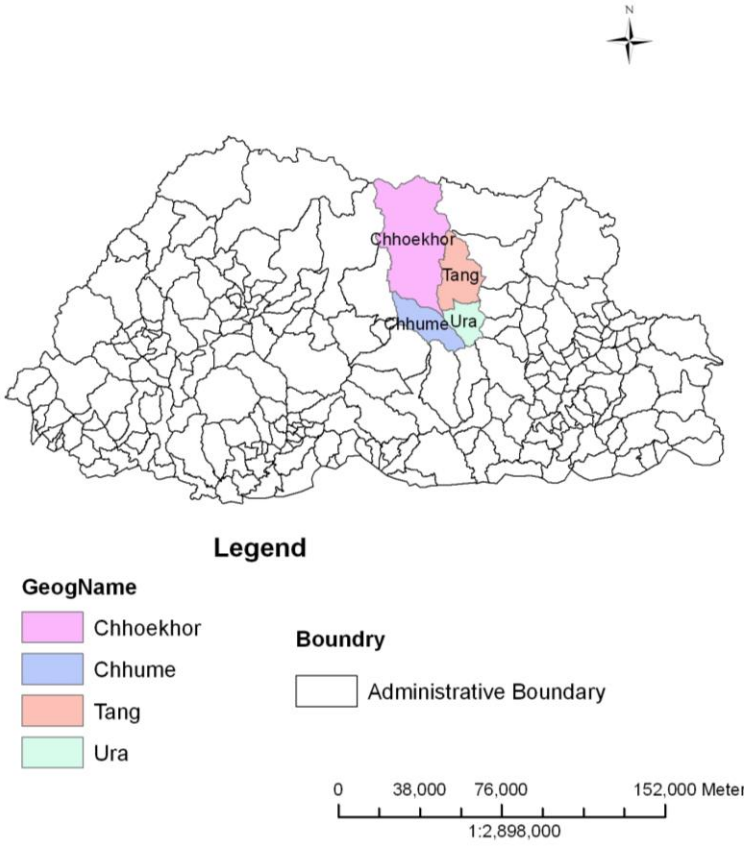


Fig. 2.3 Map of Bhutan showing the Study areas

2.4 Study Design

The study design was designed to illustrate location, target groups and population, research strategy, information collection method and the tools used for the field research with other details (Fig. 2.3).

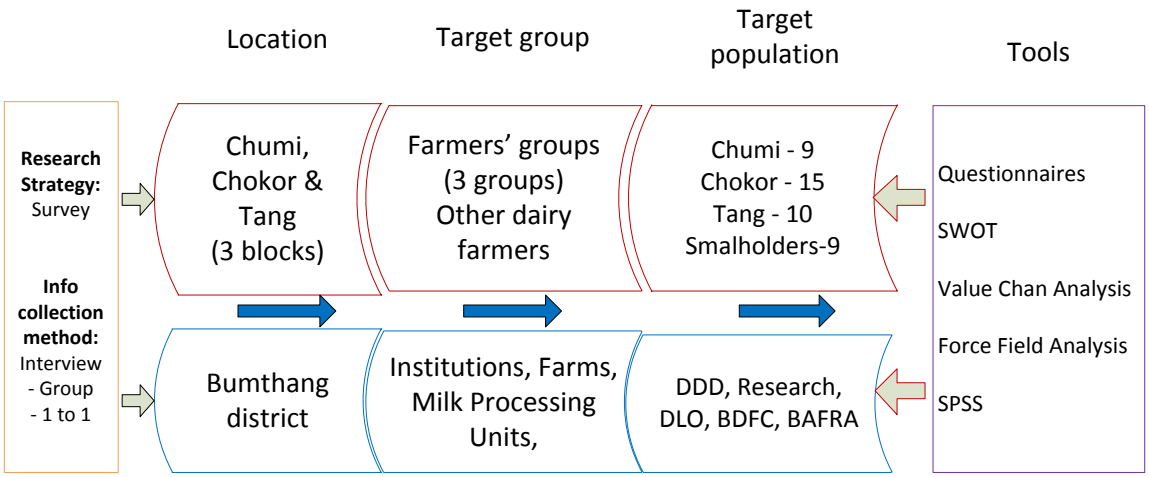


Fig. 2.4 Study design

2.5 Literature Review

A number of published books, reports and Google-internet sites were referred to gain better insight into co-operatives and dairy co-operatives. The literature review were done to understand issues like why co-operative started, how it started, how does it benefits its actors and supporters, the successes and failures in global context. Further, the review was narrowed down to dairy co-operatives to understand the importance, principles, processes and strategies. As suggested by the research topic, literatures also were probed to understand potentials and scopes of dairy co-operatives as much as possible taking cases of successful dairy co-operatives development in similar conditions as Bhutan.

Where appropriate, the findings from the literature review were compared and argued with the findings from other literatures and from field.

A chapter (Chapter 4) past dairy development initiatives in Bhutan was included as a chapter. The secondary information for this chapter was extracted from publications and documents of the Ministry of Agriculture. This chapter was required to provide an overview of the Bhutanese dairy sub-sector.

2.6 Data Collections and Sampling

2.6.1 Field Study

A month long research was carried out in three *geogs* of Bumthang *dzongkhag* (district) in the east-central part of the country. The research was focussed on three active farmers' groups, three MPUs and institutions (supporters) involved closely with dairy development activities in the

district as shown in the study design (Fig. 2.4). The three dairy farmers groups with community MPUs were:

- Chokhor Gonor Gongphel Chithuen Tshogpa (CGGCT), Chokhor geog
- Chumey Gonor Lathoen Tshogpa (CGLT), Chumey geog
- Tang Welfare Association Dairy Farm (TWADF), Tang geog

Survey was carried out to collect mostly opinion-based (qualitative) information that involved administering questions to individual respondent. Structured questionnaires (appendix 1, 2 & 3) were used to three dairy farmers' groups (34), MPUs (3), and institutions (3) to collect the information required. Nine individual non-member dairy farmers were also included as respondents in this survey.

2.6.2 Sampling Techniques

The sampling frame in this study was the three focussed groups who were the active members of the dairy farmers' groups supplying milk regularly to the community milk processing units (MPUs) in their geogs. Also to see opinion variations, three non-members from each of the three geogs were included. About 30 percent of the group members were taken as representative sample (Table 2.1). Besides, program heads of the institutions closely associated with dairy development in the district were also included in this study to have their opinions and view on the potentials of dairy co-operative in the district. The sample farmers were randomly selected both from the groups and non-group by the Block Livestock Extension staff. The sampling details were as follows:

Table 2.1 Survey samples

Geogs	Total members	Sample (30%)	Non-group farmers	Total respondents
Chokhor	50	15	3	18
Chumey	30	09	3	12
Tang	244*	10	3	13
Total				43

Survey, 2010 * only 10 members were active

2.6.3 Data collection techniques

The respondents were briefed on the concepts, principle and benefits of dairy co-operative to allow them to gain understanding on co-operative and dairy co-operative prior to the interview. To facilitate better understanding, a short presentation was also made on Anand Model and GCMMF covering co-operative functions, members roles, production capacities, support services, products made, market and turn-over and benefits to their members.

Only after the briefing and presentation, the respondents were interviewed individually and in groups. Two interviewers interviewed the interviewees separately, one handling the group and other individual farmers and vice-versa.

2.7 Data Analysis

The data collected were mostly qualitative as it was only the opinions of the dairy farmers. Therefore, MS Excel was used to analyse the data making tabulation, ranking and calculate percentages of respondents. Simple histograms, bar graph and pie charts were developed where appropriate using excel for illustration and foster better presentation of the findings.

2.8 Tools Used

2.8.1 Value Chain Analysis

The dairy chain concept helped in analysis and understanding various actors and supporters involved, the quality, value addition and market forces for milk were through the chain perspective. Further, understanding on the information flow on milk prices, consumers' needs and logistics and problem and potentials within the chain was developed using chain as a tool.

2.8.2 SWOT Analysis

SWOT analysis was used for understanding Strengths and Weaknesses and for looking at the Opportunities and Threats of the Bumthang dairy farmers' groups to understand its potentials for dairy co-operative development. It was used in the context to help uncover opportunities that is well placed to exploit. Understanding weaknesses helped to manage and eliminate threats if any.

2.8.3 Force Field Analysis

Force Field Analysis was done to understand the pressures for and against the co-operative chain development for weighing pros and cons to strengthen the forces supporting a decision, and reduce the impact of opposition to it.

3. LITERATURE REVIEWS

3.1 Co-operatives

3.1.1 Introduction

The literature reviews broadly unfurls areas relevant for this research. Information pertinent to this research study were referred, reviewed and included.

3.1.2 Definitions

- According to ICA (1995), co-operative is defined as 'an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly-owned and democratically controlled enterprise'.

- Koopmans (2006) explains co-operative 'as a member-controlled association for producing goods and services in which the members, individual farmers or households, share risks and profits of a jointly established and owned economic enterprise'.

  According to Koopmans' definition, a co-operative is established by farmers in reacting to adverse market conditions considering it as a shared problem. Such a problem could be related to either marketing produce resulting to low farm-gate prices or supply of good-quality and reasonably priced farm inputs, such as seed and fertilizer, or supply of sufficient and cheap credit.

- Karki (2005) stated co-operative is 'a user-owned and user-controlled business that distributes benefits on the basis of use'.

- The US Department of Agriculture distinguished co-operative from other business by three concepts or principles: first, the persons who own and finance the co-operative and use it as user-owned; the control of the co-operative managed by the users of the co-operative as user-controlled; and the third is the benefits of the co-operative shared among users on the basis of their use as the user-benefit (Cobia, 1989).

- Centre for co-operatives (2004) refers co-operative as a private business organization that is owned and controlled by the people who use its products, supplies or services. Although co-operatives vary in type and membership size, all were formed to meet the specific objectives of members, and are structured to adapt to members' changing needs.

3.1.3 Values

Co-operatives are founded on the doctrines of democracy, equality, equity, self-help, self-responsibility and solidarity. Co-operative members believe in the ethical values of honesty, openness, social responsibility and care for others.

3.1.4 Principles

In 1860, Rochdale Societies proposed ten principles of co-operative that were modified over periods of time. These principles are based on the voting by the members on democratic basis, open membership, equity provided by the patrons, limited equity ownership share of individual patron, distribution of net income to patrons as patronage refunds on a cost basis, limited dividend on equity capital, exchange of goods and services at market process, duty to educate, cash trading, no unusual risk assumption, political and religious neutrality, and equity of the sexes in membership. These principles are guidelines to put their values into practice. The International Co-operative Alliance (ICA) in 1995 revised the Co-operative principles to seven (UN, 2005; Co-operative^{UK}, 2008). The seven underpinning principles of ICA are explained as under:

3.1.4.1 First Principle: Voluntary and Open Membership

Co-operatives are voluntary organisation. It states that the memberships are open to all persons capable and responsible as members irrespective of gender, race, socio-political or religious practioners.

3.1.4.2 Second Principle: Democratic Member Control

Co-operatives are democratic organisations. It is controlled by their members. The members actively participate to set their policies and make decisions. The members (men and women) who serve as elected representatives are accountable to the membership. In primary co-operatives, members have equal voting rights organised democratically.

3.1.4.3 Third Principle: Member Economic Participation

This principle states that the capital of their co-operative is equitably contributed and democratically controlled by their members. Some part of the capital often is the common property of the co-operative. Usually members get limited reward on capital if any as a condition of membership. The members allot surpluses for any or all of the following purposes:

- set up reserves to develop co-operative,
- benefit members in proportion to their transactions, and
- support other activities endorsed by the membership.

3.1.4.4 Fourth Principle: Autonomy and Independence

This principle distinguishes co-operatives as autonomous and self-help organisations controlled by their members. Under any circumstances, if the members enter to agreements with other organisations including governments, or raise capital from external sources, they can do so on conditions that ensures democratic control by their members maintaining autonomy.

3.1.4.5 Fifth Principle: Education, Training and Information

Co-operatives offer education and training for their members, elected representatives, managers, and employees. It is intended to contribute towards development of co-operatives

effectively. It is also to inform the general public, young people and opinion leaders particularly apropos the nature and benefits of co-operation.

3.1.4.6 Sixth Principle: Co-operation among Co-operatives

It entails that co-operatives serve their members effectively and strengthen the co-operative movement. It can only be achieved by working together through local, regional, national, and international structures.

3.1.4.7 Seventh Principle: Concern for Community

Co-operatives contribute to the sustainable development of their communities through policies approved by their members.

3.1.5 Emergence of Co-operatives

The Shore Porters Society established in Aberdeen in 1498 claims to be one of the world's first co-operatives. In 1761, the first consumer co-operative of weavers is believed to be founded in Fenwick, East Ayrshire. Several co-operatives societies formed during that time are still trading today. Robert Owen (1771-1958) is considered the father of the co-operative movement (Wikipedia, 2010).

The genesis of the co-operative movement truly lies in the selfless performance of one individual. In 1844, Rochdale Society was founded considering the first successful co-operative enterprise. It was used as model for modern co-operatives following Rochdale Principles. A group of English weavers organised a co-operative endowed with motivation to the co-operative movement to flourish during the 19th century. Owen's ground-breaking act also impelled another such endeavour of the Rochdale Poiners (Lotti *et al.*, 2006 cited in Rajagopalan, 2007).

Over 800 million people around the world are members of the co-operative Movement. In 1994, the co-operative enterprise made secure the livelihood of nearly three billion people or half of the world's population as per United Nations estimate. These enterprises continue to play significant economic and social roles in their communities. Co-operatives offer over 100 million jobs around the world, which is 20percent more than multinational enterprises (ICA, 2009; UN, 2005 cited in Rajagopalan, 2007).

3.1.6 Legal Status of Co-operative

The types of a company and a partnership firm (equal control) bestow the legal status of the co-operatives. In the United States, largely co-operatives are structured as Limited Liability Companies. Also in the United Kingdom, co-operatives are built-in as companies, limited by shares or by guarantee. The European Co-operative law provides a corporate structure for co-operatives with individual or corporate members in other countries of the European Union. The tax laws in the US and some other countries endow with Co-operatives a special status (Dunn *et al.,* 2005 cited in Rajagopalan, 2007).

3.1.7 Logic in Co-operative Ownership

Co-operative is typified by three indispensable organisational components viz. user-owned, user-control and user-benefit (Rajagopalan, 2007). The ownership is positioned in the transaction than in capital investments in classical co-operative. In Anglo-Saxon world too, membership is provisional on the purchase of a bare minimum number of shares. Thus, these shares are not considered for assignment of ownership rights. For instance, the residual rights to control and the claims for the share are not considered. Therefore, the classical co-operative allocates benefits based on use.

3.1.8 Potentials of Co-operatives

3.1.8.1 Innovations in Co-operative

Bekkum and Bijman (2007) cited that co-operatives often receive criticism for being substandard company ownership form. It is due to the fact that co-operatives decision-making process is inefficient constrained by limited capital to invest as their co-operative business strategies remain focussed more on growth, value-addition and internationalisation. The classical cooperative ownership form has come under huge pressure as a result of such disparity amid member investment incentives and cooperative capital needs.

However, despite the mismatch, co-operative ownership structures are being adapted and various new arrangements surfaced. Often such innovations in co-operative capital and ownership structures include components of investor-owned capital structures with involvement of external ownership sometimes. Conversion of the co-operative into a public or private limited company is the ultimate form of including investor ownership.

Co-operatives are continuing to feature powerfully in agro-industry rankings. Therefore, it is true that a lot of cooperatives introduced key changes in the governance structures and ownership form.

3.1.8.2 Co-operative Difference

Co-operatives put people at the heart of their business and not capital. Co-operatives are business enterprises characterized into three basic interests; ownership, control, and beneficiary. All these three basic interests are vested directly in the hands of the users in the co-operative enterprise.

Co-operatives pursue a wider set of values more than those associated solely in making profits. This is due to the fact that co-operatives are owned and democratically-controlled by their members. The decisions taken by co-operatives balance the need for profitability with the needs of their members and the broader communal interests. Also co-operatives are enterprises, which follow a set of principles and values. The Co-operative Identity Statement (CIS) detailed in 1995 by the International Co-operative Alliances (ICA) is the internationally recognised definition of the co-operatives along with their values and principles.

3.1.8.3 Co-operatives as Economic and Social Actors

ICA (2003) in the message to the 9th UN International Co-operative Day stated that co-operatives have the potential to make development happen. Millions of people over the world chose co-operative as business enterprise model to facilitate private and communal development goals. Co-operatives generate employment and provide income. Co-operative ethics ad principles in practice promote tolerance and solidarity. While being democratic, cooperatives promote the rights of each individual member. Co-operatives produce and supply safe and quality food and services to the members including the communities where they function. Socially active co-operatives respond to needy members in terms of providing literacy or technical training, or to take action against pandemics. Co-operatives in many countries are significantly social and economic actors in national economies through their varied activities. This makes both personal development and general well-being of the entire populations at the national level contributing.

3.1.8.4 Co-operatives Make Development Happen

Co-operatives for ages have been instrumental in making development happen round the world in various ways. There are about 760 million people in the world as members of co-operatives. Kenya has 20 percent of the population, Argentina over 29 percent, Norway 33 and 40 percent in Canada ad US as a member of co-operatives. Co-operatives provide over 100 million jobs in the world. Colombia's national health co-operative is the second largest employer at the national level. The savings and credit co-operative federation in Benin has provided about USD 16 million in loans to rural populace in 2002. Similarly, co-operatives in Kuwait handle 80percent of the retail trade business. In 2002, co-operatives in Cote d'Ivoire invested USD 26 million for establishing schools, rural roads and maternal clinics (ICA, 2003).

The Co-operative Movement even extends its support to the UN that pledged to support in combating poverty, hunger, diseases, illiteracy, environmental degradation and discrimination against women. The supports from the co-operatives are aimed at mitigating the United Nations' MDGs commitments for governments and the international community to halve the population of people living in extreme poverty, illiteracy, unemployment and diseases (HIV/AIDS). Co-operatives are truly making development happen on a day-to-day basis allowing people to make dreams of a better life a reality (ICA, 2003).

3.2 Development of Dairy Co-operatives

Cropp and Graf (2001) bring into being through studies that dairy co-operatives are among the first type of agricultural Co-operatives organized in the United States in the beginning of 1800s.

AMUL based in Anand, Gujrat, Inida has been a best example of a successful dairy co-operative. Amul is believed to have established as distinctively unique model for rural development. It is the largest food brand in India and world's largest Pouched Milk Brand. Amul has an annual turnover of US $ 1050 million (2006-07). Besides India, Amul has entered overseas markets.

The Gujrat Co-operative Milk Marketing Federation Ltd, Anand (GCMMF) is the largest food products marketing organization of India. It is the apex organization of the Dairy Co-operatives

in Gujrat. This State has been a pioneer in organizing dairy Co-operatives and their success has not only been emulated in India but serves as a model for rest of the world with more than 2.8 million village milk producers and millions of consumers in India and abroad through a co-operative system that includes 13,141 Village Dairy Co-operative Societies (VDCS) at the village level, affiliated to 13 District Co-operative Milk Producers' Union at the district level and GCMMF at the State level. These co-operatives collect on an average 7.5 million litres of milk per day from their producers' members. What makes these dairy co-operatives unique is more than 70 percent of their members are small, marginal and landless labourers and include a sizeable population of tribal folk and people belonging to the scheduled castes. (Amul, 2010 http://en.wikepedia.org/wiki/Amul)

FAO (1994) on World Animal Review shares similar success stories in the developing countries of Asia and the Pacific Region. FAO recognises dairy co-operative as key means to systematize the supply of agricultural inputs, process and market agricultural produce and provide credits. Such means of mitigating inputs needs have proven to be a strong economic institution and a vehicle for improving the condition of the impoverished rural population. Co-operatives help farmers with an organizational arrangement to assist them in planning, decision-making and implementing schemes at the grassroots level involving them and their families devise to raise their socioeconomic standards.

Jong (1996) found out that dairy co-operative is a crucial factor in shaping potential development. Jong rightly ruled out that both economic and social goals fall under a government department for registration, settlement of disputes and audits in most developing co-operatives. In the Netherlands, dairy co-operatives started only from the economic perspective. The legal responsibility and the commitment of farmers delivering their milk to the co-operative was managed to attract funds for joint milk processing.

3.3 Value Chain

FAO (2000) defines dairy value chain as the stages through which milk and dairy products pass from farm to final consumer. Hobbs, *et al.,* (2000) stated that a value chain is created when organizations have a shared vision and common goals. Perker (2004) states value chain approach as a business strategy to adapt to these changes. Bouma (1998) states that value chain in simplest form is a collaborative effort. Most literatures cite the triggers for chain development are intended to improve quality, efficiency and produce differentiated products (Agriculture & Food Council, 2004). The above statement justifies supporters to be an active partner with shared vision and goals. A value chain approach supports several Millennium Development Goals (MDGs) too (KIT, Faida & IIRR, 2006). Of those, MDG1 to eradicate extreme poverty and hunger is also one of the 10th Five Year Plan goals of the Ministry of Agriculture to contribute to poverty alleviation

The value chain studies tend to confirm that one of the key factors affecting smallholder competitiveness is the evolution of rural wages. Smallholder dairying is labour-intensive and reported to be most profitable when other remunerative options for labour are limited. Dairy competitiveness in developing countries is significantly dependent on the low opportunity cost for labour with herd sizes tending to rise with rising rural wage rates. This supports the sustainable dairy development strategy rationale that subsistence smallholder milk producers in

many areas, particularly those with high wages and land values will have to scale-up to more commercial small dairy farming to remain competitive.

3.4 Dairy Development Strategy

FAO-APHCA (2009) reported that the rising regional demand for milk and dairy products (from 76 million tonnes in the early 1980s to an estimated 247 million tonnes in 2008) has translated into opportunities for local producers, the majority of whom maintain between 2-5 cows and supply more than 80 percent of milk in the region. With approximately 352 million head of cattle and buffalo, Asia became by 2005 the largest milk-producing region in the world surpassing Europe. The report concludes that it has largely benefited smallholder dairy producers where milk production is an integral part of the small farm economy, providing cash, capital assets and nutritional benefits to millions of households. FAO estimates that every 10-20 litres of milk marketed in traditional markets has created one non-farm job. However, concern is slower growth in grain and fodder production. In such a production practices, animals perform under low input-output systems characterized by feed produced from local crops. The emergence of more commercial operations will require access to better quality feed increasingly.

Studies have also shown that the strategy for enhancing productivity includes better quality feed, herd growth, creation of producer associations to strengthen their market position versus suppliers of inputs and purchasers of milk. The improvements in feeding and reproduction practices will be essential to achieve faster herd growth (Bernet *et al.*, 2000). Further, study conducted in Maxican dairy farms states that inclusion of small scale farms can contribute towards closing the demand gap created due to low productivity (Arreola *et al.,* 2006).

Mubiru *et al.,* (2007) discusses the entry-point for targeting intervention efforts is by recognising the existence of a dairy intensification possibilities across a region or country. The entry point for intervention efforts are made in areas with fairly uniform socio-economic and biophysical dairy sub-systems features for exploiting full potential of the dairy cattle population.

FAO (2000) strategy emphasizes that smallholder dairy development should be seen as an enterprise-driven approach to livelihood enhancement as well as an instrument of rural poverty reduction. Also as regular income from selling milk enhance rural livelihoods appreciably through better nutrition, higher disposable income, asset accumulation, and enhanced social standing. Thus, majority of subsistence smallholder milk producers aspire to become more intensive small dairy farmers. This process will be fundamental in applying the strategy and sustaining sustainable dairy development gradually at the country level.

The dairy co-operative may also operate on four mutually reinforcing pillars to dairy development strategy to address the challenges and fulfil the objectives outlined in this study through strategic interventions as under:

- develop human resource and knowledge management
- improve productivity and competitiveness of smallholder milk producers
- strengthen linkages between farmers and consumers to deliver a quality product at a fair price
- enhance enabling environment

3.5 Legislation and Policy Review

The Co-operative Acts (2001) declares the policy of the Royal Government of Bhutan (RGOB) to promote co-operatives for the well-being of members and communities. The policy states that government shall facilitate development of co-operatives as strong and sustainable pillar of the private sector contributing to the economic development of the Bhutanese society, especially the poor. The RGOB recognizes co-operatives as private enterprises with economic purposes supporting its aims to help co-operatives realize their purposes. It helps to strengthen and sustain their capacity for self-reliance and self-management so that co-operatives grow to stand on their own as autonomous enterprises and as partners of government in development. Mutual agreement shall be the basis of partnership between co-operatives and government.

Groups are the smaller units paved for road to co-operative development. Subedi (2009) reported that the government support to growth and development of formal, informal and smaller farmers groups was envisioned as crucial for the development of co-operatives since last ten years. The government recognises need to have legal setting for farmers groups since early nineties. Consequently, the co-operative Act of Bhutan was enacted in 2001. The acts laid the basis for registration of co-operatives as legal bodies but edged the stipulation for registration of small and informal farmers groups. However, the Department of Local governance (DLG) under the Ministry of Home and Cultural Affairs (MoHCA) was given the guardian authority of the act. In contrary, to a large extent progress in development of farmers groups failed to materialise since the responsibility of implementing the RNR based farmers groups remained with the Ministry of Agriculture while registration part was looked after by the MoHCA. Similar study carried out by Norbu (2008) also recognised that the Companies Act 2000 and the Civil Society Act 2007 did not have specific conditions on the formation and management of farmers groups and co-operatives. Despite the fact that the Ministry of Economic Affairs according to its Companies Act 2000 have waived off license requirement for firm with less than a capital of Nu.1 million. The study identified that all farmers groups existed then operated below a capital of a million. Hence, registration and legalization of farmers groups failed to take place.

The 10th Five Year Plan (FYP) already gearing towards transforming subsistence rural economy into a market oriented production system. However, the government is comprehending complexity fronted by the dual custodianship (MoHCA for registration and MoA to implement) in the Co-operative Act 2001. Therefore, mandate related to formation, registration and implementation of farmers' groups was transferred to the MoA in entirety. The Co-operative Act 2001 did not allow the farmers groups as legal entities for registration so long it met the requirements as co-operative. To ease the process, the MoA in 2006 framed the draft Co-operative Regulation that accommodated all aspects of co-operative development ranging from registration, monitoring, mediation, reconciliation with the provision of legal advice and services pertaining to research, education and information. With progression in new co-operative regulations, the MoA recommenced process to develop farmers group and co-operatives in the country under the coordination of the Council of RNR Research of Bhutan (CoRRB). Conversely, without amendment in the Co-operative Act 2001, this did not contribute much to legalise farmers groups. Finally, the 2nd session of the 1st parliament in January 2009 recognized co-operatives as private enterprises amending the economic purpose and abridging gaps of the Co-operative Act 2001. The amended act authorizes the MoA to implement the act

as groups and co-operatives development by Co-operative Act, 2001 and the Co-operatives Regulations, 2006.

To facilitate a market led economy through formation of farmers' groups and co-operatives, the importance of institutional strengthening within the Ministry was recognised. The RGoB recently approved the up-gradation of the Agricultural Marketing Services to a full-fledged Department of Agriculture Marketing and Co-operatives that became operational from early 2010.

3.6 Farmers' Groups

The formation of farmers' groups came up strongly since early 90s and promoted rapidly in recent years through government support in changing subsistence production towards market-led enterprises development under the broad framework agreement of Agriculture Marketing & Enterprise Promotion Programme (AMEPP). There has been continued commitment of all stakeholders in providing assistance in the area of group development with emphasis on enterprise development.

An assessment study on farmers' group in eastern Bhutan carried out by Subedi (2009) reported that the poor performances of the existing farmers' groups were due to inadequate institutional linkage to support the groups, inept monitoring and evaluation of farmers' groups, poor awareness creation, insufficient in-depth study (feasibility), deficient in market analysis of the potential commodities, improper guidelines on business strategy, and incompetency of the facilitators.

Field assessment by Subedi (2009) necessitates identifying incentives and obligations of the groups. It can be organised as a part of awareness training during mobilization of group formation simultaneously with the initiation of formation.

3.7 Conclusions

Co-operatives are of different types and of varying sizes that operated voluntarily and democratically. Characteristically, co-operative are owner owned and controlled for greater accountability, responsibility and benefits among the members. If successful, co-operatives are known to provide employments, income and supports even where resources are most scarce. Development of co-operative in Bhutan is envisioned and permitted as per the co-operative policy act.

4. PAST DAIRY DEVELOPMENT IN BHUTAN: AN OVERVIEW

4.1 Introduction

To obtain the right perspective of dairy farming in Bhutan, it is imperative to see what has been done and achieved. This could throw some light on the future course of action and entail description of the major landmarks in dairy development. The brief history of dairy development during the five year plan periods is highlighted.

4.2 Major Achievement of Dairy Sub-sector

4.2.1 Achievements: First FYP (1961-65)

Phanchung *et al.,* (2001) reported that the first Five Year Plan (FYP) was devoted to institutional infrastructure development. Breed improvement was given due importance due to low genetic potential of the native breeds in terms of milk production. For this, National Jersey Breeding Farm (NJBF) in Samtse and a Cattle Breeding Farm in Wangchutaba were established. Also during this period, pure Jersey and some Hariyana breeds were introduced to produce superior bulls for crossbreeding with the native breed. Regional Livestock Production Farm (RLPF) at Lingmethang and four veterinary centres were also opened.

4.2.2 Achievements: Second FYP (1966-70)

A small cheese making unit in Maneting in 1969 and a Brown Swiss Farm in Gogona in 1970 was established. It was ushered by the Rural Department Project with the support of the Swiss Government. Five veterinary centres were added. Vaccination of cattle against Rinderpest, Haemorrhagic Septicaemia and Black Quarter was initiated. About 132 Jersey and BS and 48 Mithun breeding bulls were distributed.

4.2.3 Achievements: Third FYP (1971-75)

Brown Swiss Bull Mother Farm was established in 1974 in Bumthang under the Brown Swiss Crossbreeding program of the Rural Development Project. This farm was to produce BS bulls for distribution and promotion of the BS crossbreeding program. The distribution of livestock and animal health gained impetus with addition of thirteen veterinary centres (Phanchung *et al.,* 2001).

4.2.4 Achievements: Fourth FYP (1976-80)

Two Regional Mithun Breeding Farms (RMBF) in Chukha and Arong was established to produce Mithun bulls for distribution. Mithun Calf Rearing Centre (MCRC) was established at Trashiyangphu. Some Jersey cows were supplied at a subsidised rate to farmers and Artificial Insemination (AI) with liquid semen was also introduced on a pilot scale. Distribution of bulls and animal health care continued. The Livestock Acts and By-Laws enacted for the first time 1980.

4.2.5 Achievements: Fifth FYP (1981-86)

In 1982, National Fodder Seed Production Centre (NFSPC) was established in Bumthang. The pasture development was supported by supplying free fertilisers, fencing materials, seeds together with extension activities. About 5000 acres of pasture was developed. The Inoculants

Production Centre (IPC) was established at Serbithang. The policy to recover a part of the cost of Mithun bulls (30%) was introduced. Forty two additional veterinary centres, Royal Veterinary Diagnostic Laboratory and Vaccine Production Centre were established (Phanchung *et al.,* 2001).

4.2.6 Achievements: Sixth FYP (1987-92)

During this plan, Milk Processing Unit (MPU) at Bumthang and Tangsibi in Trongsa was established under HAADP. Tala Milk Cooperative Society and the Milk Processing Plant (later Bhutan Dairy Limited) in Phuntsholing were established under HLDP. Nationwide Artificial Insemination program was introduced with the establishment of the Semen Processing Centre at Wangchutaba. Thirty eight AI service centres were established across the country. Pasture development picked up and farmers were introduced to urea treatment of straw and other fodder conservation techniques. The groundwork for the establishment of the Deothang Milk Cooperative Society was initiated in 1991-92. Also in 1992, EEC funded project on strengthening of the veterinary services for Livestock Disease Control was started. The credit facility was introduced with the establishment of Bhutan Development Financial Corporation (BDFC) aimed towards financing rural development (Phanchung *et al.,* 2001).

4.2.7 Achievements: Seventh FYP (1993-97)

This plan was marked by the establishment of Deothang Milk Cooperative Society in 1993. The RNR Extension Project was also established in Bumthang and Trongsa. The Milk Processing Plant at Phuntsholing was privatised. The concern of the native breed was addressed by establishing the National Nublang Breeding Farm in 1994 and preservation of semen from the local Siri cows. The plan also saw technological break-through in collection, processing and distribution of Mithun semen to meet the demand for Mithun bulls. The Contract Bull Breeders Program (CBBP) as a pilot project was started to reduce the pressure on the farms for Jersey bulls (Phanchung *et al.,* 2001).

4.2.8 Achievements: Eighth FYP (1998-2002)

It was during this plan, the concept of small scale backyard dairy farming with improved breeds of cattle and improved management was promoted. It was aimed to give more impetus to market oriented dairy farming. About 1838 backyard farms are expected to be established at the end of the plan period (Phanchung *et al.,* 2001).

4.3 Dairy Production System

The dairy production system can be broadly categorised into two broad systems in Bhutan; transhumance and sedentary (Phanchung, *et al.,* 2001*)* as described below.

4.3.1 Transhumance System

This is a traditional system involving migration within different agro-ecological zones. (Table 4.1). The cattle herds move to the temperate regions in summer (May-June), where they are herded in traditional grazing lands (*Tshamdrog*) which are located at altitude of about 1200-3000m. By late autumn (Oct-Nov), the herds move down to the subtropical areas.

Table 4.1 Agro-ecological zones (AEZ)

Agro-ecological Zones	Altitude range*	Annual rainfall (mm)	Annual mean temp. (^{0}C)
Alpine	3600-4600	< 650	5.5
Cool Temperate	2600-3600	650-850	9.9
Warm Temperate	1800-2600	650-850	12.5
Dry Subtropical	1200-1800	1,200-1,800	17.2
Humid Subtropical	600-1200	1,200-2,500	19.5
Wet Subtropical	150-600	2,500-5,500	23.6

Source: Wangdue (2002)

This traditional system involves share herding. It is practised commonly in Paro and Haa in west, Bumthang in central and Trashigang in eastern Bhutan with a special herding partnership formed between owners from the temperate and subtropical areas. The herd size ranges between 20 heads to a maximum of about 80-100 cattle. The local Siri and the Mithun crossbreds are the predominant breeds. Cattle migration is practised in direct response to shortage of fodder resources and livelihood and income opportunities (Moktan *et al.*, 2006). Reports indicate that migratory trend of herding is declining due to advent of socio-economic changes, manpower shortage, adoption of improved breeds, specialisation in other agricultural activities, access to health, education, market and secondary jobs (Kuensel, 2004; Rinchen, 2004; Norbu *et al., 2003)*).

4.3.2 Sedentary System

The sedentary system of production is most common. Phanchung *et al.,* (2001) considers this system as crop-cattle system. Under this system, the herd size ranges between 2-10 heads kept around the homestead. The cattle depend mostly on the common property resources during the day and brought to the homestead in the night. The milking cows are often supplemented with some home mixed feeds (by-products). In the urban and peri-urban areas with access to market and road connectivity, small scale market-oriented dairying with Jersey cows are raised on improved pasture and under stall feeding conditions.

He reported that of the 85 percent of the sampled sedentary herds, 65 percent practiced day-out and night-in system and about 35 percent followed stall-feeding.

4.4 Livestock Breeding Policies

Luethi (1999) reports that during the late seventies, the government policy was focussed on establishing and strengthening government farms to produce quality breeding bulls and heifers for distribution and meet requirements for livestock products near townships (AHD, 1976). Breedable cows with 50-75 percent exotic inheritance were provided to farmers. Selected cross-bred bulls were distributed to farmers in remote areas and AI introduced in government farms, near towns and accessible areas. Government advocated farmers to maintain herd strength to match resources enabling crossbreds to express its genetic potentials.

During late eighties and early nineties, the livestock breeding policy focussed more on maintaining BS and Jersey as the main exotic breeds for crossbreeding with Siri (AHD, 1986a). BS was supplied to the farmers in the high altitude areas of Bumthang, Gasa, Ha, Trongsa and Wangdue whereas AMZ introduced on pilot basis in few areas of the sub-tropical belt. The exotic inheritance of progenies was kept at 50 percent. Fifty percent bulls were used for inter-se

mating. Pure Jersey bulls (100%) and semen was used on local cows. Tarentise breeding trial was used to widen the availability of exotic breeds. Tri-hybridisation (Mithun-Jersey-Siri) was done get a stable dairy breed with a good degree of hybrid vigour and to achieve satisfactory performances and good adaptability under local management conditions. Selective breeding of pure Siri was encouraged in the Siri breeding tracks of Ha and Samtse. Mithun breeding continued but without subsidy support. Siri priority areas of Ha and Samtse were given attention for selective breeding and breed conservation. Liquid nitrogen plant and frozen semen bank was set up in order to up-scale use of AI. Improved pasture and fodder trees were propagated to meet higher feed requirements of improved cattle.

Areas specific and geographic distribution was taken into consideration for the planning of livestock development schemes during the eighth FYP. To strike a balance between fodder resources availability and cattle population, reduction of unproductive livestock population was encouraged. To sustain food security, the sub-sector had to support the RNR system concept. Marketing and processing remained in the private sector with emphasis in potential pockets near urban centres (MoA, 1995).

4.5 Livestock Products

Kuensel (1996) reports, animal products in various forms (milk, cheese, butter, meat, draught, manures, fibres and hides) contribute to 30 percent of the total agricultural value. IRRI (1995) reported about 43.5 percent of the contribution to national GDP is made by livestock products and outputs. To achieve self-sufficiency in livestock and livestock products has been one of RGOB's national development objectives since fourth FYP onwards (Mack and Steane, 1996).

Milk

Milk and milk products are important in traditional Bhutanese diets. However, there is still a deficiency of this product in Bhutan (Mack and Steane, 1996). Milk is often processed to make butter and soft cheese. Even today, milk is consumed commonly in the households in the form of sugar milk tea but still rarely sold.

Butter and cheese

Butter has always been in high in demand in Bhutan and still has not reached self-sufficiency and meets the deficit with import of Amul butter from India (Guenat, 1991). Baumgartner (1984) reported that beside the use of fresh butter in making butter tea and lighting butter lamps and for making *torma.* Today, butter is replaced by imported vegetable fat (Guenat, 1991). Butter was used widely to pay tax levied by the royal family, the aristocracy and the clergy prior to 1968 (Ura, 1995). RNR-EP (1994b) reported that butter is used still to make payment for the natural service in the local breeding practices with cattle or yak bulls. Consumption of butter is regarded a sign of wealth due to its high value (Baumgartner, 1984b). It is not uncommon in Bhutan to barter butter with other products like cereals (Guenat, 1991) and chillies (RNR-EP, 1993a). Butter is sometimes preferred to *datshi* for sale as it takes less time for processing (RNR-EP, 1993a). *Datshi* is the main ingredients for *Emadatshi* that most Bhutanese relish as curry.

Draught

For most farmers in Bhutan draught power can be a main reason for keeping cattle (NES, 1992). Therefore, suitability of cross-breeds for draught is often considered in the breed

acceptance. MoA (1995) estimated yearly draught input in the country amounting to a value worth of Nu. 250-300million which is ignored as it is not monetised. Of a 45 days ploughing season for 375,000 acres of arable land available in Bhutan, not less than 25,000 oxen pairs are required to meet the draught requirements. Fifty one percent of 132 farmers interviewed in the Punakha-Wangdue valley wanted to increase the number of bullocks owned due to shortage of draft bulls (Wageningen, 1986).

To allow proper development of body and hump in Siri, draft bulls are usually not castrated till the age of five years (RNR-EP, 1993a). Therefore, animals unwanted for reproduction but used for draught are often found strong and better that hindered breeding programmes.

Manure

In Bhutan, places where crop production is predominant manure is regarded as the second most important livestock product after draught power, milk production ranked last (RNR-EP, 1994b). As for draught power, manure production and use is difficult to quantify in terms of monetary benefit.

FYM is produced by livestock when it is kept in enclosures. Often livestock is tethered in crop fields after harvest to provide nutrients for the next harvest. Additional nutrients are provided through bedding materials, leaf moulds and fertilisers (Luethi, 1999).

Meat

In Bhutan, generally farmers do not slaughter animals due to religious sentiments attached to killings but consume meat from dead carcasses (Ura, 1995). Mack and Steane (1996) reported that Bhutan is likely to face difficulties in achieving self-sufficiency in meat production due to the religious beliefs. Despite the taboo against killing, the impact of meat production on the household budget can be substantial due to the high meat price.

4.6 Dairy Breeds

4.6.1 Siri

Denzler (1994c) appreciated Siri for its easy maintenance and handling, modest feed requirement and draughtability. Resistance to diseases, high butter fat content (4.5% - Louthi, 1998) and active behaviour are other qualities (RNR EP, 1994a). Low milk production (471.8 - Dorjee, 1997), late maturity (with 48 months age at first calving - (Buergin, 1982b), long calving interval (12-79 months - Denzler *et al., 1993)*, impaired fertility and delayed conception are reported by Tshering and Acharya (1995). Currently Siri represents 65 percent of total cattle population in Bhutan (Fig 7).

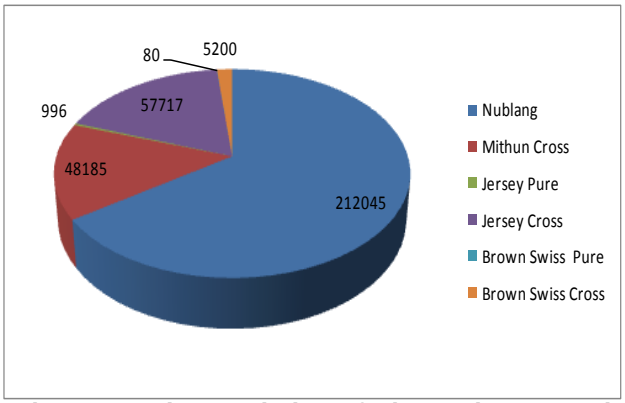


Fig. 4.1 Cattle population of Bhutan (DoL, 2008)

4.6.2 Mithun Pure and Crosses

These breeds are known for their good foraging ability, mothering instinct and longevity (CLSD, 1996a). Mithun is used for cross-breeding with Siri cows. The F1 off-spring of Mithun and Siri; Jatsha, the male is preferred for draught (Tshering, 1996) and female Jatsham appreciated for high butter content (8.6 percent - Hickman and Tenzin, 1982c) in the milk. The Mithun population is estimated about 15 percent of the total population in 2008 (Fig. 4.1).

4.6.3 Jersey Pure and Crosses

The crossbreeding programmes implemented since early seventies led to the propagation of 996 (0.3%) Jersey pure and 57,717 (17.7%) Jersey crosses up till 2008 (Fig. 5) Jerseys are known for their early maturity, shorter calving interval and higher milk production (Denzler, 1994c) with docile character easy to handle. Despite the above facts, Jerseys are highly susceptible to diseases, high mortality, demands better feeds and fodder (RNR EP, 1994a) and not suitable for grazing in difficult terrain conditions. The daily milk production under farmers' conditions ranged between 4-10litre/cow (Dorji *et al.*, 2007; Sherpa and Wangchuk, 2000; Sharma, 2007). Jerseys are preferred for stall-feeding conditions over other breeds due to the small body size (Sherpa and Wangchuk, 2000). Even farmers in Bumthang prefer Jersey over BS today (Dorji *et al.,* 2007*).*

4.6.4 Brown Swiss Pure and Crosses

Rearing of BS is limited to Bumtang, Trongsa, Wangdi, Haa and Gasa. There are only about 80 (0.02%) BS pure and 5200 (1.6%) BS crosses as per the Livestock Statistics, 2008 (Fig. 4.1). About 3000 BS population is found in Bumthang. The average milk production of BS crosses is estimated at 3litre (Dorji *et al., 2007)* to 4.1litre/cow/day (AHD, 1992). Farmers are finding uneconomic to manage BS due to the large body size and low milk production compared to Jersey.

4.7 Dairy Performances in Bumthang

4.7.1 Cattle Population and Breeds

The cattle population of Bumthang district in 2008 was 10884 (DoL, 2008). The milk breeds comprised of Siri, Mithun, Jersey and Brown Swiss (Fig 4.2). The Siri was the dominant breed. However, the population trend over the last few years showed increase in cross-breeds population. The marked increase in crossbreed population is mainly due to setting-up of milk processing units making access to milk market locally.

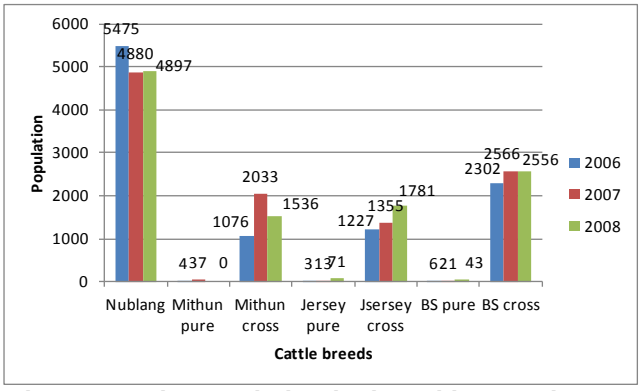


Fig. 4.2 Cattle population by breed in Bumthang

Total milking cows in Bumthang in 2008 was 2383. The milk production was 1437MT (Fig. 4.3) (DoL, 2008). Each geog produced roughly 1000 litre of milk per day, which means about 4000litres of milk is produced on daily basis by the dairy farmers in

Bumthang. There is drastic increase in milk and milk products in Bumthang. The increasing trend of milk production is evident from Fig. 4.3. The per capita consumption of milk in Bumthang (86.6%) is one of the highest in Bhutan.

4.7.2 Dairy Products

Milk is mostly processed into butter and cheese. In 2008, Bumthang had produced 1437MT of milk (Fig. 4.4), 45MT of butter ad 248MT of cheese. From the total volume of milk, butter and cheese produced, only small volume is sold and rest is used for home consumption (Fig. 4.3). Sale of fresh milk is not common except for the farmers with access to urban and peri-urban markets. Chokhor geog has the highest production of milk followed by Chumey, Ura and Tang.

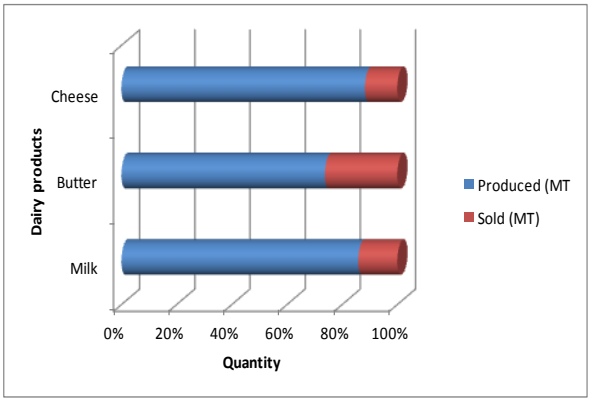


Fig. 4.4 Production and sale of products

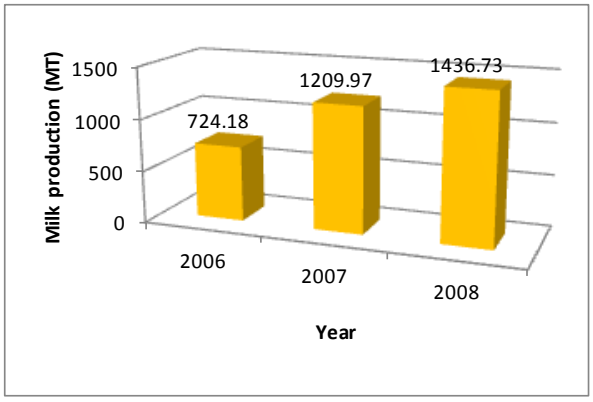


Fig. 4.3 Milk production in Bumthang

5. RESULTS AND DISCUSSIONS

5.1 Results

5.1.1 Dairy Farmers' Groups and Non-group Members

5.1.1.1 Farmers Groups' Inventory

The District Livestock Officer informed that there are seven dairy farmers groups in the four *geogs* of Bumthang with 483 farmers as members, which is roughly 20 percent of the total households (Appendix 4). Of the five groups, only three groups, one each from Chokhor, Chumey and Tang was covered as focussed group for this study (Table 5.1). Tang Community Welfare Association Dairy Farm has 244 members from 15 sub-blocks but only 10 members were actively supplying milk to the MPU. Despite being the oldest farmers' group, the farm remained non-operational and revived from 2009.

Table 5.1 Dairy farmers' groups in Bumthang

Block	Group's name	Year established	Total members	Active members	Villages covered
1. Chokhor	Chokhor Gonor Gongphel Chithuen Tsogpa	1993	50	50	12
2. Chumey	Chumey Gonor Lhothuen Tshopa	2008	30	30	3
3. Tang	Tang Community Welfare Association Dairy Farm	1998	244	10	15

Survey, 2010

5.1.1.2 Literacy

Majority of the respondents who were the members of the dairy farmers groups including non-members were illiterate (Fig. 5.1). There was exceptionally few farmers from Chokhor who were semi-literate with some level of reading and writing ability in *Dzongkha*.

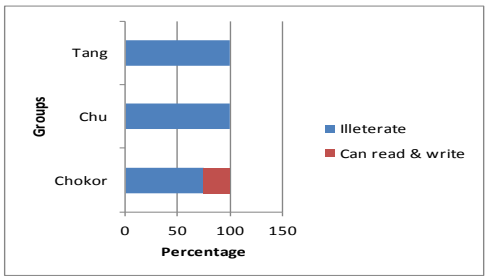


Fig. 5.1 Farmers' literacy

5.1.1.3 Milking Cows

Most of the respondents from the dairy farmers groups had about three milking cows (Fig. 5.2). One of the non-group farmers from Chumey had 32 milking cows.

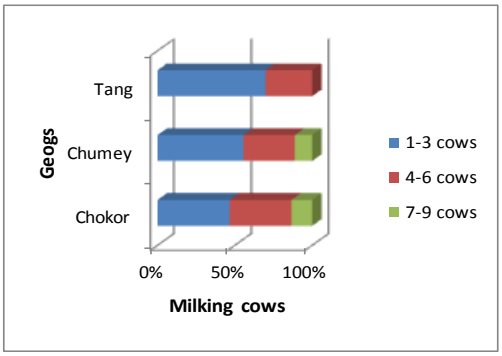


Fig. 5.2 No. of milking cows

5.1.1.4 Milk Production and Delivery

Milk production and supply per household to the MPUs ranged between 3-20litres/day (Fig. 5.3). Milk was delivered only once a day in the morning between 8-9.30AM. It was also common among all milk producers to accumulate milk produced in the evening and deliver to the MPU the next morning. In all three blocks, milk is collected and transported by a hired van. Only for members close to the MPUs delivered the milk themselves. The time taken to collect and reach milk to the MPUs is less than 30 minutes.

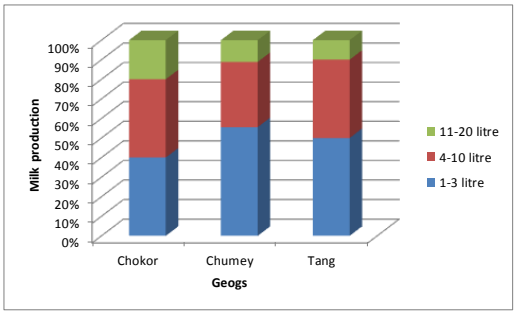


Fig. 5.3 Milk production and supply

5.1.1.5 Breeds

The common dairy breeds the farmers groups members have are Jersey and Brown Swiss Crosses and Thrabam. About 41 percent each of the dairy cattle comprised of Jersey and BS crosses and rest is Siri (Fig. 4.2).

5.1.1.6 Potentials of Non-group Members

Most of the non-group dairy farmers are capable of producing more milk with breed and fodder production improvement like dairy farmers' groups members. They also owned improved pasture land (1-6 acres) and community pasture (*Tshamdrog*). Few non-members had as many as 32 milking cows and were supplying milk to the MPU as informal member. In many ways they were capable of producing and supplying milk as other formal farmers' group members.

5.1.2 Milk Processing Units

All the three MPUs made more or less the same products (Table 5.2). However, the volume of production differed mainly due to differences in milk supply from their members (Table 5.3). These MPUs have the basic machineries and processing equipment in place (Appendix 6).

Table 5.2 Establishment of MPUs and products made

Group's name	Year estd.	Block	Products made
Chokhor Gonor Chithoen Tshogpa	2004	Chokhor	Milk, soft cheese & butter
Chummey Gonor Lothuen Tshopga	6/2008	Chumi	Milk, soft cheese & butter
Tang Dairy Farmers Welfare Association	8/2009	Tang	Gouda, soft cheese & butter

Survey, 2010

Table 5.3 Processing and volume of production by MPUs

Group	Daily milk received (litre)	Milk processed (litre)	Total milk sold (litre)	Total soft cheese (ball)	Total butter (kg)
Chokhor*	620-650	620-650	-	110	33
Chummey	130-150	110-120	30-40	50-70	10-11
Tang	210	110-120	-	80-90	9-10
* 400litres processed into butter and butter milk is sold; remaining 250 litres processed into soft cheese					

Survey, 2010

5.1.2.1 Marketing of Processed Products

The combined production of three MPUs was 275MT of milk, 74,620 balls of cheese and 15.5MT of butter annually worth Nu. 113.34 million (Table 5.5). The products (milk and processed milk products) were sold from the MPU. Most often the demand for soft cheese and butter were placed in advance and the customers come to pick themselves. In few cases, the customers from the nearby town come to buy. Most of their customers comprised of monastic schools, hoteliers, shopkeepers and travellers. The production and processing was about 50 percent less in winter due to cold weather and fodder shortage. The production capacities of three MPUs for summer and winter are presented in Table 5.4.

Table 5.4 Milk, cheese and butter productions

Group's name	Milk (litre)		Soft cheese (ball)		Butter (kg)	
Chokhor Gonor Gongphel Chithuen Tsogpa	Summer[1]	Winter[2]	Summer[1]	Winter[2]	Summer[1]	Winter[2]
	650	320	110	50	33	20
Chumey Gonor Lhothuen Tshopa	150	80	70	40	11	6
Tang Community Welfare Association	210	100	90	50	10	5
Production/day	1010	500	270	140	54	31
Production/annum	183820	91000	49140	25480	9828	5642
Annual income (Nu)	4595500	2275000	1228500	637000	2457000	141500

Survey, 2010 (1-182 days; 2-182 days)

5.1.2.2 Price Fixation

The price of milk and processed products for sale were fixed jointly by the board representatives and members. Prices were revised based on the need to meet the expenditures, rise in workers payment and rise in prices in the shops. The selling prices for milk, cheese and butter were same in all three MPUs except the milk price paid to the members varied. The milk prices in Chumey, Tang and Chokhor are presented in Table 5.5.

Table 5.5 Prices of milk and milk products

Groups	Buying Price	Selling Price		
	Farmers' milk price (Nu/litre)	Milk (Nu/litre)	Soft cheese (Nu/ball)	Butter (Nu/kg)
Chokhor	21	25	26	240
Chummey	16	25	25	250
Tang	18	-	25	250

Survey, 2010

5.1.2.3 Expenditures

The operational costs incurred in the MPUs were purchase of firewood and spare parts, payment of electricity and transportation charges, repair/maintenance of machineries and workers payment. The monthly recurrent costs was found between Nu. 24000 and 33500/month for functioning day-to-day activities in the MPUs (Table 5.6).

Table 5.6 Expenses of MPUs

Items	Chokhor	Chumey	Tang
Firewood (Nu/month)	6300	6300	6400
Electricity (Nu/month)	1000	800	900
Transportation (Nu/month)	10000	6000	6000
Worker's payment (Nu/month)	12100	6000	9000
Repair & spare parts (Nu/month)	5000	5000	5000
Total/month (Nu.)	33500	24100	27300

Survey, 2010

5.1.2.4 Quality Control

The Bhutan Agriculture and Food Regulatory Authority is the sole authority in controlling the quality of milk and milk products. The concerned agent's staff made visit to the MPUs and monitored the quality of products. They were also provided training to the workers in the MPUs enabling them to produce clean dairy products. However, the respondents felt that the services provided by BAFRA were inadequate and in many instances inefficient due to lack of required competencies.

5.1.2.5 Problems

All the three MPUs had expressed concern for insufficient milk for the processing units. The reason they stated for low milk procurement were less members enrolment in the groups limited by distance, remoteness and difficulties in collection compounded by high transportation cost. Due to low volume of milk received by the plant, the MPUs were unable to fulfil the demand of the customers for milk, soft cheese and butter. The members also stated fluctuation of milk production in winter due to cold weather and fodder/feed shortage. The milk supplies from the regular members decreased by 50 percent in winter (Table 9).

5.1.2.6 Experiences of MPUs' Workers

All the workers in the MPUs in Bumthang had the working experience of processing gouda and soft cheese and butter with the knowledge of operating simple machineries and equipment for making those products. They were also able to conduct basic fat and SNF test for milk. The board representatives and some of the members were knowledgeable on dairy co-operative, its potentials and benefits. Series of workshops and farmers meeting on co-operative were conducted by the District Livestock Office. Besides, efforts were also made to take some of the board members on study tours to the neighbouring Indian State of Gujrat to see and familiarise themselves with the various activities carried out by the Amul in Anand, Gujrat. The board representatives had also briefed all their members on their return on dairy cooperative activities, benefits, impacts and potentials based on their observations and experiences.

5.1.3 Potentials of Dairy Co-operative in Bumthang

On the potentials of dairy co-operative, the survey findings came out with ten possible potentials of the dairy co-operative for Bumthang. The potentials were asked to rank in the order of importance (Appendix 4). Each of the potential of dairy co-operative was briefly elaborated and supported by reasons as to why those were potentials for the respondents. Twenty seven (77%)

respondents strongly agreed and eight (23%) agreed that dairy co-operative can bring positive changes (Table 5.7). None disagreed.

Table 5.7 Positive changes expected from dairy co-operative

Do you expect dairy co-operative to bring positive changes?	Percent (n=35)
1. Strongly agree	77
2. Agree	23

Survey, 2010

Twenty (57%) respondents strongly agreed dairy co-operative can help them bring positive changes (Table 5.8). They think that changes are beneficial in terms of the following potential factors (10 factors) of dairy co-operative as explained one by one below (appendix 4):

Table 5.8 Beneficial changes

Are these changes beneficial?	Percent (n=35)
1. Very much beneficial	57
2. Beneficial	43

Survey, 2010

The Chi square and Kruskalwallis Tests performed on the benefits of positive changes (potential factors) of dairy co-operative and their benefits did not yield to any significant differences (Appendix I). It was mainly due to the fact that there were not many samples (n=35) and the respondents opinions were biased more in favour of the changes and benefits of the dairy co-operative as shown in Table 5.7 and 5.8.

5.1.3.1 Products Diversification

Products diversification had topped the priority list of dairy co-operative's potentials. The opinion shared by the respondents (n=35) made it clear that product diversification is necessary to make efficient use of available raw materials. The respondents' rationale for this was that making mere products like cheese and butter was not enough to compete in the national market flooded with cheap Indian imported dairy products and to be sustainable. Also it is not beneficial to keep producing same products that all farmers are capable of producing traditionally. To capture the national market, the dairy co-operative needs to be capable of producing better or similar products available in the Bhutanese market and customers are familiar of their tastes and prices. They pointed out that developing niche products for the niche market is also an options

5.1.3.2 Income generation

Income generation was ranked second. Speaking from their present experiences, the respondents expected more opportunities for dairy co-operative than the existing MPUs. as it provided those cash revenues from the regular sale of milk to the MPUs. Despite the income generated from the products sales, the co-operative can come up with various schemes like loan, self-help and inputs supply to the members.

5.1.3.3 Quality Enhancement

The reasons the respondents gave for a need to enhance product quality was to capture the national market from consumers' perspective and food safety with the assistance of competent persons from relevant institutions or programs.

5.1.3.4 Poverty Reduction

Like the existing MPUs, dairy co-operative can continue to offer a regular place for sale of milk for the producers locally, the respondents think. Dairy co-operative can provide platform for even the pro-poor and marginalised farmers to grow through their unfailing supports, economically and technologically. Earning small income regularly through the sale of milk to the co-operative could help such farmers to rescue from poverty and rise socio-economically and technologically in the long run.

5.1.3.5 Employment Opportunity

Currently, MPUs had employed 2-5 persons as workers (1-2 people) and board representatives (3 people - Chairman, Secretary and Treasurer) for running the MPUs and marketing of the products. The respondents expected that having dairy co-operatives in all dairy potential areas in Bhutan can create more employment opportunities than the MPUs.

5.1.3.6 Expand Market

The respondents hope that instituting dairy co-operative offer dairy farmers with worry-free production and supply of milk. It provides assured market for even greater volume of milk than they used to produce for the MPUs. Secondly, the dairy co-operative can cater to local, regional and national market's need for milk and milk products with higher production volumes and at affordable prices.

5.1.3.7 Capacity Building

The respondents emphasised on the need to up-grade their working knowledge and skills on improved dairy husbandry and dairy technology from time to time. It is essential for the members to acquire the required knowledge and skills for the production of clean milk and milk products through regular training and educations. Besides, the members also wanted to be educated on various information on products, processing, prices, customers' needs, government policies and any upcoming changes and decision to be made.

5.1.3.8 Packaging, Labelling and Branding

The respondents explained that the dairy products produced by the farmers lacked packaging. They pointed out, absence of proper packaging, labelling and branding is a big set-back for the Bhutanese dairy products today. There is no brand and level designed to suit the requirement for product standardisation. The new co-operative is expected to introduce new but appropriate packaging technology to suit the needs of the Bhutanese products and customers. The introduction of packaging, labelling and branding could be one of the key initiatives of the up-coming dairy co-operative in Bhutan.

5.1.3.9 Offer Equal Opportunity

Looking back the way present dairy farmers' groups were operating; there were many potential dairy farmers left out of the groups. This strongly indicated that they were not given equal opportunity by the existing dairy farmers' groups. Therefore, the respondents stressed the need for such farmers to be members of the dairy co-operative irrespective of distance and difficulties. The respondents felt the dairy co-operative can provide equal opportunity to all those who are interested to be members.

5.1.3.10 Economic Growth and Development of Dairy Sector

The respondents were hopeful that the dairy co-operative if instituted can add to the growth of the dairy sector with first ever dairy co-operative in Bhutan. Also instituting a new dairy co-operative is a milestone in the history of dairy development in Bhutan. The success of this dairy co-operative can be propagated in other dairy potential districts through the experiences gained.

5.1.4 Facilitating Factors

Five pertinent factors that facilitate dairy co-operative development were emphasised by the respondents supported by their justification. The each factor is elaborated as under:

5.1.5.1 Feasibility

The dairy co-operative is feasible as all blocks. All the blocks have access to road and transport network. Villages are connected with electricity and telecommunication facilities. All the four blocks have block extension centres that render uninterrupted support services. Further, the block extension centres are backed by Research and Development Centres, Central Breeding Farms, Feed and Fodder Development Programs and Credit institutions for loan. The presence of functional dairy farmers' groups; equally interested non-members and four operational Community Milk Processing Units and one private Milk Processing Unit make dairy co-operative development obviously feasible. More opportunities are seen for the development of improved pasture with the policy introduction of leasing government reserved forest land. The door-to-door mobile AI service in all the *geogs* further contributes towards dairy intensification. This was also evident from the fact that all most all respondents agreed that dairy co-operative is feasible in Bumthang since they are aware of the development programmes, facilities and supports they have. (Table 5.9).

Table 5.9 Feasibility of dairy co-operative in Bumthang

Is dairy co-op feasible in Bumthang?	Percent (n=35)
1. Strongly agree	92
2. Agree	8

Survey, 2010

5.1.4.2 Favourable Policy and By-laws

Seventy one percent of the respondents thought that legal protection of dairy co-operative is essential. All 35 respondents (100%) felt that by-laws, rules and regulations are useful to guide the members during the time of conflicts and misunderstanding (Table 5.10). To curb such problem, the respondents emphasised the need to have the co-operative's by-laws, rules and

regulations in place and enforce it when necessary. Respondents felt that co-operative policies and principles will assist to form a new dairy co-operative.

Table 5.10 By-laws, rules and regulation

Are by-laws/rules and regulations useful to guide and direct the members?	Percent (n=35)
1. Yes	100
2. No	0

Survey, 2010

5.1.4.3 Members' Working Experiences

About 25 (71%) respondents felt that the members of the existing farmers' groups have the experiences and commitment. Members with such experiences and commitment will contribute immensely towards development of new dairy co-operative through sharing of experiences among members, training new members and taking the lead in terms of managing day-to-day activities (Table 5.11).

They emphasised that the working experiences of the members are an added advantage in instituting dairy co-operative. It would facilitate smoother transition from the groups to co-operative. Other experienced members will be equally instrumental in facilitating the change from groups to co-operative.

Table 5.11 Members' commitment and experiences

Are there members with such commitment and experiences?	Percent (n=35)
1. Yes	71
2. No	29

Survey, 2010

5.1.4.4 Members' Interest and Motivation

The members' motivation to formation of new dairy co-operative emerged important as per the responses of the respondents. Eighty percent of the respondents were motivated to have new dairy co-operative instituted. The respondents (83%) also showed there is a desired level of attitude, interest and co-operation among members (Table 5.12).

Table 5.12 Members' motivation

Are the members motivated?	Percent (n=35)
1. Very motivated	80
2. To some extent motivated	20
Are there the desired level of attitude, interest and cooperation?	
1. Very much	83
2. To some extent	17

Survey, 2010

5.1.4.5 Dairy Co-operative Models

On the main challenges to setting-up dairy co-operative, the respondents remained divided (Yes-17, No-18) to have or not to have milk co-operative at village or community level (Table 5.13). Most members expressed their concern to retain the present MPUs as milk collection centre (MCC). If dairy co-operative materialises, a new processing plant with full set of equipment and machineries can be located in the district headquarter. It will take up processing, packaging and distributions functions.

Table 5.13 Need for a village level milk co-operative

Is there a need for village or community level milk cooperative?	Percent (n=35)
1. Yes	49
2. No	51

Survey, 2010

5.1.5 Challenges

The respondents highlighted five main challenges with the rationale as under:

5.1.5.1 Sustainability

The sustainability of the dairy co-operative was uncertain to most respondents. About 19 (54%) respondents were not comfortable when the issue of sustainability was questioned since the existing members are not capable of supporting the new dairy co-operative financially and fund support from external donors and RGoB is uncertain (Table 5.14).

The existing dairy farmers' groups speaking from their past experiences said the co-operative needs to be sustainable economically through the spontaneous supply of the raw materials and making profits. It needs to be viable economically. The other factors, which they considered important was to look at the production aspects of the raw materials, costs of production and market for the products.

Table 5.14 Sustainability of dairy co-operative

Would dairy co-operative be sustainable?	Percent (n=35)
1. very much	46
2. to some extent	54

Survey, 2010

5.1.5.2 Inputs Supports

Cent percent (n=35) of the respondents opted for inputs support as one of the roles of the dairy co-operative (Table 5.15). The members expressed their concern on the unavailability and inaccessibility of dairy inputs based on the present experiences. Input like Karma Feeds was inaccessible when they need it most. Even if it was available through the agents, it was either expensive or insufficient. Such input can be made available through the co-operative. Members need for high producing dairy breed like Jersey was difficult to procure. The Jersey Breeding Farms are not able to fulfil their demands. They have to buy from the farmers from other

districts, which they said the quality of Jersey was not up to their expectation yet had to pay high price. The co-operative can take a role of procuring and distributing inputs needs of their members can reduce transaction costs. The list was long. Therefore, the upcoming dairy co-operative needs to consider what best could be done for the benefit of the members within their capacities.

Table 5.15 Inputs support as dairy co-operative's role

Should inputs need and support functions be part of co-operative's role?	Percent
1. Yes	100
2. No	0

Survey, 2010

5.1.5.3 Funds for Developing Infrastructures

Development of infrastructures for the new dairy co-operative is beyond capacity of the farmers. Therefore, there is no expectation of financial assistance that was evident from "zero" response to "yes" (Table 5.16)

The members pointed on the needs to have separate structures to house the dairy co-operative office, processing equipment and machineries at the district level. Therefore, for the initial inception of the new dairy co-operative, need for external fund is important. Outsourcing of funds for the construction structures, purchase and import of all necessary equipment and machineries is necessary. External fund support will be required till the time the dairy co-operative is capable of generating profit and sustaining itself. The possible fund sources the respondents suggested were to look for external donors (GoI) or the RGoB.

Table 5.16 Fund sources

Are there fund sources for the dairy co-operative?	Percent (n=35)
1. Yes	0
2. No	100

Survey, 2010

5.1.5.4 Enhance Optimum Production Volumes

On the volume of production required for the dairy co-operative, cent percent responded saying that critical volume of production is there and can be maintained (Table 5.17). The three MPUs have maintained about 1000litres of milk on daily basis. Thus, the respondents even guaranteed a minimum of 1000litres of milk for the co-operative on daily basis though the higher side was difficult to predict for them (Table 5.17).

The main idea of instituting dairy co-operative they think should be to enhance optimum milk volumes by increasing members irrespective of the volume of milk they produce. Therefore, the key to achieve this is to have as many members as possible those who produce milk and can supply it to the co-operative.

Table 5.17 Volume of production capacity

Is there a critical volume of production from the members?	Percent (n=35)
1. Yes	100
2. No	0
How much? (in litre/day)	
1. 100-500	
2. 501-1000	63
3. 1001-2000	37

Survey, 2010

5.1.5 Incentives Schemes in Warana Co-operative Milk Union

The Warana Co-operative Milk Union at Kollapur, Pune was instituted in 1968. The members are mostly small scale farmers keeping 2-3 milking animals. The milking animals include buffalo (Murrah, Meshana, Sruti, Pandharpuri, Non-descript breed) and cattle (Holstein Friesian and Jersey Crosses). There are about 2000 employees generating an annual turn-over of 5000 million per annum.

Potentials

The potentials of dairy co-operative are immensely huge provided there are no political interferences. It makes market available for the small scale farmers throughout the year. The three-tier structure (State, District and Village) seems to be important for imminent success of dairy co-operative. The dairy co-operatives can provide most necessary support to their members in terms of mitigating basic inputs needs to boost milk production on cost sharing basis between the district and village co-operative. From the Warana experiences, having too many village co-operatives become unmanageable. Also from their experiences, one co-operative be give birth to another co-operative.

Roles

The primary aim of the dairy co-operative is to help farmers enhance production and generate cash income. The dairy co-operative is also mandated to provide support and input services for their members to revamp milk production.

Incentives Schemes

The Warana Milk Co-operative has developed number of incentives for the milk producers, which served as the centre of attraction and motivation for fulfilling members' obligation with greater interest. The incentives include:

- Special package (all food stuffs required for making different sweets and home products with spices chilli powder) for the festival (Dewali) developed and offered on annual basis
- Cash awards for producing milk qualitatively and quantitatively
- Free flour milling service

- Producers' Provident Fund Scheme (deduct some about 30 paise/litre) and add 30paise by the co-operative and deposit in the account of scheme holders (members)
- Tractors for works at farmers' place intended to enhance milk production with only fuel costs borne by the users
- Natural calamities relief fund (flood, road and fire accidents, lightening)
- Dairy animals insurance
- Food aids to the farmers and animals affected by calamities.
- Cattle exhibition with various stalls useful for the dairy farmers
- Milk competition (rewarding the highest producing animals in 24 hours)
- Payment of rebate on milk supplied by producers
-

Working Environment

The dairy co-operatives adhere to the co-operative principles that are further strengthened by the Co-operative Acts and By-laws. Therefore, the members have the right to complain anyone in the board for any problem (members are powerful). The success of the co-op largely depended on dedication of board representatives and members. Further, attitude, cooperation, and interest of the members was needed to increase greater sense of attachment, ownership and responsibility with the village co-operatives. The coordination mechanism (meeting and workshop) of all stakeholders are important to share information and have common consensus of any changes to be incorporated and/or actions to be taken. The frequency of such meeting and workshop depended on needs. However, one annual meeting is organized yearly.

5.1.6 SWOT Analysis

SWOT analysis led to an understanding that there is more strength and opportunities (Table 5.18). The dairy co-operative could capitalise on these strengths and opportunities to exploit the potentials. The weaknesses and threats are not many and not strong enough to hinder the dairy co-operative development.

Table 5.18 SWOT analysis

Internal	**Strength** - Dairy priority area - Five MPUs available - Presence of farmers' groups - Access to road and transport (all four blocks) - All blocks connected by electricity and telephone - Centrally located district - Tourist destination - Government land available on lease for pasture development - Presence of dairy sector development programme offices	**Weakness** - Social structure (individualist) - Traditional farming attitude - Major diseases and mortality
External	**Opportunity** - Employment	**Threat** - Glacial outburst

	- Product market - Donors attraction for fund support - Export market for niche products	- Competition with imported dairy products from India

5.1.7 Force Field Analysis

The force field analysis done to understand the pressure for and against dairy co-operative development confirmed that the forces for change outweighed the forces against change (Fig. 5.4). There are more forces supporting the change than opposing. Based on this analysis, a decision is reached that dairy co-operative is feasible in Bumthang.

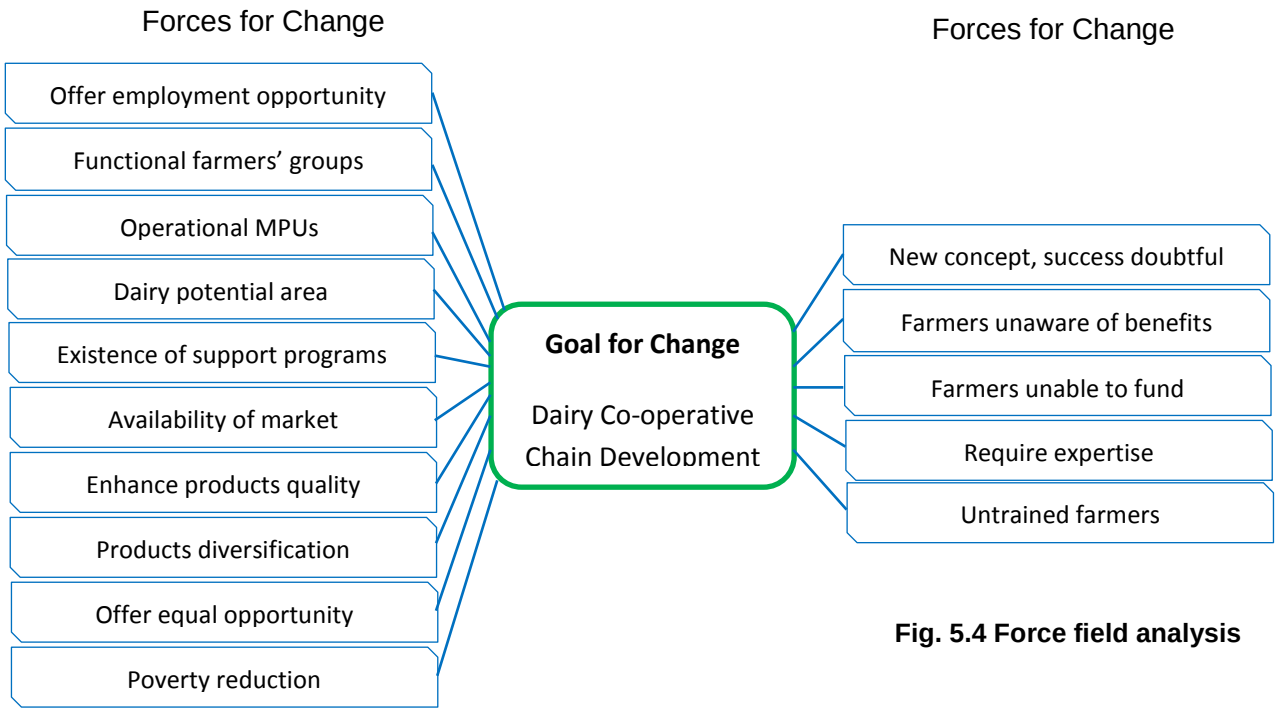


Fig. 5.4 Force field analysis

5.1.8 Analysis of existing Dairy Chain

Bumthang does not have a formal dairy chain (Fig. 5.5). Therefore, the actors and supporters in the chain is not organised systematically and disintegrated. The chain has weak links. The non-member dairy farmers were left out and operate in isolation. There was no established linkage between the farmers' group and non-group farmers. They were largely backward and traditional in nature. The chain was incomplete in the absence wholesalers. All actors and supporters were individualistic. There was no vertical and horizontal integration among actors in the chain. Even the supports provided by the supporting institution were not coordinated and the roles and responsibilities were unclear and divided with lot of duplications. The dairy commodities on which the chain worked is inadequate with large demand gap. The gap is met with import from

India as shown in Fig. 5.5. The import of dairy products was worth Nu. 169.6 million in 2006-07 (PPD, 2008).

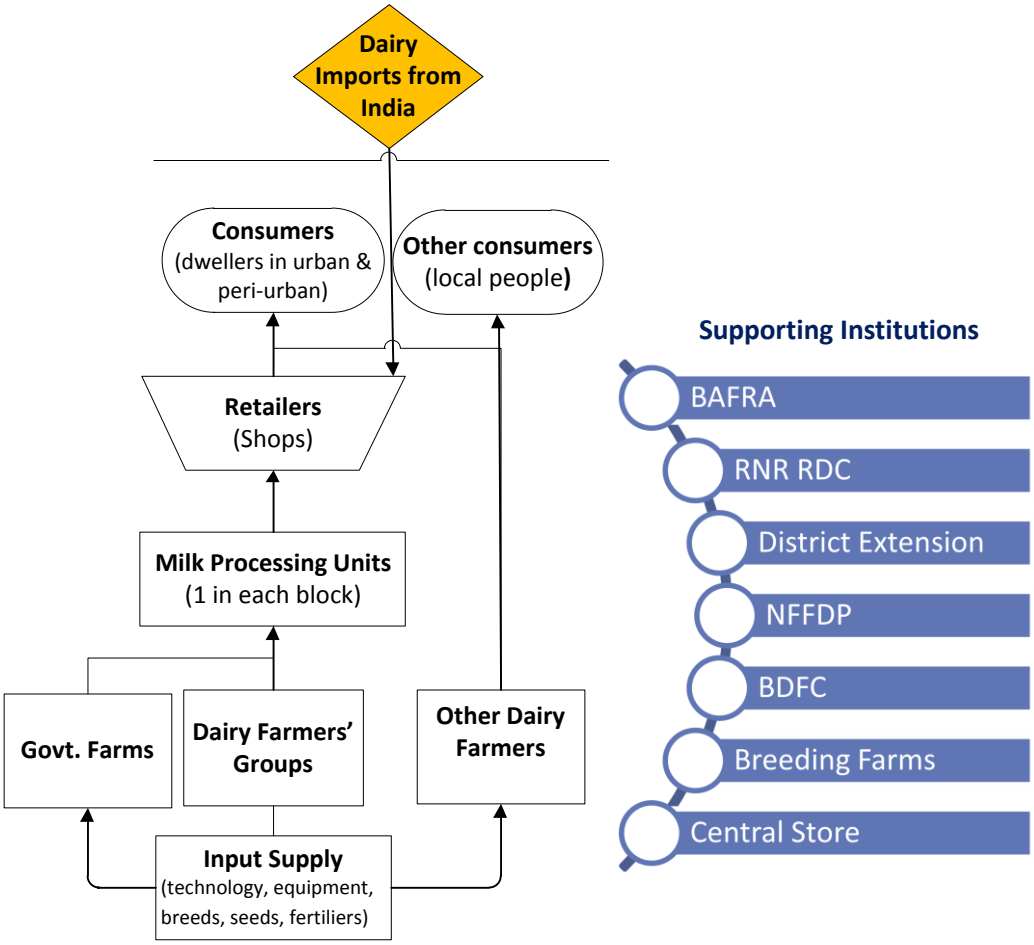


Fig. 5.5 Existing dairy chain of Bumthang

5.2 Discussions

The discussions are made on pertinent issues from literature reviews and field study findings. It is organised according to the chapter settings.

5.2.1 Definition of Co-operative

The co-operative defined by International Co-operative Alliance is a complete one. ICA has looked co-operative as an autonomous association of person but in this case dairy farmers unite voluntarily on their own interest and free will. The farmers form association to meet their common economic and socio-cultural needs. Further, the ICA has put beautifully that an association is jointly owned by the members and democratically controlled. Though there are many definitions defined by different authors and institutions yet it is centred on the same logic and theme. Thus, ICA's definition is appreciated best.

5.2.2 Working Principles of Co-operative

It is known that co-operative is founded on the doctrines of democracy, equality, equity, self-help, self-responsibility and solidarity with the members believing in the ethical values of honesty, openness, social responsibility and care for others. The seven overarching principles of co-operatives framed and modified several times by ICA suit the needs of all. The seven principles (Sub-heading 3.1.3 of Chapter Three) should guide and govern co-operative establishment in Bhutan too.

Co-operative is typically characterized by three indispensable organisational components i.e. user-owned, user-control and user-benefit (Rajagopalan, 2007). This provides the members the ownership, control and benefit from the association.

5.2.3 Dairy Chain Development

Value chain is characteristically a market-focussed collaborative approach since it responds to market by linking all actors and chain functions ranging from production, processing to marketing to market demand (Barnes, 2004). Chain development is part of the dairy co-operative development. Since the formal dairy chain does not exist, chain development is equally important as dairy co-operative development. The dairy co-operative and chain are both new to the actors and supporters in Bumthang. Therefore, both can be instituted at the same time to pave success of the new co-operative from the beginning, save time and resources.

5.2.4 Dairy Sector Development

Dairy development in Bhutan started since 1961 with the inception of the first FYP. Since then the focus of the sector remained on crossbreeding program with the supply of imported exotic Jersey and Brown Swiss breeding bulls. Artificial Insemination program was introduced during the sixth FYP only in accessible areas concentrated near road heads. The breeding policies formulated focussed mostly on improving and upgrading the local herds. Most of the dairy development programs were supported by HLDP and HAADP funded by Helvetas, ADB and Norway. The development dairy sector achieved today is certainly the efforts of the past and the contributions made today will make a difference in future.

FAO-APHCA (2009) strategized strategies for enhancing dairy productivity placing greater emphasis on the creation of producer associations to strengthen their market position versus suppliers of inputs and purchasers of milk. They have come up with four mutually reinforcing pillars to dairy development. The strategies state developing human resource and knowledge management; improve productivity and competitiveness of smallholder milk producers, strengthen linkages between farmers and consumers to deliver quality dairy products at a fair price and enhancing enabling environment.

The strategies do match the practical challenges to fulfil the objective outlined in this study. These strategies if followed conscientiously are capable of addressing practical problems that a dairy sector is facing today or the co-operative would face in future.

5.2.5 Milk Processing Units

There are five milk processing units in the four blocks of Bumthang district. The roles of these MPUs have been very crucial at this point of time handling a range of activities from collection to processing and distribution. The processing capacities differed slightly depending on the volume of milk they received on daily basis. The deficit milk volume has limited volume of production currently. The milk volume each MPU received ranged between 150-650litres today. These MPUs did basic processing of fresh milk into butter and soft cheese. They sold fresh milk, butter and soft cheese without packaging. The farm gate prices are Nu. 25/litre, 250/kg and 25/ball for milk, butter and cheese respectively. The MPUs pay Nu. 16-21 for fresh milk to the farmers. The profit made is spent on paying workers payment, electricity and transportation charges of hired van, repair and maintenance of equipment/machineries, buying spare parts, firewood, etc. The left over profit after monthly deposit in their saving scheme is distributed among the members.

Should there been a single central processing plant, there would not have been a deficit in volume of milk required collectively. This problem is likely to be resolved on instituting the co-operative milk processing plant located centrally to the existing MPUs. Furthermore, with operationalizing the co-operative milk processing plant, there would be increased number of members leading to increased volume of milk. The dairy co-operative in Bumthang will have options for collection of milk from the MPUs in Sengor, Mongor and Tashangkha, Trongsa.

5.2.6 Co-operate Policy

The Co-operative Acts (2001) allows the government to promote co-operatives for the benefits of members and communities. The policy clearly states that government to facilitate development of co-operatives with an aim to contribute to the economic growth and well-being of Bhutanese society especially the poor. Framing policy isn't enough to target poor section of the society. The poor and marginalised section of the society is often backward, resource poor and fear taking risks. The trigger should come from someone capable of realising genuine need of those people to bring to the limelight and facilitate the required change and make it happen. The Agriculture Minister rightly said in Stakeholders Workshop for development of cooperatives convened in Thimphu from 22-23rd June 2010 said, "Although the RGoB took the step of creating an enabling legal environment for Cooperatives ten years ago. However, it has still not taken off and that meeting of the focal persons and interested people not only marks a significant milestone in the progress being achieved towards the establishment of cooperatives and farmers groups but also ensures that such workshops and dealings with various specialists

will serve as a launching pad for the cooperatives movement in Bhutan". Therefore, dairy development in Bumthang is certainly a "way forward" and support his views.

5.2.7 Literacy and Youth Employment

From the experiences of the developed countries, literacy is the key to spark development. The national literacy rate of Bhutan is 59.5percent (PHCB, 2005). However, majority of the Bhutanese farmers today are illiterate. The reason rural communities today remain void of educated lots is due to economically unattractive employment opportunities of the agricultural enterprises in the rural areas. The educated youth today consider farming as job of the poor and illiterate societies. They leave their home in search of white and blue colour jobs in the capital city and other towns. The trend of rural-urban migration has become a problem. The same problem has led youth to drug abuse, addiction and increased crime rates in the urban towns in Bhutan rendering such places unsafe for normal citizens. Therefore, to attract those educated lots comprising of school drop-outs and unemployed, developing attractive rural enterprises to create employment opportunities and income sources, dairy co-operative development is certainly an option to address ever escalating problem of youth joblessness. Such an initiative would also encourage educated youth to venture into farming enterprises and engage them fruitfully towards enhancing rural economy.

5.2.8 Farm size and Dairy Cattle Breeds

Dorji *et al.,* (2007) reports five heads per household as an average herd size in Chokhor, Bumthang. He also found that 52 percent of the sampled farmers preferred Jersey as dairy breed over Brown Swiss. This study also found that dairy farmers' groups maintained a milking cow-unit of three per household. In both cases, the size of the farm is determined by the size of the landholding and fodder production capacity. Land is the main limiting factor. To curb this problem, government has introduced the policy of leasing Government Reserved Forest Land for improved pasture development to support dairy productivity (DoL, 2006). As far as dairy co-operative is concerned, increasing herd size is not a solution to increasing volume of milk production. The idea of dairy co-operative is to increase the members to increase the volume. Even a single cow raised under the homestead should suffice the need to produce 1-5litre of milk daily. Thus, the issue of small landholding and small herd size does not feature as a problem for the dairy co-operative. However, those who can afford, the option is open for them.

Based on the findings of this study, there are more local cattle breed than high producing breeds like Jersey and Brown Swiss. Breed improvement can be seen more of an option rather than increasing the herd size and landholding. Rear one or if manageable two productive Jersey cow producing about 10-15litres of milk per day than keeping 15 local cows producing 1litre of milk. Economically and managerially, keeping 1-2 Jersey cows is more profitable and manageable. Jersey is even more efficient than Brown Swiss in term of the quantity of feed requirement due to their relatively small body size.

5.2.9 Changes after Group Formation

From the findings on the changes that took place before and after group formation indicated the respondents resorted to respond positively on the latter than the former despite the difficulty in quantifying each changes (Appendix H). The results exhibited that aftereffect of group formation has benefited the members. Thus, it had indicated that the dairy co-operative with greater

developmental opportunities will have better and positive impacts for the dairy farmers in general.

The non-group farmers also believed that the group members received better inputs (credits, breeds, pasture seeds, equipment, machinery) support and services from the research (improved technologies) and extension (mobile AI, health care, trainings on improved husbandry practices) to boost milk production. The level of improved dairy husbandry practices was found better with the group members. Therefore, the non-group farmers realised the benefits that the members have been reaping and showed their interest to become members of the new dairy co-operative in near future.

5.2.10 Processing and Marketing

The milk processing units in Bumthang is limited to cheese and butter making. The MPUs even resorted to sell fresh milk and the by-product (butter milk and whey) to their daily customers to save labour and energy (firewood, electricity) to cut down costs. Based on the current scenario, the MPUs could generate higher profit margin by selling fresh milk directly. For instance, the MPU in Chumey paid Nu. 16/litre to the farmers and sold at Nu. 25 generating a profit of Nu. 9/litre. The MPU in Tang paid Nu. 18 to the farmers and sold at Nu. 25 making a profit of Nu. 7/litre and the MPU in Tamshing paid Nu. 21/litre and sold at Nu. 25 drawing a profit of Nu. 4/litre. For the MPU in Chumey, selling fresh milk was more profitable than processing into butter and cheese. The daily customers for milk were the civil servants working in their communities. One thing in common to all the MPUs was they processed only the left-over milk after selling.

The good thing about all the MPUs was that they were able to sell out all the cheese and butter they make on daily or on every alternative day basis. It was surprising to notice that the butter (Nu. 245-250) they sold is slightly cheaper than Amul Butter (Nu.260/kg) sold in the grocery shops. This seems to be the reason why the MPUs were able to sell better then they produced compared to previous years where they had faced problem of selling butter. This indicates that fair price for the products based on the quality increases competitiveness with probable chances of better marketability of local products.

5.2.11 Price Fixation

The price fixation of milk and processed products were done jointly by the board representatives and members concentrating more on their need to maximise profit and reduce expenditures. They remain oblivion of the cost of production, current market prices for similar products and the marketability of the products in terms of quality. The prices of imported dairy products are not compared. Farmers have a notion that local products they make is supposed to receive better prices compared to imported products despite the inferior quality and absence of proper packaging, labelling and brands. Unlike what is in practice, the price fixation of milk could be based on fat percentage and SNF for uniformity and curb monopoly of pricing as in practice internationally. Strengthening milk price based on quality can be enhanced for customers' satisfaction (price, food safety).

5.2.12 Potentials

5.2.12.1 Products Diversification

Diversifying dairy products increase choices for the customers according to their taste and needs. Besides, it would also add value to the products and increases the marketability and longevity of the products. In the past years, the MPU in Tamshing was not able to sell butter. They sought help of the research centre to look for possible alternative to reprocess and package for marketing. The research centre in pursuit to help the MPU converted the fresh butter into Ghee, packed in bottle containers of 500g size. Both keeping quality and eating quality of the Ghee was good with aroma. The shelf life at room temperature and under cold chain (4-7^{o}C) was equally good. Despite the fact, product diversification improves the shelf-life with value addition; it was later known that Ghee wasn't popular among Bhutanese consumers. Therefore, whenever such new initiatives are taken, it is important to put customers at the centre of the business. The product diversification may be done with proper market analysis to benefit well both the producers and consumers.

The Indian Amul products like Butter, Milk, Cheese, Milk Powder, Paneer, Chocolates, Ice-cream, Gulab-Jamun, Nutramul and many others are available in the Bhutanese market. These products are available in various shapes and sizes, which are cheaper than most local dairy products. The upcoming dairy co-operative could consider all these aspects to fulfil the needs of the consumer at fair price to compete and survive as new entrants.

5.2.12.2 Income Generation

Based on the present set-up of dairy farmers' groups and MPUs, the members sold their milk and received cash payment at the end of every month. The MPUs catered as milk market locally. Dairy co-operative is expected to avail similar or better opportunity to their members to boost their income generating capacity in future. An impact study by Shrestha (2009) in Chitwan, Nepal showed an increase of 94.5% income of the co-operative members in nine years of its establishment. This was true with the dairy farmers' group members in Bumthang. The farmers were not able to sell and earn when MPUs did not exist. However, with the establishment of farmers' groups and MPUs, they were able to earn more. A farmer who sold a litre of milk per day for Nu. 16/litre earned at least Nu. 480/month to as high as Nu. 9600/month those who could sell 20litre/day. The earning was slightly better for farmers who sold at Nu. 21/litre (Nu. 630-12,600) selling same amount of milk. Therefore, increased in farmers' income after the co-operative establishment shown by Shrestha stands valid.

5.2.12.3 Quality Enhancement

Maintaining quality is the surest way to compete for the market. However, Bhutanese dairy products lack quality though the consumers continue to relish. There is a need to improve product quality. There are two areas from where the quality of products could start i.e. the producers of the milk and the processing centre with processing and packaging functions. Firstly, the quality can be enhanced through regular training for the producer covering their personal health, cows' and udder health, shed hygiene and cleanliness of equipment, containers and maintenance of cold chain including transportation.

Secondly, at the processing level with platform testing of milk for adulteration, fat content and SNF and laboratory testing for bacterial load and somatic cell count and antibiotic/pesticide residues carried out prior to processing improves quality. Checking for adulteration is required to determine the producers' milk price. Such a practice is common elsewhere in other parts of the world. The need to test for bacterial and somatic cell count and antibiotic/pesticide residues is for food safety reason since the products are aimed for wider customers' consumption nationwide.

Milk producers and workers at the processing plants could be trained regularly on clean milk practices and hygiene. HACCP could be introduced at two level; one at producers' level and the other at the processing centre. The aim of introducing HACCP is for the quality control and standardization of the products. The role of BAFRA, Extension and Research would be crucial in rendering necessary training (improved dairy husbandry, dairy technology, quality control) from time to time. Stricter monitoring for quality of products, processing and marketing by BAFRA is strongly foreseen unlike what is in practice at present.

5.2.12.4 Poverty Reduction

The poverty in Bhutan is 23.2 percent (NSB, 2007). Poverty reduction is one of the Millennium Development Goals and an objective of the MoAF in the 10th FYP with OGTP approach (GNH, 2009). Development of dairy co-operative is one of the means to achieve it. The potentials of co-operative are eminent from countries worldwide ever since the first co-operative was instituted in Aberdeen in 1498. It is also known from the fact that about 2.8 million village milk producers are members of 13,141 Village Dairy Co-operative Societies of Gujrat Co-operative Milk Marketing Federation Ltd, which is more than the whole population of Bhutan (Amul, 2010). This is one such living evidence of the potentials of dairy co-operative from the neighbouring Indian State of Gujrat. There are more such dairy co-operatives in other States of India. The dairy co-operative lays greater emphasis on pro-poor farmers living under poverty. Providing membership with the right to produce and supply milk to the co-operative enhances their earning capacity and improves the living standards. It thus frees such marginalized societies from poverty stricken state to better living conditions.

5.2.12.5 Offer Employment Opportunity

Instituting dairy co-operative will definitely create job for some people with working experiences and required competencies. However, it cannot employ all members directly. In fact, it will keep farmers engaged in the production of milk as raw material for the co-operative. Since most of the farmers produce milk, they could be members of the co-operative for supplying milk and generating income for their families. Establishment of more dairy co-operatives in Bhutan would definitely create better employment opportunities for many. It is due to the fact that co-operatives are known for creating employment to millions worldwide (ICA, 2004). Even in India, dairy co-operatives served 10 million farmers in over 80,000 villages (Dairy Co-operatives, 2000). The same could be true in Bhutanese context if it flourishes and succeed.

5.2.12.6 Expand Market

Marketing management involves proper analysis and planning. Given the small production capacities of the producers and processors, the aim to capture export market may be difficult. Even to suffice the needs of local and national consumers may be deficient given the limited

flow of raw materials. At least 4-6 more such dairy co-operatives may be required to fulfil the local demand alone. Also given the bilateral and free trade relationship with India, complete ban on import of Indian dairy products is not an option in immediate future. Instead, increased competitiveness with imported products by improving local products in terms of quality and quantity with due consideration for prices could be the spirit of keeping both producers and consumers at bay. Besides, exploring production possibilities of niche products for the export market could be considered instead of import restriction. Keep the customers at the centre of business and look for customers driven market for the new dairy co-operative for a sustainable market (Fig. 5.6). For some years, the production focus could be limited to local and national markets. However, need to expand the market in future is an option by diversifying products and market segmentation with proper analysis of threats posed by various marketing factors.

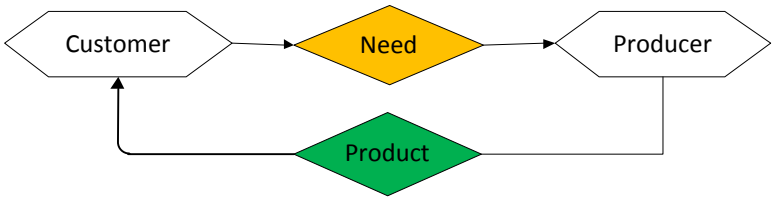


Fig. 5.6 Customer-driven market

5.2.12.7 Capacity Building of Members

The 5th principle of co-operative, “education, training and information” necessitates members to be trained and equip with all requisite knowledge and skills. As specified under quality enhancement, as a part of capacity building of the workers in the collection centre, processing plant, the workers and members need to receive regular training on clean milk production, processing, packaging and marketing. Besides, study tour to neighbouring countries, exchange visits, workshop and meeting conducted on regular basis provide exposure to the board representatives, workers and members. The dairy co-operative in some way is a strategy of enhancing the “capability” of the “incapables” by encouraging even the pro-poor members to participate equally free of stumbling blocks.

5.2.12.8 Packaging, Labelling and Branding

At present the Bhutanese dairy products are sold without the use of packaging materials and label. Additionally, there is not a single brand of dairy products branded as of date. Certainly, there is a dire need to introduce packaging of products with proper label. To popularize the Bhutanese dairy products, branding is equally important even for local and national markets. The sense of urgency for introducing packaging, labelling and branding of Bhutanese dairy products is increasing than ever before. The purpose is not only to attract customer for the products but for food safety, tracking and traceability aims. This can happen only with the institution of new dairy co-operative.

5.2.12.9 Offer Equal Opportunity

As suggested by the guiding principles of the co-operative, the dairy co-operative is expected to provide level playing field for farmers at all levels irrespective of the number of milking cows they possess and volume of milk they produce and supply. The facilities and support services

rendered must be unbiased to all the members. The new dairy co-operative maintains free and fair approach with respect for members' ethics, ethnicity and interest.

The membership remains open to all dairy farmers. However, greater emphasis for membership requires to be laid for poor and marginalized section of rural communities. What is important for the co-operative is to offer a platform for the growth and development of pro-poor farmers with time.

5.2.12.10 Economic Growth of the Dairy Sector

Dairy co-operatives have been successful and created positive impact on dairy farmers even in Nepal (Shrestha, 2009). Establishment of co-operatives can create market for milk at local level. This would stimulate increased production, consumption and sale of milk by the producers and consumers. This could directly increase GDP contribution of the livestock sector and per capita consumption of milk nationally. Also establishment of new dairy co-operative will be a milestone in the history of dairy development in Bhutan.

5.2.13 Facilitating Factors

5.2.13.1 Feasibility

Well, it is understood that introduction and launching of dairy co-operative seems to be timely. The DoL has already sparked discussion among various farmers groups. The DAMC is gearing the programs towards group registration and co-operative development. With the increasing number of farmers' groups emerging in the country, the need to have co-operatives or association is warranted with the consolidation of existing groups for the desired growth and development. Thus, this study findings revealed that the trigger for dairy co-operative is there among the actors as well as the supporters. There is a green signal given by the Ministry and the DoL and DAMC is working towards co-operative development already.

5.2.13.2 Favourable Co-operative Policy, Acts and By-laws

Having a co-operate policy is the first step toward developing successful co-operative. It would aid support and facilitate to the extent of fund sourcing for its development. Since the co-operative policy 2001 enshrined about ten years ago legally allows formation and development of co-operative within the scope of the policy frame.

In addition to the co-operate policy, there would be a need to frame conducive working acts, by-laws and rules and regulations for the co-operative. Also as the co-operative grows and expand business, the need to confer the national/international legal status as limited company is necessary.

5.2.13.3 Working Experiences of the Members

The present working members in the MPUs are trained and possess rich working experiences. They are performing even better than some the extension staff looking after the day-to-day activities of the MPUs. Those members with good working knowledge and skills are pre-requisites for the up-coming dairy co-operative and co-operative milk processing plants. This

could ease and aid better operationalization of dairy co-operative as it saves time and resources from training new members.

5.2.13.4 Motivated and Committed Board Members

Corruption is rampant even in developing countries. Money is the root cause to corruption. People tempt to misuse money if it is within their authority and control. There was case in one of the MPUs in Bumthang where the Chairman had misused the money and failed to pay the payment of the members. The MPU collapsed and left its entire member in desperation. Finally, the Department of Livestock had verified the case and revived the MPU with a complete set of new board representatives and workers. Therefore, it reminds that interest and motivation of the farmers can be crucial to form successful dairy co-operative. Despite voluntary and open membership, the level of interest and motivation of the farmers needs to be considered for membership and board representatives especially.

The sincerity and dedicated board representatives is the key to success of the co-operative. They need to be committed and willing to work on their own free will for their members, community and nation in general. Any form of corruption by the board representatives could ruin the co-operative. Groups are most likely to succeed when made up of like-minded people. Therefore, careful selection of capable and committed workers would be important for the co-operative from the initial inception.

5.2.13.5 Three -Tier Structure

Like in India, three-tier system of co-operative is possible. The need to have three-tier is also foreseen for Bhutan. However, the apex, the third tier at National level may be formed later. As for now, milk collection centre at the block level and co-operative milk processing plant at the district level should suffice. So to give a start, two-tier system has featured strongly based on the results of the study conducted. With the growth and development of the dairy co-operative the third tier could be formed and made functional.

5.2.14 Challenges to Setting Dairy Co-operative

5.2.14.1 Sustainability of the Dairy Co-operative

Launching dairy co-operative alone is not sufficient. The dairy co-operative's ability to generate profit and sustain on its own is more important. It may not be possible for co-operative to be sustainable from the initial stages since this is the stage where maximum investments are required for the construction of structure, development of infrastructure and purchase of equipment and machineries. However, at the latter stages dependency for external fund support may not be necessary once the co-operative becomes operational and start to generate income.

Providing social justice and cultural respect to the members could contribute to the sustainability of dairy co-operative. The co-operative could also address gender inequalities and disengage child labour for any profit motives. The long term relationship needs to be improved among members of different levels to enhance co-operation and the bargaining power of the fellow members. The co-operative could choose to operate in an environmentally safe place and remain free of pollution and avoid polluting as a result of its operationalization activities. There are needs to strive for economic viability of the co-operative, continue to pay fair prices for the

members and develop fair trade free of trade barriers through joint negotiations and collaborative approach. Experiences from India, Nepal and Bangladesh revealed that political interferences had hindered smooth operation of most dairy co-operatives. The dairy co-operative needs to mature much before it can face such unforeseen challenges ahead.

5.2.14.2 Inputs Supports

Derville (2006) reported the availability and accessibility of most dairy inputs as problems of the farmers. Input like improved breeds, pasture seeds, fertilizer, feeds, dairy equipment, machinery, packaging materials, technology etc. are the basic needs of the producers and processors. Regular supplies of these inputs are essential to produce and supply volume of milk required uninterruptedly. To the extent possible, it is easier for the members to buy these inputs as much as possible from a fewer or single agent. Therefore, it would be beneficial both for the members and the co-operative, if the dairy co-operative could take-up additional responsibility of procuring and supplying the required inputs. The good thing for the co-operative acting as supplying agent of inputs is that the members need not have to pay cash to buy the inputs they wanted. Inputs can be sold on credits and recover gradually from the milk payment. Also it would be cheaper and convenient for the farmers to buy all required inputs through the co-operative and for the co-operative to buy in bulk.

5.2.14.3 Fund Support for Building-up Infrastructures

Building-up infrastructures is one of the biggest challenges foreseen for the upcoming dairy co-operative. Without fund support development of dairy co-operative is far from realization. To support the co-operative financially is beyond the capacity of the members. Establishment of dairy co-operative is dependent on fund support either from external donors or the Royal Government of Bhutan. The fund during the inception phase is necessary to develop structures, purchase machineries, equipment and mobility.

5.2.14.4 Enhance Optimum Production Volumes

Milk will be the most important raw material for the dairy co-operative. The co-operative cannot operate if there is no supply of milk. Reduction in milk supply would result into low production and income. The repercussion would lead to threatened sustainability of the co-operative. Therefore, critical volume (1000-2000litres) of milk required should be flowing spontaneously from the members in order to maintain optimum production volumes of the dairy co-operative for its sustenance.

In 2008, the milk production potential of Bumthang was as high as 1000litres in each *geog* daily. Therefore, 4000litres/day of milk was produced (Fig. 4.3). Since most of the *geogs* are accessible with higher milk density compared to inaccessible areas. At least 2000-3000litres of milk can be collected for the dairy co-operative on daily basis.

An impact study on milk producers' co-operative in Chitwan district of Nepal showed 49.6 percent increase in production and 55 percent increase in sale between 1997 and 2006 (Shrestha, 2009). The increases in both production and sale of about 50 percent is quite an achievement made in ten years despite lot of problems and political unrest in Nepal. This indicates that dairy co-operative has potentials to make impacts on dairy farmers.

5.2.15 Co-operative Incentives

Warana Co-operative Milk Union's experiences revealed that incentives to help boost milk productivity to the members were the trigger to dairy co-operative development. Introduction of similar incentives could be possible for the dairy farmers in Bumthang. Incentives act as morale booster to maintain long term relationship, members' cohesion and co-operation.

5.2.16 SWOT and Force Field Analysis

Many strengths and opportunities from SWOT analysis (Table 5.9) also confirmed that dairy co-operative development has potentials and is feasible. Force Field analysis also discovered more forces for changes (dairy co-op development) supporting the SWOT findings (Fig. 5.4). There were more forces in favour of the change with few weak factors against the change.

5.2.17 Existing Dairy Chain Analysis

Due to the fact that formal dairy chain is non-existent, it has led to major uncoordinated and disoriented links among actors and supporters within the chain. There is major confusion among the actors and supporters. There is no coordinated efforts on the side of the supporters. For instance, there are a lot of duplication of works done by the research and extension. The weak links, actual needs and problems of the actors are not identified properly. Therefore, programs lacked focus and are not planned based on the needs of the actors. Also on the side of the actors, especially the producers looks confused as who to approach for what kind of supports. There was no formal market established for marketing of dairy products produced by the MPUs. They were also found handling a lot of activities that could have been shared among the actors. This warrants developing formal dairy chain in Bumthang for coordinated and organised dairy co-operative.

6 CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

6.1 Conclusion

The outcome of this thesis is guided by the overarching objective outlined and broadly aided by three key research questions (sub-headings 1.5 Research Questions), sub-questions and field questions (Appendix 1, 2 & 3), research framework (Fig. 2.1), conceptual framework (Fig. 2.2) and the study design (Fig. 2.3). This study has attempted to break new ground of unexplored area of dairy enterprise in Bhutan. It is no doubt a bold attempt and interesting findings.

The results showed that the dairy co-operative chain development has potentials (Chapter five, sub-headings 5.1.3.1-5.1.3.10). Most of the pre-requisites (Chapter five, 5.1.4) are in place except the funds for infrastructures development of the new co-operative was missing and needed to source-out. The members of the present dairy farmers' groups and processing units are clear of their roles and responsibilities. The farmers who are not the members of the group at present also realized the need to be members and fulfil their obligation as existing members. They saw differences between the members and non-members and the benefits being members.

The three dairy farmers' group taken for this study showed their capabilities to embrace the co-operative movement. They were aware of the problem and limitations of the existing groups. The need to have a fully operational co-operative processing plant at the district level was felt rather than each MPU taking up processing and marketing activities in isolation. Instituting new processing plant with two-tier structure is believed to resolve some of the common problems (insufficient milk, transportation, few products without products diversification) the MPUs are faced with due to individualistic working nature. The focused groups and program heads included in this study unanimously expressed that development of new dairy co-operative chain could foster greater co-operation, collaboration, integration and enhance better communication among the actors and supporters. Further, it can stimulate entry into bigger market and promote growth in rural communities.

The co-operative policy enshrined allowed formation of co-operative. The dairy co-operative chain development matched the millennium development goal one i.e. poverty alleviation. The survey results found strong potentials of dairy co-operative. The first potential was products diversification. The current practice of producing merely two products (butter and cheese) for the consumers in the local market over and over again was not enough to maximize profit with increasing competition posed by imported dairy products. Therefore, need to diversify dairy products to suit the needs and demands of the national consumers should have to be considered.

Secondly, due to the fact that milk, butter and cheese are sold unpackaged. It also lacked proper labelling, which is important to meet the quality standard and enhance competitiveness with imported dairy products. Bhutanese dairy products are not branded as to date. Branding is necessary for gaining and retaining identity and reputation of the firm producing the products. Proper packaging and labelling also helps tracking and tracing should there be hazard like food poisoning.

Third was quality enhancement. The products the co-operative is planning to produce is aimed to meet the standard set for marketing the products. The quality is of greater concern for the

consumers. Therefore, the aim to meet the quality standards also enhances the marketability and profitability. The quality standard can be achieved through clean milk production, and processing, and packaging practices both at producers' and processing levels. The dairy industry will have to adopt HACCP in a big way as a strategic quality management program. There will be a need to promote clean milk production coupled with prompt chilling and eliminate pesticide and antibiotic residues, hormone, heavy metals and adulterants in milk.

Co-operatives are believed to have offered over 100 million jobs worldwide with over 800 million people as members. In a similar manner, the dairy co-operative is expected to offer employment for some as workers and other as members in the milk collection centres at the block level and in the processing centre.

To have efficient workers in the collection and processing centres, the need to develop capacities of the workers to equip with required knowledge and skills was felt. The members wanted to get trained on clean milk production practices.

Developing a dairy co-operative is believed to create a place for the milk producers for continuous production and supply of milk to generate cash income locally. The regular income the producers earn will help to meet other household needs and educating their children. The dairy co-operative is expected to help farmers to grow economically and eliminate poverty.

The local dairy products the existing MPUs produced are sold in the local market. The dairy co-operative will have to expand and capture regional and national markets with increased production.

The government has planned to consolidate the existing groups to form dairy co-operative to offer platform for growth and development of the dairy sector. The results showed that the dairy co-operative is feasible in Bumthang given most pre-requisites in place (dairy farmers and MPUs), availability of developmental facilities (road, transport, electricity, and telecommunication) and presence of dairy sector support program offices (research, extension, breeding farm, fodder development, credit, and quality regulatory agent).

The favourable co-operative policy, experienced working members, interested and motivated members, committed workers and preparedness of the supporters collectively facilitate dairy co-operative development. The members' proposition to have three-tier system is excellent. However, the need to have national level co-operative is not foreseen now.

The main challenges to setting up dairy co-operative were sustainability of the dairy co-operative itself, building up additional structures, inputs support and fund sources. The dairy co-operative to be successful, needs to be sustainable economically, socio-culturally, politically and technologically. Many studies in the past reported dairy productivity are hindered by numerous problems. To garner success of the up-coming dairy co-operative, the dairy co-operative and the supporting institutions should work at their own capacities to resolve the problems the producers are faced with.

The respondents also suggested the dairy co-operative takes the initiative to cater to inputs support of the members instead of dealing with too many input suppliers. They expressed the need to take the role of input suppliers was to ease the work of the members in procuring individually on cash payment. Should the dairy co-operative take this role the flexibility of

payment for the inputs can be developed. The payment for the inputs the members buy can be done through gradual deduction of their milk payment.

Building up new structure and putting in place the equipment and machineries required for the new co-operative processing plant is the biggest challenge. It can be materialised only through fund supports from the donors and/or the Royal Government of Bhutan. The dairy farmers believe the volume of milk required for the co-operative is in production now.

Despite many hurdles, this study still saw a big potential for dairy co-operative in Bumthang as revealed by the findings.

6.2 Recommendations

The recommendations are specific to dairy co-operative development in Bumthang covering only important aspects that facilitates its establishment and operationalization. It is in line with the objective outlined for this study.

6.2.1 Dairy Co-operative Model for Bumthang

Dairy co-operative model for Bumthang should be similar to Anand Pattern and operates as the three-tier co-operative. This structure is planned to eliminate internal competition and to ensure economies of scale.

It consists of a Geog Dairy Co-operative Society at the geog (all dairy farmers' groups with new members) level affiliated to a Milk Union at the dzongkhag level and further to Milk Federation at the national level. Unlike Anand Pattern, the village level co-operative is not feasible in Bhutan as the villages are very small and scattered. Therefore, there should be geog level co-operative instead of village co-operative. The existing MPUs should operate as Milk Collection Centre (MCC). The milk producers should supply their milk to milk collection centre in their respective geogs. From the MCC, the Milk Processing Centre at the dzongkhag should procure for processing, packaging and distribution. Marketing of milk and milk products should be done by the National Dairy Co-operatives Union at the national level. Till the time the National Dairy Co-op Union is formed the marketing should also be handled by the *Dzongkhag* Co-operative Milk Union.

Fig. 6.1 Dairy co-operative model for Bumthang

The Bhutanese version of dairy co-operative is designed with modification from Anand Pattern (Fig. 6.1). Three-tier structure dairy co-operative modelled for Dairy Co-operative in Bumthang is as under:

6.2.1.1 Geog Dairy Co-operative Society (GDCS)

The *Geog* Dairy Co-operative is the primary society under the three-tier structure. It can form the membership of milk producers of villages in the *geogs*. It should be governed by the management committees of the GDCS comprising of 2-5 elected representatives of the milk

producers based on the principle of one member, one vote. Depending on the need, the GDCS can appoint a Chairman, Treasurer and workers for the management of the day-to-day activities. The GDCS should be independent and manage locally by the milk producers assisted by the District Co-operative Milk Producers' Union. The functions of the GDCS should be as follows:

- collect milk from the milk producers
- make payment of milk received based on quality and quantity
- supply milk to the District Milk Union
- record milk received/collected and supplied to the DMPC

6.2.1.2 Dzongkhag Co-operative Milk Producers' Union (DCMPU)

The DCMPU is the second tier. The members of the GMCS will be the members of the DCMPU. It should be governed by a board of directors consisting of 5-10 elected representatives of the *geog* societies. The milk union should appoint a professional Manager (paid employee and member secretary of the board for the managing routine activities. It can also employ technically competent people to do the processing works. The functions are:

- procure milk from the GDCS
- arrange transport for milk from the GDCS to the Milk Union
- provide inputs services to the milk producers
- conduct training on co-operative development, dairy husbandry, clean milk production, specialized knowledge and skill development
- provide management support to GDCS for supervision of activities
- sell milk and milk products within and outside the district
- process milk into various products as per the requirement of National Diary Federation
- decide on milk prices (buying and selling) and prices of support services to members

6.2.1.3 National Dairy Federation (NDF)

It is the apex body with the membership of the DCMPU and governed by a board of directors comprising of one elected representative of each milk union. The NDF further appoints a Managing Director (paid employee and member secretary of the board) for the management of NDF. It may employs people for assisting the MD. Functions of the NDF are:

- marketing of milk and milk products processed by the Milk Union
- establish distribution network for marketing
- arrange transportation from the Milk Union to the market
- create and maintain brand for marketing of milk and milk products
- provide support services to the Milk Unions and members (technical inputs, management and advisory support services)
- arrange purchase of raw materials for processing/packaging of milk products
- decide on milk and milk products prices to be paid to the Milk Union
- decide on products to be produced by the Milk Union
- arrange finance for the Milk Union
- provide technical know-how and capacity building to the members of the Milk Union
- resolve conflict and keep the entire structure intact

6.2.2 Basic Features of Dairy Cooperative for Bumthang

The dairy co-operative development in Bumthang should be guided by the seven overriding principles of the co-operative as under:

1. Voluntary an open membership: The membership should be kept voluntary. Ethically, it should be left to the individual but with acceptance of the responsibilities of membership.
2. Democratic member control: The members will own, control and benefit from the dairy co-operative free of untoward interferences for its development. The members should have voting rights to elect their representatives to manage the day-to-day functions and at the same time participate actively in decision making and setting policies.
3. Member economic participation: Guide the members to contribute equitably and control democratically the capital for the co-operative. To ensure that the capital is rightfully used as common property and distribute surpluses fairly.
4. Autonomy and independence: The new dairy co-operative should not become government agency. It should remain autonomous and independent with respect from their members and external agents.
5. Education, training and information: Training of the members and representatives should remain as regular feature to upgrade knowledge and skills for the development of the co-operative. They could invite competent person from relevant programs/institutions to coordinate education and training for members, representatives and workers.
6. Co-operation among cooperatives: Co-operation among cooperatives should be fostered for greater cooperation and collaboration with best partners for better services and greater benefits.
7. Concern for the community: The co-operative should not intend to benefit their members alone but should operate in an institutional environment i.e. community-oriented and work towards sustainable development of their communities.

6.2.3 Need for Legal Protection

Laws are the legal binding force to resolve conflicts and misconducts by punishing the defaulter. No two people are same by attitude and conducts. Therefore, irrespective of the size of organisation at whatever level should be guided by its by-laws, rules and regulations. The needs to protect the organisation's reputation and success is important. This can be achieved by having the laws in the first place.

6.2.4 Outsourcing of Funds

The fund for dairy co-operative development is a challenge. The DoL or the DAMC should source out funds for infrastructure development for the dairy co-operative chain development in Bumthang. Possibilities of funds could be sourced out either through RGoB or external donors like GoI project and EU by developing project proposal.

6.2.5 Improve Quality Standards

The concerned agencies should train hygienic milking techniques and handling milk. Proper feeding and housing should be encouraged to reduce diseases risks and antibiotic and pesticide residues to the milking animals and milk. Random spot checks of farms to ensure milk quality should be done by BAFRA. Wherever possible, subsidy on milking and cleaning equipment should be provided. The transporter of milk should be trained on personal hygiene, basic milk testing and handling techniques. The transporter should be registered and issued certificate of

worthiness. If necessary, cold chain may be introduced to transporting cars. At the MCC, regulating bodies should assess hygiene and standard for certification. Training needs to be provided to the working staff on milk testing, hygiene, handling, storage, temperatures and transformation of technologies. The MCC should have the facility to carry out basic pH and specific gravity test, butter fat content, SNF and check for adulteration. HACCP should be introduced at milk producers' and processing level with stricter monitoring to produce products safe for consumption and tracking and traceability.

6.2.6 Developing Formal Linkages

It is vital for the DoL or the DAMC to link the dairy co-operative to similar organisations outside the country for technical and technological back-up supports. Formal linkages should be developed to receive help and share experiences for mutual benefits. For instance, the National Dairy Development Board in India is of interest for the dairy and dairy co-operative development in Bhutan.

6.2.7 National Dairy Development Board

Cooperative board should be established at the National level. It should consist of 10-15 members representing actors (milk producers, milk collection centres, co-operative milk union, wholesalers, retailers and consumers) and supporters (DAMC, Research, Extension, RLDC, NFFDP, Cattle Breeding Farm, policy experts, BAFRA, BDFC) of the dairy co-operative chain. The board should be appointed for a terms of up to 3-5 years. The key function of the board should be to co-ordinate public and private dairy development programs.

6.2.8 Co-operative Incentives

Co-operative incentives are essential to boost members' morale. It is a strategy to trigger active participation towards fulfilling their obligation. As in Warana Co-operative Milk Union case, incentives should be planned specifically in direct response to members needs and problems. It will help to address certain needs and problems and make members more responsible in promoting growth and success of the co-operative itself.

6.2.9 Formal Dairy Chain Development

Absence of formal dairy chain in Bumthang has led to un-coordinated efforts of the actors and supporters in general. To bring all actors and supporters on board, the development of formal chain together with new dairy co-operative development is warranted.

Actors

- The actors of the dairy co-operative chain should be Input Suppliers, Milk Producers, Milk Collection Centre, Co-operative Milk Processing Centre, Wholesalers, Retailers and Consumers (Fig. 6.2).
- The Input suppliers (could be the new dairy co-operative in this case) supply the required inputs to the milk producers, MCC and the DCMPU. Once the dairy co-operative is fully established the DCMPC should also take the role of suppliers for certain inputs that can be purchased directly and supply it to the demanding members with gradual deductions of payment from the milk payment. Except for inputs like technology, breeds, pasture seeds

the co-operative may liaise with the concerned agents and negotiate on be-half of their members.
- The producers should be responsible to production milk for the co-operative.
- The MCC should collect milk from the producers and supply it to the co-operative.
- The DCMPU procures milk from the MCC, process, package and distribute to the Wholesalers.
- The Wholesalers should then distribute it to the retailers for retailing it to the consumers.

Supporters

- RNR RDC will support in terms of developing suitable technology for the co-operative.
- Breeding Farms will supply with appropriate dairy cattle breeds.
- Extension will provide necessary training and technical backstopping required by the co-operative.
- NFFDP will provide with improved pasture seeds and assist in terms of pasture development activities.
- BAFRA will monitor for products quality and certify products safe for consumption. The
- Central Store should procure and provide the dairy equipment and machineries for the co-operative and assist in repair and maintenance works periodically.

Influencers

- The Department of Agriculture Marketing and Co-operative will assist in co-operative development provide fund support wherever possible.
- The Bhutan Development Finance Corporation will avail credit facility as usual.

Formal dairy co-operative chain in Bumthang should be developed as designed in Fig. 6.2.

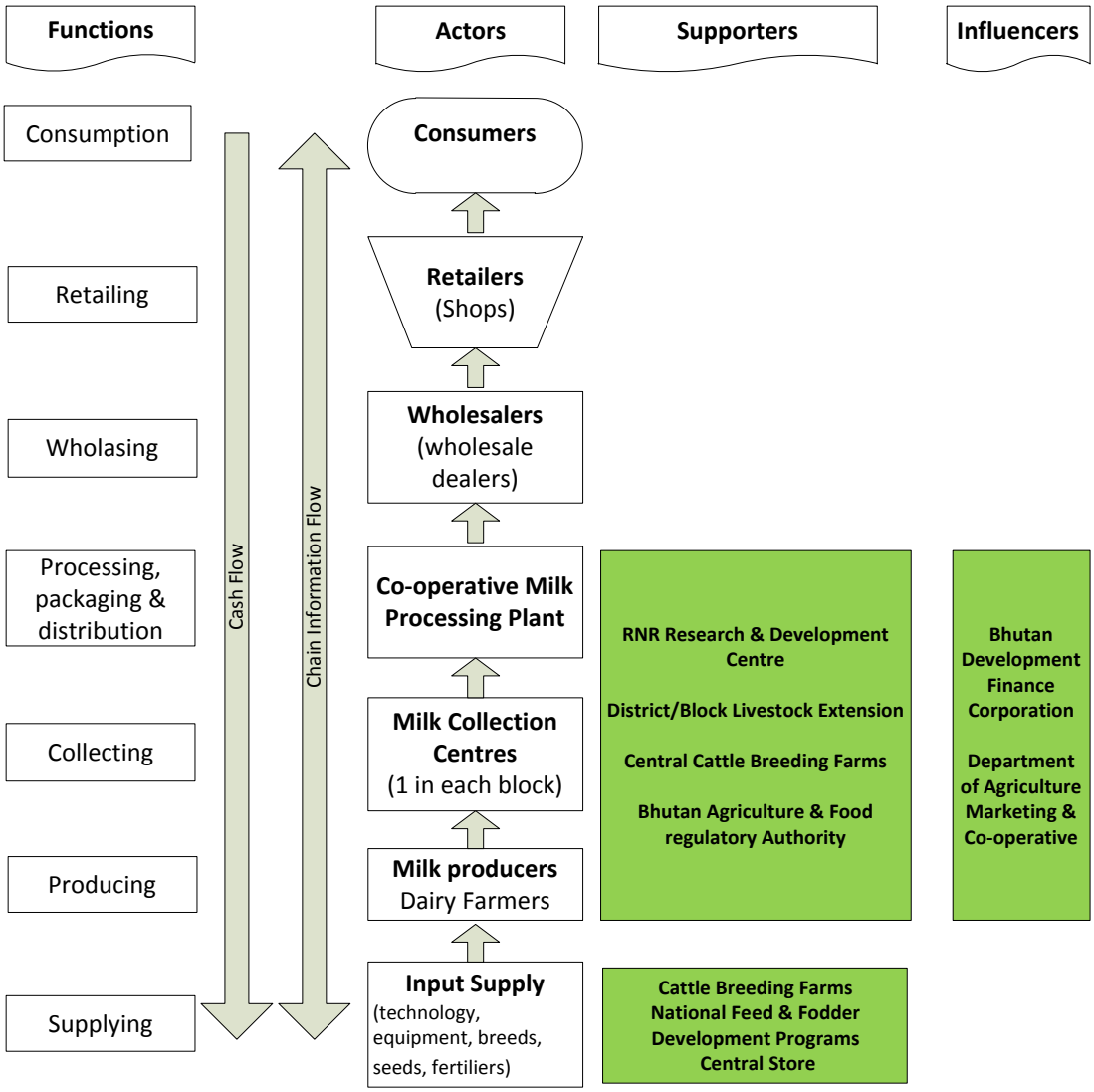


Fig. 6.2 Formal dairy chain for Bumthang

6.3 Limitations and Problems

Limitation

The study is limited in terms of coverage and depth owing to time and resources. Therefore, it only tried to address the objective outlined for the study. The time for field research coincided with the cropping season and monsoon in Bhutan and given the short time period, the survey sample was limited to small sample size of 35 respondents only. As the aim of this study was only to know the opinions of farmers on dairy co-operative so major volume of data are categorical and unreliable for testing major significance of the findings. Therefore, most of the data are tabulated, processed and analysed in Excel.

Also, the issues discussed in my research may seem too apparent and obvious. In fact to make explicit some of the obvious issue is one of the aims of this study. My research does not venture to discover anything new. It is also possible that some of the issues raised may not be relevant anymore by now, because they may have been already remedied. If this is the case, my research findings may be just treated as valid for the time that I conducted my research in retrospect. It is also possible that the discussion or argument may be biased at times in favour of the subject selected. If so, it is bent by my professional affiliation and work ethics on the subject.

Problems

- Availability of literatures especially on dairy co-operatives was limited for this thesis.
- It was difficult to meet all farmers in the study area due to their busy farming activities.
- Some of the program heads failed to respond to the questionnaire sent to them since they were busy with financial year closure and at the same time preparing to implement the new plan of activities.
- To find suitable time for the survey interview with farmers' groups was difficult since the farmers were busy with farming activities. Therefore, given the busy schedule of the members and short time notice for the livestock extension to inform all the dairy farmers' group members, the members turn-up for the survey interview was low.
- Also, July and August is monsoon in Bhutan, the rain disrupted smooth progression of field research work.

REFERENCES

- AHD, 1976. National Policy of Animal Husbandry Department, Ministry of Agriculture, Royal Government of Bhutan
- AHD, 1986a. Proceedings of the 14th Department Conference. Animal Husbandry Department, Royal Government of Bhutan
- AHD, 1992. Review of the Sixth Five Year Plan (1987-1992). Department of Animal Husbandry, Ministry of Agriculture
- Amul, 2010. www.amul.com accessed 11.5.2010
- Amul, 2010. http://en.wikipedia.org/wiki/Amul accessed 18.4.2010
- Arreola, D. V. *et al*., 2006. Modelling Small-Scale Dairy Farms in Central Mexico Using Multi-Criteria Programming. *Journal of Dairy Science*. 89:1662-1672.
- Barnes, M., 2004. Value Chain GuideBook. A process for value chain development. Agriculture and Food Council of Alberta
- Baumgartner, R., 1994b. Short note on milk-processing and marketing in Bumthang
- Bernet, T., *et al.*, 2000. Peri-Urban Milk Production in Peru: Farm Strategies and Policy Options.
- Bhutan, 2010 http://en.wikipedia.org/wiki/Bhutan accessed 28.8.2010
- Buergin, H., 1982b. Brown Swiss Cross-breeding Programme, Bumthang. Statistical evaluation of data collected from 1980-82
- Centre for Co-operatives, 2004. Working together for stronger Co-operatives. University of Wisconsin, Madison, U.S.A. http://www.uwcc.wisc.edu/info/fra/case.html accessed 14.5.2010
- CLSD, 1996a. A report on Mithun of the North Eastern States of India – studied through a Bhutanese perspective. Crop and Livestock Services Division
- Cobia, D. W. Ed, 1989. Co-operatives in Agriculture. Englewood Cliffs, New Jersey. Prentice Hall
- Co-operative^{UK} , 2008. Starting a Co-operative. A Guide to Setting up a Democratically controlled Business http://www.Co-operatives-uk.coop/live/images/cme_resources/Public/ots/Starting-a-Co-operative.pdf accessed 18.4.2010
- Cropp, B. & Graf, T., 2001. The History and Role of Dairy Co-operatives
- Dairy co-operatives, 2000. http://www.indiadairy.com/tech_list_dairyplants_cooperatives.html.
- Dem, P., 2003. Report of Proceedings. *Dairy Sub-sector Stakeholders and Business Services Workshop*
- Denzler, T. *et al.,* 1993. Comparison of intercalving period of local cows and Brown Swiss cross-bred cows under different conditions. *Journal of Animal Husbandry Bhutan* Vol. 14
- Denzler, T., 1994c. Nationwide breeding evaluation. NH&BSCBP, Bumthang
- Department of Livestock, 2006. Leasing Government Reserved Forest Land for Pasture Development
- Derville, M., 2006. Dairy Chain Analysis: Can the development of the dairy sector contribute to poverty alleviation
- Dhendup, T., 2009. Summary of Tour Report. Department of Livestock
- Dorji, J. *et al.,* 2007. Smallholder dairy farming practices in peri-urban areas of Chamkhar, Bumthang
- Dorji, T., 1997. Comparative study on production parameters of local cattle and different blood levels of Brown Swiss crossbred at field level, Bumthang

- FAO, 2000. Asia Smallholder Dairy Development Strategy and Outline Investment. Animal Production and Health Commission for Asia and the Pacific.
- FAO, APHCA, 2009. Smallholder dairy development: Lessons learned in Asia. *Rap Publication* 2009/2
- Gross National Happiness Commission, 2009. Tenth Five Year Plan Vol. II. Royal Government of Bhutan
- Guenat, D. V., 1991. Study on the transformation of traditional farming in selected areas of central Bhutan. A dissertation submitted to the Swiss Federal Institute of technology for the degree of Doctor of Technical Science. Diss. ETH No. 9296. Zurich
- Hickman, C. G & Tenzin, D., 1982c. The present cattle breeding structure-Bhutan. *Journal of Animal Husbandry Bhutan* Vol. 5, September 1982
- Hobbs, J. E., Cooney, A. *&* Fulton, M., 2000. Value Chain in the Agri-Food Sector
- International Co-operative Alliance, 2003. Co-operatives make development happen. *The contribution of co-operatives to the United Nations Millennium Development Goals*
- International Co-operative Alliance, 2004. http://www.ica.coop/coop/principles-revision.html accessed 20.7.2010
- International Co-operative Alliance, 1995. Statement on the Co-operative identity. ICA, Manchester.
- IRRI, RGOB, 1995. A project proposal. Wetland production system in Bhutan
- Jong, R., 1996. Dairy stock development and milk production with smallholders
- Karki, B. B., 2005. Strategic Planning in Co-operative Sector: A Study on Dairy Co-operative. *The Journal of Nepalese Business Studies* Vol. 2 No. 1 http://www.nepjol.info/index.php/JNBS/article/viewFile/57/486 accessed 14.5.2010
- KIT, Faida, M and IIRR, 2006. Setting the Scene. *Chain Empowerment: Supporting African Farmers to Develop Markets*
- Koopmans, R., 2006. Starting a Co-operative: Farmer-controlled economic initiatives, (2nd ed). Wageningen: CTA. http://www.agromisa.org/ accessed 14.5.2010
- Kuensel, 1996. Heavy crossbreeding of animals bad. March 23, 1996
- Luethi, N. B., 1998. Final Report NH&BSCBP, Bumthang
- Luethi, N. B., 1999. Bovine and Equine in Bhutan
- Mack, S. D. & Steane, D. E., 1996. Livestock Breeding and Research Issues and options paper prepared for the Royal Government of Bhutan
- MoA, 1995. Livestock Development Policy and Strategy
- Moktan, M.R *et al.,* 2006*.* Migratory Cattle Grazing: An Ecosystem Approach to livelihood. *RNR Journal, Ministry of Agriculture, 2006*
- Mubiru, S. L., *et al.*, 2007. Categorization of dairy production systems: A strategy for targeting meaningful development of the systems in Uganda. *Livestock Research for Rural Development* 19 (7).
- National Housing & Population Census, 2005. Office of the Census Commissioner. Royal Government of Bhutan
- National Statistical Bureau, 2007. Poverty Analysis Report
- NES, 1992. Bhutan towards sustainable development in a unique environment. National Environment Secretariat, Planning Commission
- Norbu, K, 2008. A Situational Assessment of Co-operatives & Farmers' Groups and Associations in Bhutan, Netherlands Development Organization – Bhutan
- Norbu, L. *et al.,* 2003. Rights and Benefits for poor people in the traditional cattle grazing system in Tobesa Geog in Western Bhutan.
- Ortmann G.F. & King A., 2007. Agricultural Co-operatives II: Can they facilitate access of small-scale farmers in South Africa to input and product markets? Vol. 46, No 2.

- Phanchung *et al.,* 2001. Sustainable Development of Smallholder Diary Farming in Bhutan
- PPD, 2008. Compendium RNR Statistics. Ministry of Agriculture
- Rajagopalan, S., 2007. Co-operatives in 21st Century. The Road Ahead
- Rapp, G. & Ely, G., 1996. International Co-operative Alliance. *Co-operative Information Report 7*. http://www.rurdev.usda.gov/rbs/pub/cir7/cir7rpt.htm accessed on 3.5.2010
- RGOB, 2001. The Co-operative Act of Bhutan
- Rinchen, D., 2004. Study on Grazing, Cattle Migration and Tseree/Pangzhing in Thrumshingla National Park-Phase I
- RNR EP, 1993a. Report of findings. RRA in Bjakten geog, Trongsa
- RNR EP, 1994a. Report of findings. RRA Chumey geog, Bumthang
- RNR EP, 1994b. Report of findings. RRA in Langthel geog, Trongsa
- Sharma, B., 2007. Study on constraints to dairy cattle management in village farms
- Sherpa, D. L. and Wangchuk, S., 2000. Cattle staff feeding practices in Tsirang
- Shrestha, J., 2009. Impact of milk producers' co-operatives on socio-economic development of dairy farmers: A case study of Chitwan district.
- Subedi, U., 2009. Support to development of farmer groups' enterprise in eastern Bhutan
- Tshering, L. and Acharya, T. N., 1995. Country paper for presenting at Kualalumpur Workshop on conservation and use of animal genetic resources in the Asia and the Pacific
- Tshering, L., 1996. A discussion paper on cattle breeding policy. Annual CLSD Production Planning Workshop, 1996
- United Nations Department of Public Information, 2005. Co-operatives at work http://www.un.org/esa/socdev/social/Co-operatives/documents/CoopsAtWork.pdf accessed 3.7.2010
- Ura, K., 1995. The hero with a thousand eyes. Ministry of Planning
- Wagningen, V., 1986. Survey of farmers on paddy/cattle in Wangdi/Punakha
- Wangdue, K., 2002. Country pasture/Forage resources profiles http://www.fao.org/ag/AGP/agpc/doc/Counprof/Bhutan/Bhutan.htm accessed 19.4.2010
- Wikipedia, 2010. History of the Co-operative movement *http://en.wikipedia.org/wiki/*History_of_the_Co-operative_movement accessed 14.4.2010

APPENDICES

Appendix A. Questionnaire: Section I. Farmers' Groups

1	Farmers' literacy	1. illiterate 2. can read & write
2	Farm size	1. 1-3 cows 2. 4-6 cows 3. 7-9 cows
3	Breeds	1. Jersey cross 2. BS cross 3. local
4	Milk production	1. 1-3 litre 2. 4-10 litre 3. 11-20 litre
4	Milk delivery	1. By car 2. On-foot
5	Walking distance	1. less than 30 min 2. more than 30 min 3. others
6	Payment	1. Weekly 2. Monthly 3. others
7	Quality control	
	1. Milking practices	1. Traditional 2. Improved
	2. Milkers' health and hygiene	1. Good 2. Poor
	3. Cows health and udder hygiene	1. Good 2. Poor
	4. Shed cleanliness/disinfection	1. Good 2. Poor
	5. Containers cleanliness/disinfection	1. Good 2. Poor
	6. Cold chain	1. Yes 2. No
8	Feeds and feeding	1. Forest grazing with supplement 2. Improved pasture grazing with supplement
9	Group functions	1. when formed 2. why formed 3. who formed
10	Group roles	1. supply milk 2. generate income 3. others
11	Problems	1. insufficient milk 2. low milk prices 3. poor market 4. others
12	Differences between groups and non-group	
13	Reasons for being members	1. Interest 2. Income 3. others
14	Produce more milk	1. yes

		2. No
15	How produce more milk	1. breed improvement
		2. improve fodder situation
		3. others
16	Pasture land	1. 0-1 acre
		2. 1-5 acres
		3. 10-15 acres
17	why work in group	1. reduce risk
		2. improve access to credit
		3. resource sharing
		4. co-operation
18	How is group better than non-group	1. benefit
		2. better services
		3. better co-operation

Appendix B. Questionnaire: Section II. Dairy co-operative

No.	Questions	Likart scale / Ranking
1	**Potentials of Dairy Cooperative**	
1.1	Possible potentials	
1.1.1	Do you agree or expect dairy cooperative to bring positive changes	1. strongly agree 2. agree 3. disagree 4. strongly disagree
1.1.2	If yes, what would those be? *(Rank in the order of importance*)	1. Products diversification 2. Offer employment 3. Quality enhancement (value addition) 4. Expand market. / provide milk market at present 5. Income generation 6. Poverty reduction 7. Packaging, labelling and branding 8. Capacity building 9.Equal opportunity 10. Economic growth of dairy sector
1.1.4	Are these changes beneficial?	1. very much beneficial 2. Beneficial 3. Not beneficial 4. Not at all beneficial
1.1.5	If yes, how?	1. enhance product quality 2. profitable farming 3. easy market for products 4. enhance income
1.2	Benefits and opportunities	
1.2.1	Do you foresee opportunities of dairy cooperatives?	1. Strongly foresee 2. Foresee 3. Don't foresee 4. Strongly don't foresee
1.2.2	Would you mention those opportunities? *Rank in the order of importance.*	1. market access for products 2. maintain product quality 3. intensify dairy dev. Venture 4. others (specify)
1.2.3	Is dairy co-op feasible in Bumthang?	1. Strongly agree 2. Agree 3. Disagree 4. Strongly disagree
1.2.4	If yes, why do you think is feasible? *Rank in the order of priority.*	1. Group consolidation 2. Dairy priority area 3. Easy accessibility 4. Others (specify) presence of groups & MPUs
1.3	Effectiveness of dairy cooperative as compared to existing farmers' groups	1. very effective 2. effective 3. ineffective 4. very ineffective
1.3.1	Which one do think is effective?	1. Dairy Co-op 2. Farmers' groups

1.3.2	Any reason why? *Rank in the order of importance.*	1. Co-op can absorb greater volume 2. Co-op can accommodate more members 3. Co-op can produce and market greater volume 4. Maintain continuous flow of products and income 5. Others (specify)
1.4	Innovative functions	
1.4.1	Should the dairy cooperative bring in new innovation functions different from the existing groups	1. very much 2. much 3. less 4. least
1.4.2	Why?	1. Product diversification 2. Maintain product quality 3. Improve marketing strategy
1.5	Future market conditions and opportunities	
1.5.1	Do you agree there are assured market conditions for milk and other dairy products?	1. strongly agree 2. agree 3. disagree 4. strongly disagree
1.5.2	If yes, where?	1. local towns 2. Capital city 3. regional market 4. Others (specify)
1.5.3	Can you maintain both quantity and quality?	1. very much 2. to some extent 3. less
1.5.4	Do you expect to receive good prices for your products?	1. very good 2. good 3. bad
1.6	Factors essential for a sustainable farmers' cooperative establishment	
1.6.1	Would dairy coop be sustainable?	1. very much 2. to some extent 3. not at all
2	**Facilitating factors** for smooth transition to cooperative chain development	
2.1	What supportive and enabling legal environment or legislation is essential?	
2.1.1	Are there groups' by-laws / rules and regulation be made?	1. Yes 2. No
2.1.2	Is acts & by-laws useful to guide and direct the members on board?	1. Yes 2. No
2.1.3	If yes, how?	1. Awareness on group function 2. More education on group mobilisation 3. Others (specify)
2.2	Organisational structure most practical and efficient way to achieve its goals	
2.2.1	Is the groups' structure working well?	1. Yes 2. No
2.2.2	If no, why?	
2.2.3	Are the groups capable of developing their own organisational structure?	1. Yes 2. No
2.3	What is the level of members' motivation for a new dairy cooperative?	

2.3.1	Are the members motivated?	1. very motivated 2. to some extent motivated 3. Not motivated
2.3.2	If yes, how?	
2.3.3	Are there desired level of attitude, interest and cooperation from the farmers?	1. very much 2. to some extent 3. Not at all
2.4	Tasks commitment or experiences of the members	
2.4.1	Are there members with such commitment and experiences?	1. Yes 2. No
2.4.2	If yes, how does that contribute? (*Rank in order of importance)*	1. share experiences with others 2. training new members 3. experienced members taking the lead 4. others (specify).
2.5	Impacts	
2.5.1	Is dairy coop is expected to bring in tangible impacts in near future and in the long run; are there specific impacts you think could benefit well?	1. Yes 2. No.
2.5.2	If yes, what would that be? (Ranking in order of importance)	1. dev. of dairy hub 2. product branding 3. others (specify)
2.6	How does dairy cooperative contribute to growth of dairy sector?	
2.6.1	Do you think coop can contribute to the growth of dairy sector?	1. very much 2. much 3. less 4. least
2.6.2	What growth do you expect? Like:	1. Farmers org (2nd) 2. Co-op org (1st) 3. Other (specify)
3	**Main challenges of dairy co-operative**	
3.1	Coop models	
3.1.1	Is there a need for village or community level milk cooperative?	1. Yes 2. No
3.1.2	If yes or no, why?	
3.1.3	Do you agree that dairy co-op offer equal opportunity to all members?	1. strongly agree 2. agree 3. disagree 4. strongly disagree
3.1.4	If agree, how?	1. Small farmers can become members 2. Equitable input and support sharing 3. Other (specify)
3.2	Important needs and level of interest among the existing actors and supporters	
3.2.1	Are there needs for the dairy farmers to organise a cooperative?	1. very much a need 2. to some extent a need 3. not at all a need
3.2.2	If yes, why do you think is a need?	
3.3	Preparedness of existing actors	
3.3.1	Is there sufficient preparedness of the up-takers and supporters?	1. Yes 2. No

		1. DoL is not prepared
		2. No plan of action.
		3. No funds
		4. Weak links
		5. Farmers unaware/ uninformed
3.3.2	Reasons, why? Reasons	6.Structure, equipment not in place
3.4	Inputs mechanisms /fund sources become more resourceful and competitive than the existing groups	
3.4.1	Should inputs need and supports function be part of cooperative role?	1. Yes
		2. No
		1. All processing & packaging equipment
		2. Dairy inputs to the members.
3.4.2	Inputs lists	3. Credit facility
3.4.3	How should the inputs be made available?	
		1. Yes
3.4.4	Are there sources of funds?	2. No
		1. Donors
		2. GOI
	If yes, from where? If no, how can it	3. RGOB
3.4.5	made available?	4. Other (specify)
3.5	Level of production is needed to attract cooperative from the members	
	Is there a critical volume of	1. Yes
3.5.1	production from the members?	2. No
		1. 100-500
		2. 501-1000
		3. 1001-2000
3.5.2	How much? (in litre/day):	4. 2001 and above
		1. Very much
	Can a balance be made between	2. To some extent
	members' needs and cooperative	3. little
3.6	profitability?	4. Too little

Appendix C. Questionnaire: Milk Processing Units (MPUs)

1	**Respondents' profile**	
	Name of MPU	
	Geog/Block	
	Place/village	
2.	**MPUs' short history**	
	When started?	
	Group members	
3.	**Inventory**	
	List of equipment	
4.	**Structures**	
	Funds for construction	
	Cost of construction	
	Purpose	
5.	**Quantity of milk received/day**	
	AM (litre)	
	PM (litre)	
	Monthly average (litre)	
6.	**Daily processing**	
	Daily (litre)	
	Twice a day	
7	**Products processed**	
	Soft cheese (balls)	
	Gouda cheese (kg)	
	Butter (kg)	
	Fluid milk (litre)	
9	**Selling rates**	
	Soft cheese (balls)	
	Butter (kg)	
	Gouda cheese (kg)	
	Fluid milk (litre)	
10	**Prices**	
	How are the pricing done?	
	Who determine the price for different products?	
	How often is the price increased? And why?	
	Are the milk producers and customers happy with the pricing system?	
11	**Annual turn-over**	
	Soft cheese (balls)	
	Butter (kg)	
	Gouda cheese (kg)	
	Fluid milk (litre)	
12.	**Customers**	
	Customers	
	Retail shops	
	Hotels / Restaurants	
	MPU’s retail outlet	
	Tourists	
	Travellers	
	Wholesalers	
	Traders	

13.	**Products Quality**	
	Milk received from the farmers	
	Soft cheese made	
	Butter produced	
	Gouda cheese made	
	Fluid milk packaged	
14.	**Quality control**	
	Milk	
	Cheese	
	Butter	
15.	**Quality regulation**	
	Who monitors the quality? How often?	
	How is farmers' milk quality monitored and maintained?	
16.	**Problems**	
	Any problems encountered by the MPU? If yes, what are the problems?	
	How are the problems resolved?	
17	**Potentials of the MPUs**	
	What do the farmers benefit from the MPU?	
	How does MPU benefit?	
	What facilities do the MPU render to the farmers in producing milk?	
	Any plan for future?	
18	**Operational management**	
	No. of workers	
	Workers' payment	
	money to pay workers	
	Regular expenses	
	Annual income	
	Annual profit	
	Records keeping	
	Markets	
	Saleability	
	Left-over or unsold products	
19	**Expenses**	
	Firewood	
	Electricity	
	Workers' payment	
	Transportation	
	Machinery repairs/spare parts	
20	**Future growth of farmers' groups**	

Appendix D. Potentials of dairy co-operative and ranking

Potentials	Factors	Rank
Is dairy co-op capable of bringing possible potential changes? Rank all potential factors in order of importance	1. Products diversification	1
	2. Offer employment	5
	3. Quality enhancement (value addition)	3
	4. Expand market. / provide milk market at present	6
	5. Income generation	2
	6. Poverty reduction	4
	7. Packaging, labelling and branding	8
	8. Economic growth of dairy sector	11
	9.Equal opportunity	10
	10. Capacity building	7

Appendix E. Dairy Farmers' Groups in Bumthang

Name of farmers' groups	Year of establishment	Members
1. Chokhor Gonor Gongphel Chithuen Tshogpa	2004	50
2. Chumey Gonor Lothuen Tshogpa	2004	30
3. Tang Welfare Association Dairy Farm	1998	244
4. Shingneer Community Dairy Farm	2004	32
5. Khangdrog Lanor Chugo Tshongdrel Chithuen Tshogpa	2008	10
6. Dhur Gonor Tsadrog Gongphel Tshogpa	2006	35
7. Shingkhar farmers' Dairy Group	2010	32
Total		**433**

Appendix F. Livestock infrastructures as of March 2007

Sl. No.	Infrastructures	Numbers
1.	Dzongkhag Veterinary Hospital	19
2.	Livestock Extension Centres	50
3.	Regional Livestock Development Centres	4
4.	Satellite Veterinary Laboratories	3
5.	Livestock Farms	12
6.	National feed and Fodder Development Programs	1
7.	Vaccine Production Centre	1
8.	National Artificial Insemination Centre	1
9.	Cold Water Fishery Centre	1
10.	National Warm Water Fishery Culture Centre	1
11.	National Centre for Animal Health	1
12.	National Livestock Breeding Programme	1
13.	AI Centres	70

Source PPD, 2008

Appendix G. List of equipment/machineries in the MPUs

Equipment	Capacity	Quantity		
		Chokhor	Chummey	Tang
Cream Separator	1000 litre	-	-	1 no
Cream Separator	500 litre	1 no	2 no	-
Cream Separator	150 litre	1 no	-	1 no
Butter Churner	50 litre	1 no	3 no	1 no
Butter Churner	15 litre	1 no	-	-
Deep Freeze	500 litre	2 no	1 no	1 no
Refrigerator	150 litre	2 no	-	-
Lactometer	-	2 no	2 no	2 no
Milk Fat Scanner	-	1 no	1 no	1 no
Steam Boiler	-	1 no	1 no	1 no
Water bath	50 litre	2 no	2 no	1 no
Milk Can	50 litre	10 no	4 no	6 no
Pots	20 kg	3 no	2 no	2 no
Bucket steel	10 litre	4 no	4 no	3 no
Weighing Balance	10 kg	1 no	1 no	1 no
Milk Chiller	500 litre	-	1 no	-
Cheese vat	700 litre	-	-	1 no
Cheese vat	400 litre	-	-	1 no

Appendix H. Changes before and after group formation

Variables	Before	After
No of milk cows	Less	More
Milk production level	Less	More
Income level	Less	More
Expenditure level	Less	More
Breed composition	Poor	Better
Improvement of dairy shed	No separate shed	Separate shed
Improved pasture development and production	None or less	More
Use of concentrate feed	None	More
Diary equipment	Traditional	Improved/more
Level of farm mechanisation	Less	More
Concentrate feeding	None	More
Health and hygiene	Poor	Better
Milk quality	Poor	Better
Animal disease incidences	Low	High
Cow and calf mortality	Low	High
Availability of inputs	Less	More
Extension support and services	Poor	Better
Technology	Less	More and better
Improved dairy husbandry knowledge & skills	Poor	Better
Breeding services (Natural & AI)	Natural mostly	AI
Customers for milk	Less	More
Customers for other dairy products	Less	More
Credit facility	Less	More
Training, meetings, workshops for the farmers	Less	More
Saving schemes	None	Operational
Road network	Poor	Better
Tele-communication facility	None	Well connected
Electricity	None	Well connected
Drinking water	Poor	Better
Media (TV, Radio)	None	Available now
Cooperation among neighbours	Individualistic	Cooperative

Appendix I. Chi Square and Kruskalwallis Test

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2,241[a]	1	,134		
Continuity Correction[b]	1,196	1	,274		
Likelihood Ratio	2,157	1	,142		
Fisher's Exact Test				,227	,138
Linear-by-Linear Association	2,177	1	,140		
N of Valid Cases	35				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.14.

b. Computed only for a 2x2 table

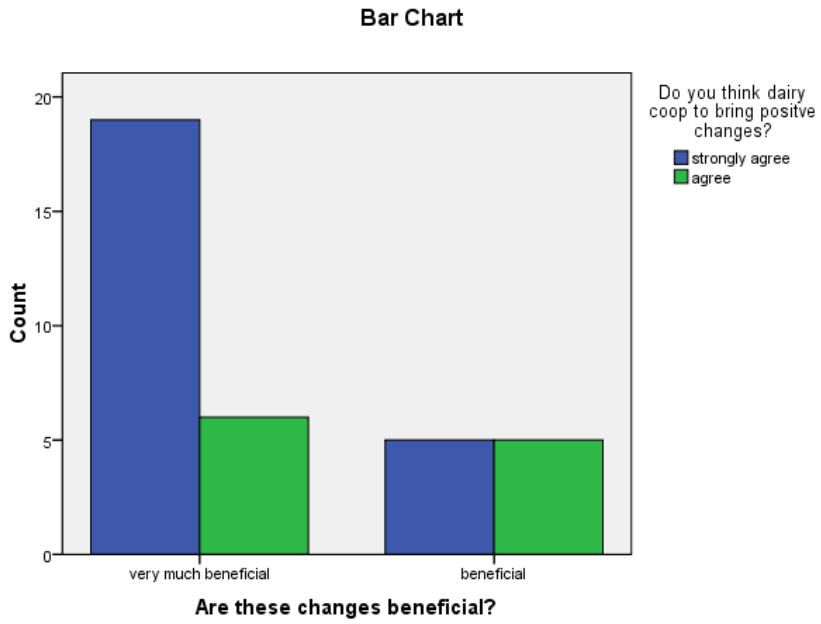
Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	,253	,174	1,502	,143[c]
Ordinal by Ordinal	Spearman Correlation	,253	,174	1,502	,143[c]
N of Valid Cases		35			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.



Kruskalwallis Test

Ranks

	Do you think dairy coop to bring positive changes?	N	Mean Rank
Are these changes beneficial?	strongly agree	24	16,65
	agree	11	20,95
	Total	35	

Test Statistics[a,b]

	Are these changes beneficial?
Chi-Square	2,177
df	1
Asymp. Sig.	,140

a. Kruskal Wallis Test

b. Grouping Variable: Do you think dairy coop to bring positive changes?

Dairy cows grazing on improved pasture in Norgang, Bumthang,2008