

# **Study on Sustainable Development Conditions of Dairy Farming**

**- Case Study of Japan and Bangladesh-**

## **酪農の持続的展開条件に関する研究**

—日本とバングラデシュの事例研究—

March, 2014

Department Of Science of Bio-resource Production

The United Graduate School of Agricultural Sciences

Kagoshima University

Junayed Uddin Ahmed

---

**STUDY ON SUSTAINABLE DEVELOPMENT CONDITIONS OF DAIRY  
FARMING  
- CASE STUDY OF JAPAN AND BANGLADESH-**

JUNAYED UDDIN AHMED

A DISSERTATION SUBMITTED TO THE UNITED GRADUATE SCHOOL OF  
AGRICULTURAL SCIENCES, KAGOSHIMA UNIVERSITY

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY IN REGIONAL AND GLOBAL RESOURCE ECONOMICS

RECOMMENDED FOR ACCEPTANCE

BY THE DEPARTMENT OF

SCIENCE OF BIO-RESOURCE PRODUCTION

SUPERVISOR: PROFESSOR DR. TSUNEO KOBAYASHI

MARCH, 2014

---

# Abstract

The study was conducted to find out extent of sustainable development of dairy farming in Bangladesh and Japan (except large farm in Hokkaido). Starting in the early 1970s, when Japanese economy increased steadily, livestock consumption especially consumption of milk and other dairy products grew sharply. But the consumption of rice has declined in the long term. Despite this, the consumption of milk and dairy products increased steadily. An average annual increase of 9.4% in daily per capita consumption was recorded between 1965 and 1975. Compared with rice and other traditional staples, the market for milk and other dairy products shows considerable room for growth and of great potential. In that way, dairy has been developed in Japan and has been continued to sustain. The biggest problem facing Japanese agriculture as well as dairy farm is the shrinking labor force and lack of young people willing to carry on operating family farms onto the next generation. Currently, only about 6.5% of all farms in Japan will be passed down to the next generation. In light of this, almost 93% of Japanese farms will disappear in the near future.

In case of successors' condition, this study empirically analyzed different scale of dairy farms through classification such as small scale (those have 2-48 cows), medium scale (those have 48-80 cows) and large scale (those have above 80 cows). In Saga Prefecture, the survey results indicate that small scale farmers were facing most of retaining successor. Medium and large scale farmers send their children to dairy specialized college for training and study, those who are continuing farming activities and can continue their own farm onto next generation. There are three farms who involves in "Sixth-industry" farming i.e. small, medium and large in size. The results indicate that successor of two farms engaged in farming activities along with processing units. Another successor is planning to continue the farming activities after retirement of his parents from farming as he is working in prefectural government office as veterinary doctor.

In Bangladesh economy, a structural transformation has taken place during the last three decades. The country has achieved self-sufficiency in food grain production due to appreciable growth rate in the sector but the share of agriculture in GDP has declined relative to other sectors and within the agriculture sector, the share of livestock sub-sector has increased relative to crop, fisheries and forestry. Livestock share of agricultural income increased from 7.6% in 1973-74 to 12.9% in 1998-99 and is projected to increase to 19.9% in 2020. During 1973/74-89/90, livestock output grew at 5.2% per annum compared to 1.7% for crop output and 2.6% for agricultural output in general. These changes have been prompted by a rapid growth in demand for livestock products due to income and population growth and urbanisation.

Dairy is the most important livestock product produced by smallholder crop-livestock farmers. Milk production in Bangladesh increased from 1.29 million metric tons in 1987-88 to 1.62 million metric tons in 1997-98, to 1.74 million metric tons in 2001. However, current national production is inadequate to meet demand. Due to increased production import of powdered milk decreased from 55,000 metric tons in 1991-92 to 17,000 metric tons in 2001. Income elasticity of demand for milk is estimated to be 1.62 compared to 1.19 for meat and eggs in 1995-96, and these are projected to be 0.65 and 0.63 respectively in 2020. Milk production in the country needs to grow by 4.2- 5.6 percent per annum to meet increased demand.

Dairying in Bangladesh is practiced as a part of mixed crop farming system where most of the rural household keep cow in order to cultivate land and also to produce milk for family consumption. Cows are reared in very primitive way. It is seen from the history that, milk may not have been sold in many parts of Bangladesh where production was mainly aimed at subsistence consumption. In Bangladesh, most of the cow (about 80%) is owned by smallholder households. The survey results indicate that dairy farming in this area is mainly carried out as main source of income in which women (34.4% of the respondents) contributes in agricultural activities. Integrated dairy farming and agriculture increases short term benefits to and long term sustainability of agriculture. The data reveal a greater use of family labor in dairy cows' care and delivering milk. Income from the dairy activities was used to meet/provide household expenses, savings, investment and insurance. Finding of the study reveals that Local Resource Circulation Systems (LRCSs) by means of farm management to decrease the cost, and increase the income and labor utilization in dairy-crop farming in the farm level. It has contributed to provide year-round working opportunities for the local people, utilize family labor effectively and provide a place for milk market low shipping and no storage cost.

There were not many commercial dairy farms in Bangladesh. The commercial dairy farming in Bangladesh was started mainly after the Chernobyl disaster in former Soviet Union. Imports of dairy products from European countries were banned temporarily by the Bangladesh government in 1987. As a result, a number of dairy farms have grown up in private initiatives under incentive bonus program and dairy loan program that have been taken by the government. In general, most of the commercial dairy farms are operating their activities under cooperative system in Bangladesh. However, the milk marketing and processing systems in Bangladesh are not yet developed. Milk being perishable item, need timely supply and special attention to market, makes the marketing more difficult (FAO, 1990). Generally, rural milk producers sell their surplus milk to various marketing intermediaries prevailing locally who in turn sell the milk to the individual consumers, restaurants & tea stalls in the urban area. Lack of organized milk marketing system in the grass-root level is a drawback for the farmers' position in selling milk. Earning money and improving production will be vulnerable if they are unorganized. Under these circumstances the farmers are unable to improve their socio-economic conditions. Cooperative marketing system could play a vital role in providing a channel that can link the farmers to the urban markets/consumers smoothly and ensure higher price for their products. It was observed that cooperative members were bringing milk to the milk collecting point twice a day, morning and evening. It was also observed the veterinary team and extension officials from Baghabarighat milk shed area are visiting Potazia primary cooperative at least once a week. Available services provide them an opportunity to develop their cooperative and dairying.

The study found the extent of sustainable development of dairy farming in Japan and Bangladesh. As, it found the successors' condition in different scale of dairy farms and also found sixth industrialized farm to retain successor. In Bangladesh, farmers are being continued their support and membership tenure in cooperative society in the long run to sustain their farm.

# Acknowledgements

While graduate students are frequently admonished to take ownership of their thesis, at the terminus of my research I cannot help but see my thesis as a product, not of individual industry, but of the conversations I have had, the instruction I have received and the intellectual environment I have lived in over the past three years. I would first like to thank my supervisor, Professor Dr. Tsuneo Kobayashi, Department of Agricultural Economics, Faculty of Agriculture, Saga University, Saga, Japan, for his constant supervision, continuous guidance, helpful criticism, suggestions and encouragement given throughout the course of this research. Even with his tight and hectic schedules, he always gave the author his time and the support every time when needed. His suggestions have given me a good knowledge in relation to Japanese agriculture and many advises to accomplish the dissertation and has arranged for the most advantageous working survey and available data. His high appreciations, positive attitudes and generous comments about the author's research ability, played an important role in the outcome of this dissertation. It has been a very pleasant experience to work under guidance of Professor Kobayashi, a person having highly disciplined life style, leadership character and philosophical thoughts.

The author also sincerely indebted to co-supervisors Professor Dr. Yoshiharu Shiratake, Department of Agricultural Economics, Faculty of Agriculture, Saga University, Saga, Japan and Professor Dr. Shoichi Tashiro, Department of Agricultural Economics, Faculty of Agriculture, Kagoshima University, Kagoshima, Japan. They were very supportive throughout the completion of the dissertation. The author always grateful to them for their continuous guidance and motivations during research work. Their encouraging words are still echoing in heart and lighting up my way.

Profound gratitude is expressed to the other members of the advisory and examination committee of this dissertation, Professor Dr. Izumi Iwamoto, Department of Agricultural Marketing and Agri-business, Faculty of Agriculture, Kagoshima University, Kagoshima, Japan, and Professor Dr. Shigeyuki Naitoh., Department of Agricultural Marketing, Faculty of Agriculture, The University Ryukyus, Okinawa, Japan for managing their time from tight and hectic schedules and their support and valuable suggestions and comments.

The author wishes to indebtedness to the authority of Saga University and Kagoshima University and The Government of Japan (MEXT) for providing financial support through Manbukagakusho Research Scholarship to accomplish this research work.

The author would like to express his deep gratitude and appreciation to parents, brothers and sisters for their sacrifice and constant inspiration and encouragement. The author would like to express my very kindness to wife, Mrs. Maya Sultana, for her wisdom in understanding the situation and very well tolerance everything and to son, Jarrar Anan Ahmed for giving a cheerful and heavenly atmosphere at home and making me to be more powerful in my life.

# Contents

ABSTRACT.....	iii
ACKNOWLEDGEMENTS.....	vi
TABLES.....	ix
FIGURES.....	xi
MAP.....	xii

## CHAPTER 1

<b>INTRODUCTION.....</b>	<b>1</b>
1.1 Background.....	1
1.2 Motivation.....	4
1.3 Objective of the study.....	7
1.4 Concept of sustainable Development.....	12
1.5 Methodology of the study.....	16
1.6 Limitations of the study.....	20
1.7 Structure of the dissertation.....	21

## CHAPTER 2

<b>LITERATURE REVIEW.....</b>	<b>22</b>
2.1 Literature related on dairy farming in Japan.....	22
2.2 Literature related on dairy farming in Bangladesh.....	27
2.3 Literature related farmers' loyalty to dairy cooperative.....	34
2.4 Research conducted on present study.....	37

## CHAPTER 3

<b>DAIRY FARMING IN JAPAN.....</b>	<b>43</b>
<b>3.1. Introduction.....</b>	<b>43</b>
3.1.1 Dairy Farming as efficient Japanese Agriculture.....	43
3.1.2 Growing Era of Japanese Dairy.....	45
3.1.3 Planned Production of Dairy Farming.....	46

3.1.4 Government Subsidies in Dairy Farm abide by Law.....	47
3.1.5 Japanese Dairy Farming has caught up with Global Dairy farming.....	48
3.1.6 Highest production.....	50
3.1.7 Dairy becomes individualized and multifaceted.....	51
<b>3.2 Scale Classification and Practices of Dairy Farms.....</b>	<b>51</b>
3.2.1 Classification of scale size of dairy farms.....	52
3.2.2 General Characteristics of Respondents .....	54
3.2.3 Overall Management Practices of Dairy Farms.....	56
<b>3.3 Sustainable Development through Sixth Industrialization.....</b>	<b>61</b>
3.3.1 Importance of Distribution in Marketing Channel.....	63
3.3.2 Concept of Sixth Industrialization.....	65
3.3.3 Structure and Strategy of Sixth Industrialized Farm.....	69
 <b>CHAPTER 4</b>	
<b>DAIRY FARMING IN BANGLADESH.....</b>	<b>77</b>
 <b>4.1 Introduction.....</b>	<b>77</b>
4.1.1 Overview of livestock sector.....	77
4.1.2 Traditional dairy farming.....	80
4.1.3 Cooperative Dairy Farming.....	85
4.1.4 Contribution to farmers' livelihood.....	88
 <b>4.2 Farming Practices and Resource Circulation System.....</b>	<b>93</b>
4.2.1 Socioeconomic Characteristics of Dairy Farmers.....	93
4.2.2 Management Practices of Dairy Farms.....	94
4.2.3 Local Resource Circulation System of Dairy Farms.....	99
 <b>4.3 Role of cooperative services in dairy development.....</b>	<b>101</b>
4.3.1 Definition of cooperative.....	101
4.3.2 History of cooperatives in Dairy Industry.....	103
4.3.3 Dairy Cooperative in Bangladesh.....	106
4.3.4 Cooperative services in Dairy development.....	109
4.3.5 Production and Marketing Constraints.....	120

<b>4.4 Sustainable development through cooperative.....</b>	<b>122</b>
4.4.1 Development activities of dairy cooperative.....	123
4.4.2 Farmers’ Loyalty to Dairy Cooperative.....	125
4.4.3 Factors affecting farmers’ loyalty to dairy cooperative.....	125
4.4.4 Econometric Results of factors affecting farmers’ loyalty to BMPCUL.....	127
 <b>CHAPTER 5</b>	
<b>RESULTS AND DISCUSSION.....</b>	<b>131</b>
5.1 Sustainable development structure and condition of Japanese Dairy.....	131
5.2 Changes of Central dairy farming area of Saga Prefecture.....	132
5.3 Scale size of Dairy farms in Tofuken (case study of Saga Prefecture).....	133
5.4 “Sixth-Industry” of Dairy Farms.....	134
5.5 Sustainable development structure and condition of Bangladesh Dairy.....	138
5.6 Contribution of dairying.....	140
5.7 Resource Circulation System and its impact.....	142
5.8 Sustainable development structure under dairy cooperative (BMPCUL).....	144
 <b>CHAPTER 6</b>	
<b>CONCLUSION .....</b>	<b>156</b>
6.1 Concluding Summary.....	156
6.2 Managerial Implications.....	163
6.3 Future Research.....	164
 <b>BIBLIOGRAPHY.....</b>	<b>166</b>
<b>APPENDIX.....</b>	<b>172</b>

## List of Illustrations

### TABLES

Table 3-1: Scale Size of Dairy Households of Tofuken, Japan.....	53
Table 3-2: General Characteristics of Farmers.....	54
Table 3-3: Produced and Purchased Scenario of Roughage.....	56
Table 3-4 Cow Barn System Practiced by dairy Households.....	57
Table 3-5: Successor's Condition of Different Scale Dairy Households.....	60
Table 3-6: General Characteristics of Farm A, B & C.....	69
Table 3-7: Marketing Mix Analysis of Farm A.....	70
Table 3-8: SWOT Analysis of Direct Marketing Channel for Farm A.....	71
Table 3-9: Marketing Mix Analysis of Farm B.....	72
Table 3-10: SWOT Analysis of Direct Marketing Channel for Farm B.....	73
Table 3-11: Marketing Mix Analysis of Farm C.....	74
Table 3-12: SWOT Analysis of Direct Marketing Channel for farm C.....	75
Table 4-1: Energy balance sheet for cattle in Bangladesh.....	89
Table 4-2: Pattern of utilization of labor on dairy farms.....	90
Table 4-3: Socio-economic characteristics of respondents.....	94
Table 4-4: Feeding of dairy cattle by farmers.....	95
Table 4-5: Costs and income of rearing one milking cow per day.....	96
Table 4-6: Milk Production and Gross Income for Dairy Farmers.....	97
Table 4-7: Milk Consumption of Dairy Farmers.....	98
Table 4-8: Farmer's perceptions of their vulnerability reduction due to dairy farming..	98
Table 4-9: Socio-economic Characteristics of Respondents.....	110
Table 4-10: Variable inputs cost per day.....	112

Table 4-11: Milk yield, laction period and herd composition.....	114
Table 4-12: Milk marketed and consumed by respondents.....	115
Table 4-13: Strategy in different milk marketing channel.....	117
Table 4-14: Farmers' benefits as a member of being cooperative society.....	119
Table 4-15: Constraints Faced by Cooperative and Non Cooperative Members Regarding Production. ...	121
Table 4-16: Constraints Faced by Cooperative and Non Cooperative Members Regarding Marketing. ....	122
Table 4-17: Feed Support to Members by BMPCUL.....	124
Table 4-18: Demographic Characteristics of Respondents.....	126
Table 4-19: Descriptions of Variables.....	127
Table 4-20: OLS Regression Model Results.....	128

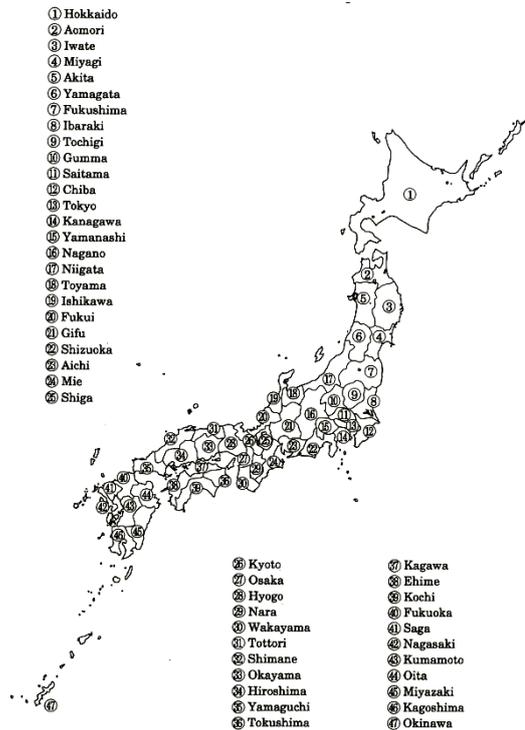
## FIGURES

Figure 1-1: Changes of Japanese Diet.....	2
Figure 1-2: Projected changes in demand for livestock products.....	6
Figure 1-3: Sustainable Development Triangle.....	13
Figure 3-1: Planned Production System.....	46
Figure 3-2: Number of Dairy Cattle per Households in Selected Countries.....	49
Figure 3-3: Milking Quantity per cows in various countries.....	50
Figure 3-4: Average Annual Income of Households (Worker’s and dairy.....	52
Figure 3-5: Family Labor Income from Raw Milk/Kg in Tofuken.....	62
Figure 3-6: Production and Consumption pattern of Milk and Milk Products, Japan...	63
Figure 3-7: Milk Distribution channel of Saga Prefecture.....	64
Figure 3-8: Economic effects achieved through promotion of “Sixth-industry”.....	67
Figure 3-9: Supply Chain Channel of Farm A.....	72
Figure 3-10: Supply Chain Channel of Farm B.....	73
Figure 3-11: Supply Chain Channel of Farm C.....	75
Figure 4-1: per capita GDP and energy consumption in South Asia.....	91
Figure 4-2: Local Resource Circulation System of Dairy Farming.....	100
Figure 4-3: Milk Supply Chain of Cooperative Dairy Farmers.....	116
Figure 4-4: Milk Supply Chain of Non-Cooperative Dairy Farmers.....	117
Figure 4-5: Veterinary extension services of Dairy Cooperative, Baghabarighat.....	123

# MAPS



(a)

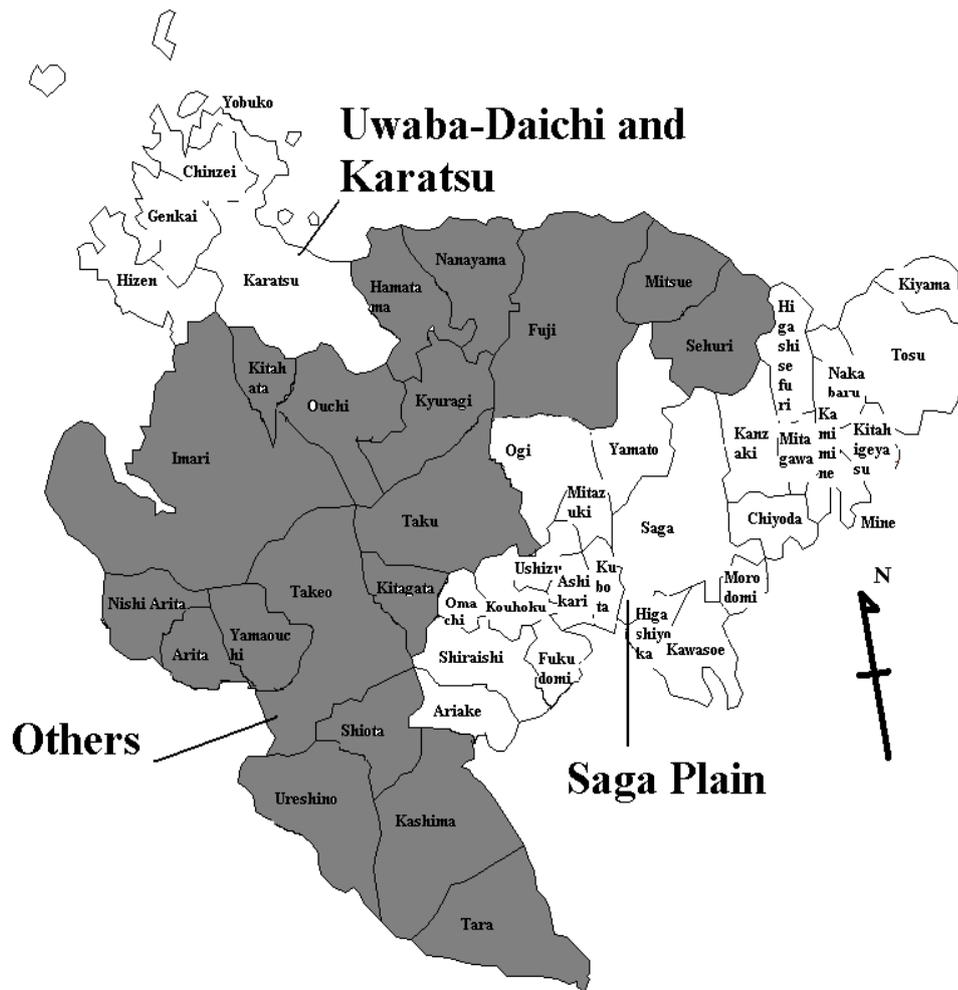


(b)

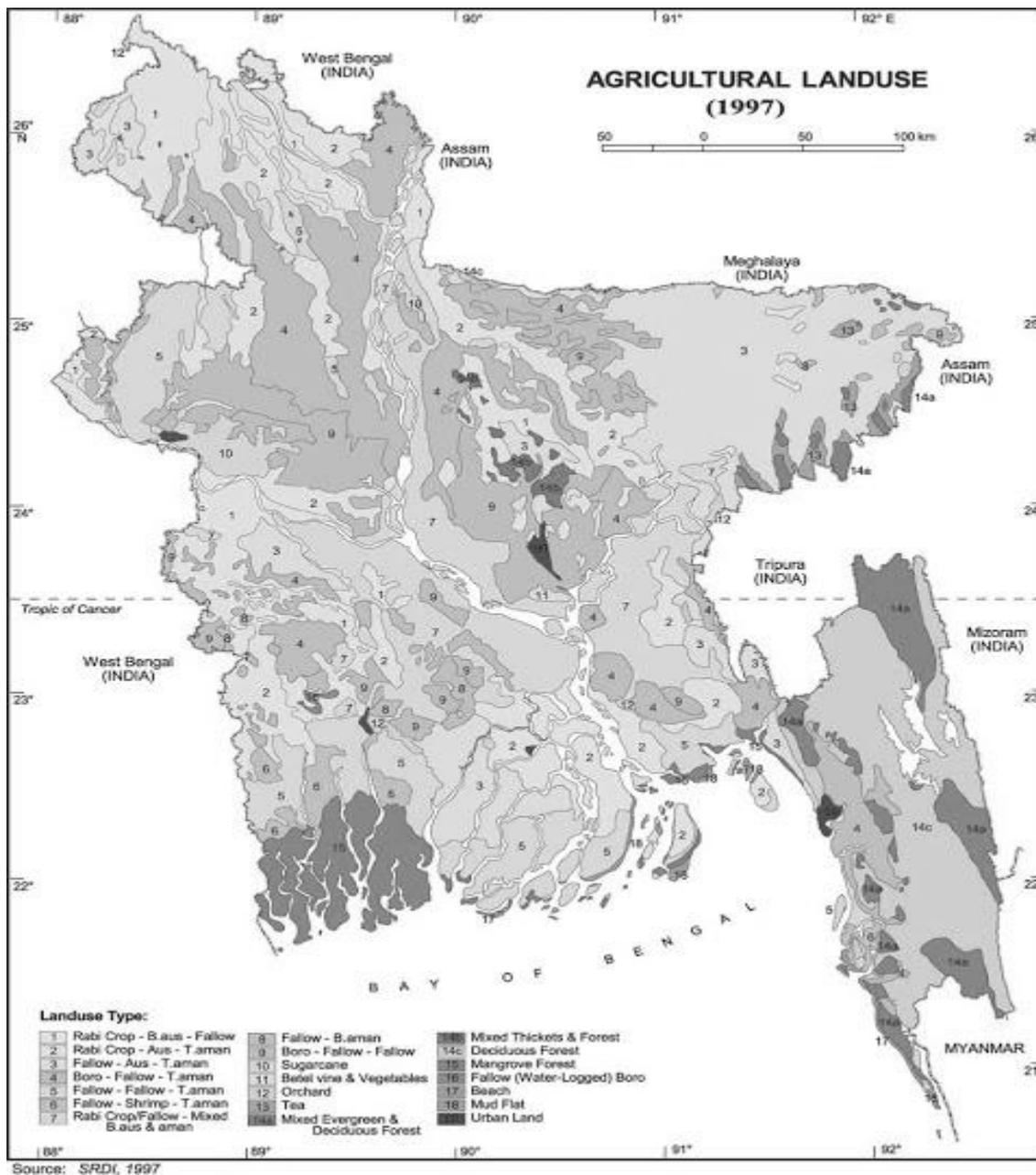
**Map 1: (a) Agricultural Regions of Japan**

**(b) Prefectures of Japan**

Source: Statistics and Information Department, Ministry of Agriculture, Forestry and Fisheries



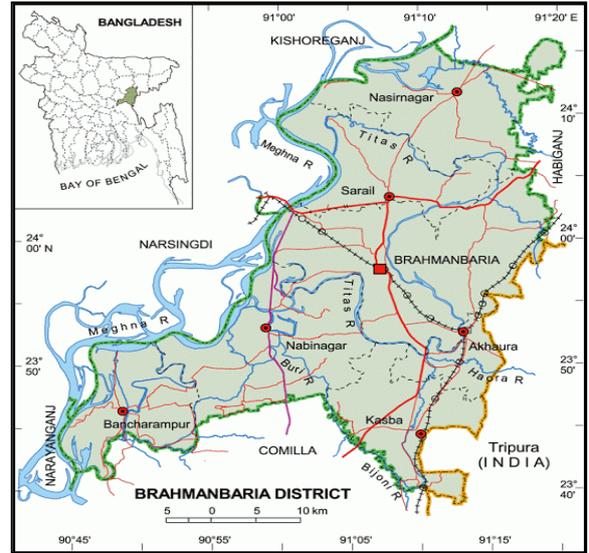
**Map 2: Agricultural Regions of Saga Prefecture**



**Map 3: Agricultural land area of Bangladesh**



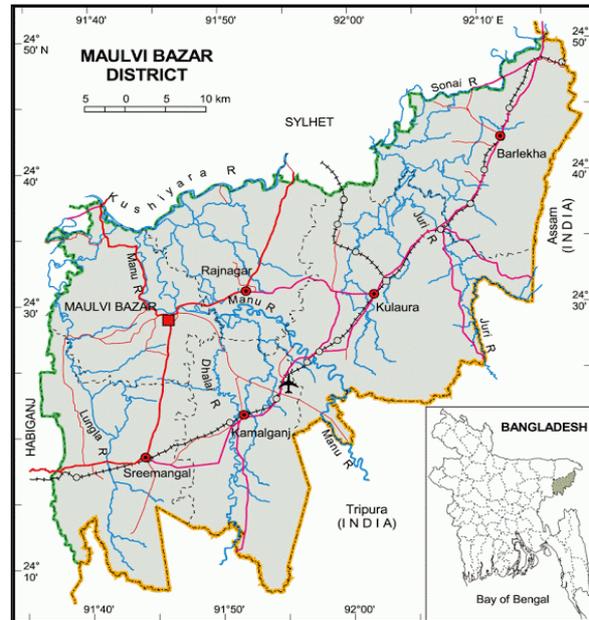
(a)



(b)



(c)



(d)

### Map 4: Study Area

- (a) Sirajgonj District
- (b) Brahmanbaria District
- (c) Jessore District
- (d) Maulvibazar District

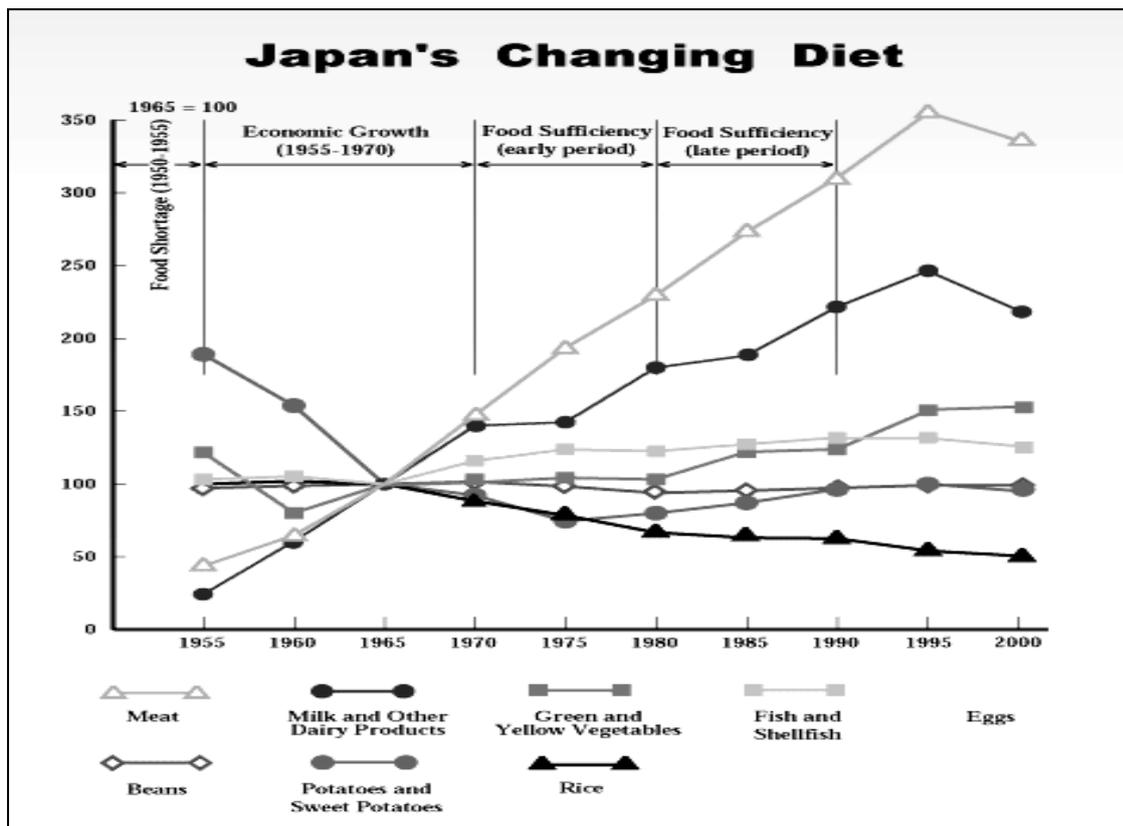
# Chapter 1

## Introduction

### 1.1 Background

The Japanese diet has changed from a traditional one, centred on rice, potatoes and sweet potatoes, vegetables, and fish to incorporate many traditional Western food staples in the 50 years since the end of World War II. The five years from 1945 to 1950 were a time of crisis, characterized by chronic labor shortages, decreased economic power, and devastation of the urban landscape and the Japanese agricultural industry. During this period, potatoes and sweet potatoes, vegetables, and minor cereals were the mainstays of the Japanese diet. Chronic food shortages and the lack of availability of animal food products meant that much of the Japanese population suffered from an insufficient intake of calories and protein. The five-year period from 1950 to 1955 saw continuing food shortages. Although the Japanese diet was still largely traditional, the percentage of animal food products such as milk, other dairy products, eggs, and meat, as well as beans was increasing. With this, the variety of food

choices began to increase, while nutrition improved, and minimum caloric requirements were fulfilled. Provisions for a national school lunch program were also initiated during this period. A typical school lunch consisted of milk, a roll, margarine, and one or two side dishes. This was the first step toward the subsequent westernization of the Japanese diet. From 1955 to 1970, the Japanese economy grew dramatically. As Japanese households acquired all the trappings of Western prosperity, including home electric appliances such as television sets, washing machines, refrigerators, and toasters, their dietary habits changed as well. The consumption of traditional European and American foodstuffs such as milk, butter, cheese, meat, and eggs rapidly grew. Food imports increased, leading to diversification and internationalization in Japanese supermarkets. The shift away from the traditional Japanese diet was well underway.



**Figure 1-1: Changes of Japanese Diet**

Source: "Research of national nutrition "Ministry of Health, Labor and Welfare

Bangladesh is a developing country in the Southeast Asian nations. It is estimated that in 2020 and 2030, Bangladesh will have a population of 169 and 191 million respectively i.e. an increase by 17 and 32 per cent over the population of 144.2 million (2008). The increase in population needs larger domestic production of foods. Production of food should be raised at least by this rate and from the same amount of agricultural land or less.

More than 70% of total population lived in rural areas, those who get their earnings from Agriculture. About 20% of Gross Domestic Product (GDP) of Bangladesh originates from Agricultural sector. Besides this, it has indirect contribution on the overall growth of GDP. Many sectors such as wholesale and retail trade, hotel and restaurants are strongly supported by agricultural sector (DLS, 2008). About 2.0% of GDP comes from livestock and poultry sector. About 42% of agricultural households engaged in dairy farming (BBS, 2008). Dairying is also considered a strong tool to develop a village micro economy of Bangladesh in order to improve rural livelihoods and to alleviate rural poverty (Shamsuddin et al., 2007). Around 150 million farm households across the world are involved in milk production, amounting to some 750-900 million people (or 12-14% of the world's population).

The dependency of rural people on livestock for their livelihood is quite substantial and this situation is likely to continue for the years to come. Among the livestock, dairy cattle play a pivotal role in the livelihoods of the poor people specially those who are poor not only in land assets but also in literacy, access to infrastructure facilities, information and basically unskilled.

According to the national health strategy, the people of Bangladesh should have 250ml of milk every day. But, people are getting less than 41.2g every day (Miah and Mandal, 2002). Malnutrition in Bangladesh has been a persistent problem for the poverty-stricken country. The World Bank estimates that Bangladesh is ranked 1st in the world of the number of children suffering from malnutrition. In Bangladesh, 26% of the population are malnourished.

Milk and its products are very rich sources of readily available calcium, riboflavin and vitamin A. ( M.A. Samad and M.H Rashid, 2002).

## 1.2 Motivation

Ever since the creation of mankind, the major thrust has been on the search for food for existence. Thus, for human population, the nature provided a continuous supply of food. Plants and animals were utilised by man as foods during the prehistoric period. Subsequent domestication of animals and evolution of crop raising activities made animals farming as a subsidiary to agriculture. In western countries, animal husbandry is even now referred to as ‘Animal Agriculture’. However, of late, dairy industry has shown the ability to sustain itself as a profitable industry in many spheres over-powering the traditional dominance exercised by agriculture.

**In Japan**, the total annual raw milk production is about 8.3 million tons, second only to rice as the country's biggest agricultural product. About 60% of production is used to produce milk for drinking, while the remaining 40% of raw milk is processed into other dairy products such as cheese and butter. This production is supported by approximately 19,400 dairy farms and about 1.42 million dairy cows. The average number of cows per farm was about 73 as of February 2013. The average annual production per head is about 7,103kg. Relative to rice farming, a single producing dairy cow provides an equivalent income as that generated by 52ares of rice field. When applied to an average dairy farm of 37.6 producing cows, this provides an equivalent of about 19.5 hectares of cultivated rice. The number of equivalent rice producers on this scale in Japan can be counted on the fingers of one hand. Apart from the sparsely settled island of Hokkaido, where pasture dairy farming is common, most Japanese dairy farmers operate farms in narrow valleys or on land located on the outskirts of urban areas. Even these small-scale farms have the income potential of all but the very largest

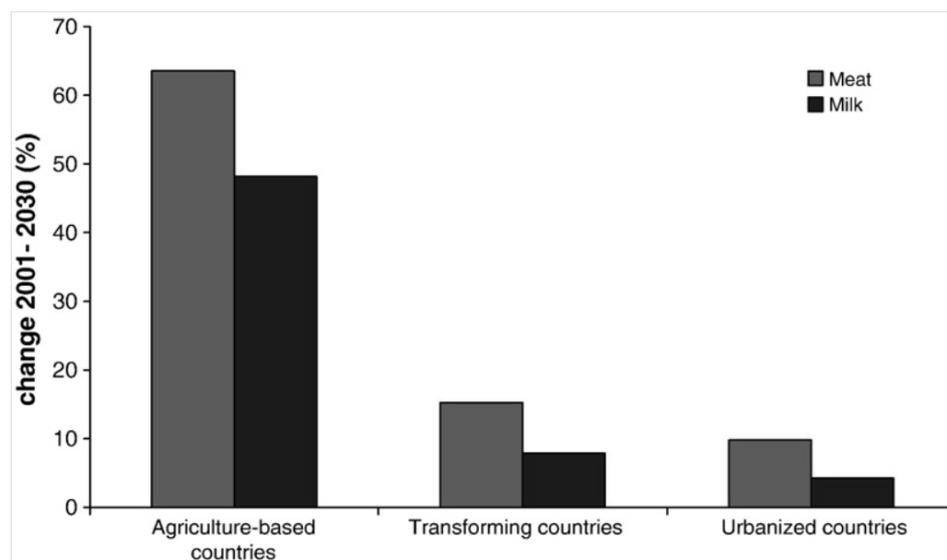
rice and dry field farms. Indeed, Japanese dairy farming is a model of agricultural efficiency in Japan.

But, biggest problem facing Japanese agriculture as well as dairy farm is the shrinking labor force and lack of young people willing to carry on operating family farms into the next generation. Currently, only about 6.5% of all farms in Japan will be passed down to the next generation. In light of this, almost 93% of Japanese farms will disappear in the near future. As Japanese dairy farms are mainly large in number and the number of households are reducing because of aforesaid problems. In Japan except Hokkaido, most of the dairy farms are small and medium scale in operations.

**Bangladesh**, is a developing country in the Southeast Asian nations. It is estimated that in 2020 and 2030, Bangladesh will have a population of 169 and 191 million respectively i.e. an increase by 17 and 32 per cent over the population of 144.2 million (2008). The increase in population needs larger domestic production of foods. Production of food should be raised at least by this rate and from the same amount of agricultural land or less.

More than 70% of total population lived in rural areas, those who get their earnings from Agriculture. About 20% of Gross Domestic Product (GDP) of Bangladesh originates from Agricultural sector. Besides this, it has indirect contribution on the overall growth of GDP. Many sectors such as wholesale and retail trade, hotel and restaurants are strongly supported by agricultural sector (DLS, 2008). About 2.0% of GDP comes from livestock and poultry sector. About 42% of agricultural households engaged in dairy farming (BBS, 2008).

The dependency of rural people on livestock for their livelihood is quite substantial, and this situation is likely to continue for years to come. Among the types of livestock kept, dairy cattle play a pivotal role in the livelihoods farmers' in Bangladesh. Milk and its products are very rich sources of readily available calcium, riboflavin and vitamin A. (M.A. Samad and M.H Rashid, 2002). According to the national health strategy, people in Bangladesh should have 250 ml of milk every day. However, the average daily consumption per person was less than 41.2 g in 2002 (Miah and Mandal, 2002) and was 44.3 g in 2007 (FAO). Malnutrition has been a persistent problem for the poverty-stricken developing country like Bangladesh. The World Bank estimates that Bangladesh is ranked first in the world in the number of children suffering from malnutrition. In Bangladesh, 26% of the population is malnourished.



**Figure 1-2: Projected changes in demand for livestock products**

Source: Adapted from IAASTD (2007)

The booming demand for livestock and livestock products is taking place almost exclusively in developing countries. Projections of food demand show per capita consumption growth rates for meat and milk differing greatly between developing and developed countries

Rural milk producers sell their surplus milk to various marketing intermediaries prevailing locally who in turn sell the milk to the individual consumers, restaurants & tea stalls in the urban area. Lack of organized milk marketing system in the grass-root level is a drawback for the farmers' position in selling milk. Earning money and improving production will be vulnerable if they are unorganized. Under these circumstances the farmers are unable to improve their socio-economic conditions. Cooperative marketing system could play a vital role in providing a channel that can link the farmers to the urban markets/consumers smoothly and ensure higher price for their products.

### **1.3 Objectives of the Study**

Starting in the early 1970s, when Japan became self-sufficient in food in quantity and quality, consumption of milk, other dairy products, and meat grew sharply. Beginning 1975, Japanese traditional diet has been reassessed. But the consumption of rice has declined in the long term. Despite this, the consumption of milk and dairy products increased steadily. The consumption of milk and other dairy products grew rapidly as the Japanese diet became more westernized. An average annual increase of 9.4% in daily per capita consumption was recorded between 1965 and 1975. Compared with rice and other traditional staples, the market for milk and other dairy products shows considerable room for growth and great potential. In that way, dairy has been developed in Japan and has been continued to sustain. The biggest problem facing Japanese agriculture as well as dairy farm is the shrinking labor

force and lack of young people willing to carry on operating family farms into the next generation. Currently, only about 6.5% of all farms in Japan will be passed down to the next generation. In light of this, almost 93% of Japanese farms will disappear in the near future. As Japanese dairy farms are mainly large in number and the number of households are reducing because of aforesaid problems. Large in number said in different text but it doesn't have classification of the dairy households.

That's why; the objectives of the 1<sup>st</sup> part of the study are;

- (1) To classify scale size of dairy households;
- (2) To find out present status of feeding, milking and other managerial practices of different scale dairy households;
- (3) To find out successors condition of different scale dairy households and retention onto the farm
- (4) To find out structure and strategy of industrialized dairy farm;

The dependency of rural people on livestock for their livelihood is quite substantial, and this situation is likely to continue for years to come. Among the types of livestock kept, dairy cattle play a pivotal role in the livelihoods farmers' in Bangladesh. Milk and its products are very rich sources of readily available calcium, riboflavin and vitamin A. (M.A. Samad and M.H Rashid, 2002). According to the national health strategy, people in Bangladesh should have 250 ml of milk every day. However, the average daily consumption per person was less than 41.2 g in 2002 (Miah and Mandal, 2002) and was 44.3 g in 2007 (FAO). Malnutrition has been a persistent problem for the poverty-stricken developing country like Bangladesh. The World Bank estimates that Bangladesh is ranked first in the world in the number of children suffering from malnutrition. In Bangladesh, 26% of the population is malnourished.

Most of the rural people of Bangladesh get energy from fuel wood, agricultural residues, cow dung, and kerosene. Only 3% of the people enjoy natural gas facilities connected to their home through pipelines mostly in eastern part of the country in big cities (gshakti.org). But, in study area, people are not getting natural gas through pipelines. To face this worst situation decentralized energy system like solar, biogas could be the best option for rural energy supply.

Bangladesh has a long history in bio gas extension program since 1972, which started experimenting under the auspices of Bangladesh Agricultural University, followed by Bangladesh Academy for Rural Development (BARD) and Bangladesh Council of Scientific and Industrial Research (BSCIR) on a pure primary Experimental basis. A part of their research work and their adopted technology for the utilization of farmers showed a very poor picture up to 1984. Eventually putting the biogas program in harness, actually the Govt. started the extension program in 1995 that continued by Netherlands Development Organization (SNV) which showed a ray of hope for its performance of the years and helped the rural farmers depending on the cattle live up to certain number which felt below the expectation giving rise to the cost analysis for consumptions at domestic level. Meanwhile, other NGOs showed their interest to participate in this ongoing programme like Grammshakti and other Partner Organizations (Pos) and Govt.

As per NDBMP, manure is a major source of biogas production and cattle manure shares the major part of this source. Among this cattle manure, dairy cattle manure accounts for significant share of manure in Bangladesh. There are 26.83 million cattle out of which 15.81 million are dairy cattle. The majority of the dairy cattle are in the hands of smallholder dairy producers. Also dairying is a part of the mixed farming systems in Bangladesh (Saadullah, 2001). 80% of the country's people live in the rural areas and are highly dependent on agricultural system that is finely attuned to a tropical monsoon climate (UNDP, 2005). About

2.0% of GDP comes from livestock and poultry sector. About 42% of agricultural households engaged in dairy farming (BBS, 2008). Dairying is also considered a strong tool to develop a village micro economy of Bangladesh in order to improve rural livelihoods (Shamsuddin et al., 2007). On the other hand, renewable energy policy of Bangladesh states that energy is one of the basic ingredients required to alleviate poverty and ensure socioeconomic development. Better access to energy can improve the quality of life especially for developing country like Bangladesh. Per capita energy consumption in Bangladesh is very much low among South Asian countries.

Renewable energy is one of the most promising options to make energy system of the country. Biogas is a promising renewable energy source to meet energy demand of rural Bangladesh. Manure of cattle is the raw material to run the biogas plant. In that regards, biogas plant contributes to farmer's livelihood.

Income from milk in producers' level is less due to poor marketing system as one of the obstacle in Bangladesh. Middlemen are performing various intermediary marketing functions such as transportation and retailing of the milk and link the dairy farmers (producers) and the consumers. The main interest of the marketing intermediaries is to gain the highest profit possible from their particular business operation (FAO, 2002). However, the milk marketing and processing systems in Bangladesh are not yet developed. Milk being perishable item, needing timely and special attention to market, makes the marketing more difficult (FAO, 1990). Generally, rural milk producers sell their surplus milk to various marketing intermediaries prevailing locally who in turn sell the milk to the individual consumers, restaurants & tea stalls in the urban area. Lack of organized milk marketing system in the grass-root level is a drawback for the farmers' position in selling milk. Earning money and improving production will be vulnerable if they are unorganized. Under these circumstances the farmers are unable to improve their socio-economic conditions. Cooperative marketing

system could play a vital role in providing a channel that can link the farmers to the urban markets/consumers smoothly and ensure higher price for their products. The concept of dairy development through smooth marketing arrangement under cooperative umbrella is well established in India and elsewhere as well<sup>1</sup>. This is also confirmed for Bangladesh by studies made earlier. Khan and Suraiya (1996), studied a traditional village in Jessore district, where bulk of the milk was sold by traditional middlemen and found middlemen are depriving the primary milk producers from their milk profit and suggest for milk producers organization, such as milk cooperative for small dairy farmers, to reduce the transportation costs and better their earnings. Rahaman and Mian (1996), by studying cooperative also in Sirajgonj district and traditional milk marketing channels in three different markets (Dhaka, Mymensingh and Rangpur) in Bangladesh, found that the cooperative milk marketing channel can provide best profit for primary producers. Ashrafuzzamn (1995), studying economic efficiency of milk production under cooperative system in Sirajganj district, Bangladesh, found farmers are enjoying a ensured milk market for selling their milk under cooperative marketing channel. Roy (2000), conducting a research on milk marketing under cooperative management again in Sirajganj, has shown that cooperative dairy farmers are receiving better price compared to non-cooperative farmers. Ghosh and Maharjan (2002), conducting a research on milk marketing channels in Bangladesh, has shown the structure, constraints and probable solutions of three different milk marketing system in Bangladesh where Pala milk marketing system is different from typical milk marketing system.

That's why the overall objective of the 2<sup>nd</sup> part of the study is to determine the sustainable development of dairy farming under cooperative production system.

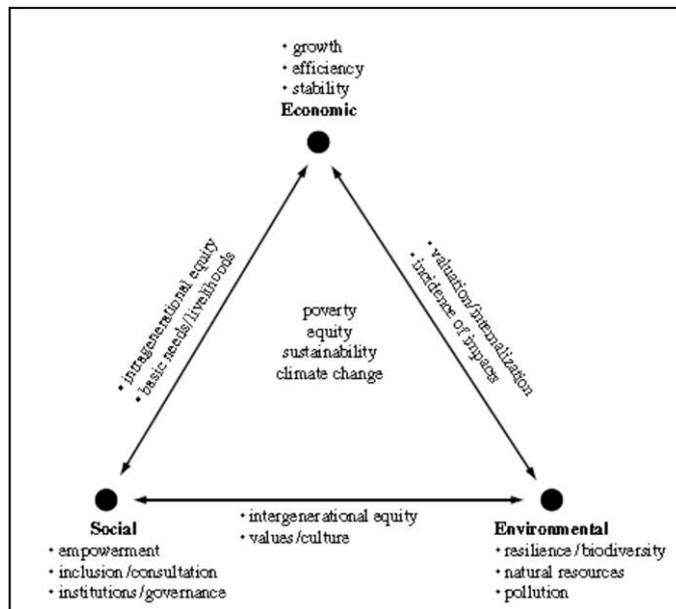
Specific objectives are-

- (1) To identify dairy farming conditions under cooperative and non cooperative production system;

- (2) To identify dairy farming contribution to farmers' livelihood;
- (3) To find out sustainable conditions of dairy farming under cooperative production system.

## **1.4 Concept of “Sustainable Development”**

The numerous definitions of sustainability produced over the last two decades all emphasize the need to take care of the economic, environmental and social consequences of development choices for the present and future generations. The debate about Sustainable Development (SD) was stimulated in 1987 by the Brundtland report which states that sustainable development is “development that meets the needs of present generations without compromising the ability of future generations to meet their own needs”. Perspectives of the concept of sustainable development vary. According to Cornelissen (2003), terms like sustainability and sustainable development are fuzzy buzzwords (terms which appear to encapsulate a discrete notion but which actually have multiple interpretations and could mean different things to different people), which are widely used but rarely defined by consensus. Sustainability in agriculture is generally described from the perspective of farm productivity (economic) or farm continuity (ecological) or societal continuity. There is a now a growing consensus that the general definition of sustainable development should encompass all economic, environment and social dimensions relevant in a specific context. According to Bell and Morse (2003), the definition of sustainable development by WCED (1987) comprises of development (to make better) and sustainability (to maintain), and the word sustainable is usually attached to human-centered activities such as agriculture, natural resource management and health care provisions.



**Figure 1-3: Sustainable Development Triangle**

Source: Adapted from munashinghe 1992a,1994a

The concept has evolved to encompass three major points of view: economic, social and environmental, as represented by the sustainable development triangle in Figure 3.1. Each viewpoint corresponds to a domain (and system) that has its own distinct driving forces and objectives. The economy is geared mainly toward improving human welfare, primarily through increases in the consumption of goods and services. The environmental domain focuses on protection of the integrity and resilience of ecological systems. The social domain emphasizes the enrichment of human relationships and the achievement of individual and group aspirations.

### **1.4.1 Key Elements of Sustainable Development**

The past evolution of economic, social and environmental thinking within the development paradigm is described as follows:

#### **a Economic Aspects**

The modern concept underlying economic sustainability seeks to maximize the flow of income that could be generated while at least maintaining the stock of assets (or capital) which yields this income (Maler, 1990; Solow, 1986). Fisher (1906) defined capital as ‘a stock of instruments existing at an instant of time’ and income as ‘a stream of services flowing from this stock of wealth’. Hicks (1946) argued that people’s maximum sustainable consumption is ‘the amount that they can consume without impoverishing themselves’. Economic efficiency plays a key role in ensuring optimal consumption and production. Many argue that unrestrained economic growth is unsustainable, and point out practical limitations in applying the economic sustainability rule without additional environmental and social safeguards. Problems arise in defining the kinds of capital to be maintained (e.g. manufactured, natural, human and social capital have been identified) and their substitutability. Even key economic assets may be overlooked where non-market transactions dominate. Uncertainty, irreversibility and catastrophic collapse also pose difficulties.

#### **b Environmental Aspects**

The environmental interpretation of sustainability focuses on the overall viability and health of living systems – defined in terms of a comprehensive, multi-scale, dynamic,

hierarchical measure of resilience, vigour and organization. These ideas apply to both natural (and wild) and managed (or agricultural) systems, and cover wilderness, rural and urban areas. Resilience is the potential of a system state to maintain its structure/function in the face of disturbance. An ecosystem state is defined by its internal structure and set of mutually reinforcing processes. Resilience is also related to the ability of a system to return to equilibrium after a disruptive shock. Petersen, Allen and Holling (1998) argue that the resilience of a given ecosystem depends on the continuity of related ecological processes at both larger and smaller spatial scales. In this context, natural resource degradation, pollution and loss of biodiversity are detrimental because they increase vulnerability, undermine system health and reduce Sustainability may be understood also in terms of the normal functioning and longevity of a nested hierarchy of ecological and socioeconomic systems, ordered. Sustainable development goes beyond the static maintenance of the ecological status quo. A coupled ecological–socioeconomic system may evolve so as to maintain a level of biodiversity that will ensure long-term system resilience. Such an ecological perspective super cedes the narrower economic objective of protecting only the ecosystems on which human activities directly depend. Sustainable development demands compensation for opportunities foregone by future generations, because today’s economic activity changes biodiversity in ways that will affect the flow of vital future ecological services.

### **c Social Aspects**

Reducing vulnerability and maintaining the health (i.e. resilience, vigour and organization) of social and cultural systems, and their ability to withstand shocks, is important. Enhancing human capital (through education) and strengthening social values, institutions and equity will improve the resilience of social systems and governance. Understanding the links that radiate out from poor communities, and their interface with agencies and government, is

critical for building connections and channelling resources more directly to make social development more sustainable. Emphasis has sometimes been placed on the formation of new community-level organizations, which occasionally undermine existing networks and local groups – ultimately causing the locals to feel that they have no stake or ownership in the project. Thus, the focus is shifting toward improving governance by giving poor people the right to participate in decisions that affect them. Working with existing community-based social capital generates pathways to lever people upward from poverty. It also results in a more sustainable link with communities and creates opportunities for more meaningful participation.

## **1.5 Methodology of the study**

Japanese dairy is particularly interesting in the context of Asia because it is the most mature market among Asian economies. Consumers' income is the highest among Asian countries; consumer exposure to Westernized dairy products has been the longest among the same pool of countries as well. The analysis of Japanese dairy markets, therefore, provides lessons for other Asian countries with emerging dairy consumption in terms of their potential per capita consumption patterns and composition of dairy products consumed. The production side of dairy markets in Japan is also interesting because technology adoption and yield improvements have been rapid but in a context of isolation from world markets.

Hokkaido is very famous dairy farming area in Japan. But, the scale size is large in Hokkaido area. There is small and medium scale farm in other prefectures of Japan. Saga is one of them. Mixed dairy farming system also exists in Saga prefecture.

Bangladeshi Dairy farming is mixed farming system yet which has similarity in Saga prefecture except mechanization, technology adoption and breeds etc.

Sirajgonj district, Northwest from Dhaka, where primary milk producers' cooperative established for integrated milk marketing. This area is under Baghabarighat milk-shed of BMPCUL cooperative system that consists of 656 primary village cooperatives. Dgulia Primary milk producers' Cooperative Union was selected for the study. The primary cooperative society follows the same rules and regulations and share same marketing facilities. Dairy farmers sometimes sell their milk to private milk traders.

Maulavibazar District, Southeast from Dhaka, was chosen as to study different conventional dairy farming that widely practiced in Bangladesh. There are eight thanes (administrative units/ sub-district). Sreemongal thana was selected for study as this marketing channel has widely practiced in this Thana. There are 'R' and 'S' are two areas that are developed dairy farming remarkably among other areas of Sreemongol Upazila.

Traditional/conventional dairy farming also exists in Brahmanbaria district, Northeast and Jessore district, Southwest from Dhaka.

### **1.5.1 Sampling Procedure**

There are three main agricultural areas in Saga Prefecture, Japan: Saga Plain Area (SP), Uwaba-Daichi and Karatsu area (UDK), and Other areas (O). The SP area includes Saga City, Tosu city, and other 24 cities and towns. In this area, most of the land area is used for rice and soyabean production. The UDK area includes: Karatsu city, and other 4 towns and cities. Most of the land in this area is coastal and upland where grass, tobacco and fruits are being produced. About 800 ha cultivable upland area has been increased in this area through upland development project. Other areas include all the cities and towns in Saga Prefecture outside of SP area and UDK area. This area is mainly mountainous and semi mountainous land area where fruits, tea, groves, etc. are the main agricultural products. Dairy farming area has been changing in this prefecture as other part of Japan. Dairy cattle rearing has reduced to 31% in

2010 from 62% in 1960 in SP area. But, dairy cattle rearing has increased to 32% in 2010 from 7% in 1960 in UDK. This area is becoming important dairy farming area in Saga Prefecture. That's why this study has conducted in UDK. Data were collected by a designed survey schedule accomplish to objectives from May to August, 2011. The survey schedule was prepared based on the following key items: owner's general information, cattle population, sources of fund, feeds and feeding system, overall management system, future prospects in dairying etc. A total of 25 different scale farms were surveyed. Data were collected through direct interviews and personal visits to the farm of all farmers.

In Bangladesh, a stratified random sampling procedure was applied to collect primary data from North-west, South-east and South-west part of Bangladesh. Sirajgonj, North-west from Dhaka, is most developed dairy farming area in Bangladesh and the first dairy cooperative society was established in this area. There are 656 primary milk producers' cooperative society and 28,820 dairy farmers. Cooperative production system is not developed in other three areas.

Jessore district is south west from capital district Dhaka, and is not connected to natural gas line. It consists of 8 upazila , 8 Pourashava ( Municipality ) , 1423 nos. Mouza/ Mohalla and 1477 no's of villages .Village A has been selected for study area as its milk market is traditional and typical, and near to district town.

Brahmanbaria district is southeast from capital district Dhaka, and is connected to natural gas line. It has 4 municipalities, 39 wards, 97 Mahallah, 9 Upazilas 98 Union parishads, 1052 mouzas and 1329 villages. Village B has been selected for detailed study which is also near to district town and milk market is traditional and typical.

Maulavibazar District is south-east from capital district, Dhaka and also connected with natural gas pipe line. About 36% of agricultural households engaged in dairy farming in this district. It consists of Seven Upazilas, Five Pourasavas (Municipality) and Sixty seven

Unions. Sreemongol is one of the Upazila of Maulavibazar districts which consist of one municipality (paurashava), 12 union parishads, 124 mouzas and 206 villages. 'R' and 'S' are two areas that are developed dairy farming remarkably among other areas of Sreemongol Upazila. There are 38 dairy farms in these areas recorded in Upazila Animal Husbandry office. We have tried to cover all these farms but some farmers didn't want to participate in the survey. Finally, we have found 25 farms to interview.

### **1.5.2 Data Collection**

Data were collected from both primary and secondary sources. Primary data were collected from field survey of sampled dairy farmers who were under cooperative society or not under cooperative umbrella in Bangladesh. Field survey has done in all farmers in selected area of Saga prefecture of Japan. We used semi-structured questionnaire for collecting primary information from farmers. Data from secondary sources that includes both published and unpublished documents from Census, Statistical Year Book, and Government Survey findings of both country.

#### **a Questionnaire**

Semi-structured questionnaire (Appendix A, B and C) used for collecting primary data. Open-ended and close-ended questions were used in the questionnaire based on the nature of the data that had to be collected from dairy farmers. Collected data comprised of farmers' socioeconomic characteristics, production and marketing, farm management practices, income from dairy farming, farmers' perception about loyalty to dairy cooperative, services rendering by cooperative etc.

After preparing the questionnaire, discussed with related personnel to check relevancy. Then, these were pre-tested to ensure validity and reliability of data collected. After getting

approval of the questionnaire, face to face interviews were conducted by authors to gather all required data from dairy farmers.

### **1.5.3 Data Analysis**

After completion of data collection, descriptive and linear regression analysis was used for analysing data collected from dairy farmers. Then, data were recorded into MS excel and then imported to a statistical package, known as SPSS 16, for analysis. Descriptive statistics described the general characteristics of sampled farms, their production as well as their marketing system in order to depict performances of dairy farms. Linear regression analysis was used to identify factors affecting farmers' loyalty to dairy cooperative.

An OLS linear regression model was applied to find out the factors that affect members' perception about continuation of membership to cooperative (members' loyalty). Members' loyalty represented dependent variable (Y). Dependent variable (Y) is the set of hypothesized to be affected by 9 explanatory variables described in Table 2. The final formulation of the model was represented as below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \mu$$

## **1.6 Limitations of the study**

Author's Japanese language ability, time and financial constraints were the main limitations of the study. In addition, some of the respondents were reluctant to give out information about income and expenditure of the farms. In Bangladesh, majority of the farmers found that they didn't keep any records. Some information was recollection of recent events. The inputs provided by farmers were taken directly but not checked for authenticity. Saga prefecture, Japan and four districts of Bangladesh have chosen for study, results cannot be generalised for whole population of dairy farmers in Bangladesh and Japan.

## 1.7 Structure of the dissertation

The study is organized into six chapters.

<p style="text-align: center;"><b><u>Chapter 1</u></b></p> <p style="text-align: center;">Brief description about background, motivational aspects, objectives of the study, justification of study matter and methodology, limitations during the study</p>
<p style="text-align: center;"><b><u>Chapter 2</u></b></p> <p style="text-align: center;">It outlines literature review which consists of corresponding literature related on dairy farming in Japan and Bangladesh, also describes literature related on farmers' loyalty</p>
<p style="text-align: center;"><b><u>Chapter 3</u></b></p> <p style="text-align: center;">It describes structure and state of dairy sustainable development in Japan that includes scale size classification, successors' status in different scale, and sixth-industrialization of dairy</p>
<p style="text-align: center;"><b><u>Chapter 4</u></b></p> <p style="text-align: center;">It describes structure and state of dairy sustainable development in Bangladesh that includes management practices, resource circulation system, dairy contribution to farmers' livelihood, cooperative and non-cooperative dairy production, farmers' loyalty to dairy cooperative</p>
<p style="text-align: center;"><b><u>Chapter 5</u></b></p> <p style="text-align: center;">It presents the results according to hypothesis and objectives, also exhibits sustainable conditions of dairy farm in both countries</p>
<p style="text-align: center;"><b><u>Chapter 6</u></b></p> <p style="text-align: center;">It incorporates conclusion, contribution and considerations for future</p>

# Chapter 2

## Literature Review

### 2.1 Literature related on dairy farming in Japan

#### 2.1.1 J. Nishitani, 1980

Dairy farming on the paddy field is going to develop newly with the characteristic of a part owner under the policy of “the program for curtailment of Paddy field Acreage” and “the Program for Reorganization of Paddy Field Utilization”. He found that compound farming seems to be possible in Saga Plain area. He also found that net returns on land are greater in the compound farming than in the specialized rice farming. For developing compound farming, factors such as land structure, technical joint of a cropping system between rice and

pasture grass, proper utilization of labor and size of cultured land in relation to the development of mechanization must be taken into account.

### **2.1.2 Shichinohe, 1983**

He clearly explained that the base of productivity of dairy farming was formed in the 1960s and 1970s. He pointed out that it was extremely urgent to change Hokkaido cow management which was then similar to pig and chicken breeding management and to improve the hay and silage making techniques.

### **2.1.3 Araki, 1994**

He examined the growth of Hokkaido dairy farming in the 1970s and 1980s. There were huge investments in dairy farms because of government funds and subsidies in Hokkaido. Most farmers got into debt and the returns in investments dropped because of the deterioration in the dairy farming economy. So most dairy farmers have increased the milk yield per cow by feeding grain. However, this cow management system has caused problems, such as cow diseases, long hours of labour, removing and treating manure and so on. He concluded that Hokkaido dairy farming should change its style of farming.

### **2.1.4 S. Kume, 1994**

The Japanese dairy industry achieved dramatic post-war growth, but it has been affected by rapid trade liberalization and structural changes on dairy farms. Milk production increased from 4.8 million tons in 1970 to 8.2 million tons in 1990. Milk yield per cow in Japan is the highest in the world. However, the number of dairy farms, especially small farms with less than ten head, has declined drastically. New technology for improved milk productivity is needed for the future development of the dairy industry in Japan.

### **2.1.5 S. Yamamoto et.al. 1997**

Japanese dairy farming under severe conditions caused by low farm gate price of milk and import liberalization from milk products. However, dairy farming not only has food production function but also has conservation function for environment. That's why; they investigated the actual conditions of dairy farming in mountainous area under above mentioned situations. They also studied problems and prospects of dairy management as a case study of Ina city, Nagano. They found that number of farms decrease in future, the farmland expected to lend more and more. They said that dispose cultivated land will increase in Japan if the dairy farms would not use this land. Proportion of the dairy farms wish to increase self-supplying of feeds and employed labor tended to increase. The dairy farms can take initiative for managing large farm land in each area.

### **2.1.6 K. Obara et.al. 2005**

Border measures—tariffs and tariff-rate quotas (TRQs)—provide high levels of support to Japan's producers of milk for manufacturing purposes and keep consumer prices for dairy products in Japan high by world standards. Since drinking milk is not easily traded, Japan's drinking milk market is largely autonomous from the world market. High farm costs of milk production and relatively high costs for processing and distributing drinking milk keep consumer prices of drinking milk high. Production quotas, designed to limit supplies and keep market prices stable, guide the volume of milk produced. A direct, fixed payment per kilogram of milk is provided from the Government budget to farmers for their quota production of manufacturing milk. A fund sharing farm and Government contributions pays farmers a portion of the difference between the current annual price and a historical average price when manufacturing milk prices fall. Japan's Government controls trade within the largest TRQ and imposes extremely high tariffs on imports outside the TRQs reserved for

private traders. Recent changes in labelling have triggered significantly reduced demand for milk reconstituted from powder and increased demand for fluid milk.

### **2.1.7 Isabelle S.C. et.al. 2005**

They explore and investigate Japanese dairy markets. They first provide an overview of consumer demand and how it evolved after World War II. Using historical data and econometric estimates of Japanese dairy demand, they identify economic, cultural, and demographic forces that have been shaping consumption patterns. Consumption patterns have evolved with increasing individual consumption of cheese and fluid milk. The individual consumption of butter and milk powder has been stagnating, as butter is not widely used in cooking or as a spread and as fluid milk has been substituted for milk powder. Overall, dairy consumption per capita has increased substantially. Then they summarize the characteristics of Japanese milk production and dairy processing and policies affecting them. The fluid milk supply has expanded through substantial yield increases, although the cost of production is very high and the typical dairy farm size is small and inefficient. The greater availability of dairy products has been achieved through trade, especially for cheese products from Australia and New Zealand. Then they next describe the import regime and trade flows in dairy products. The political economy of agricultural protection in Japan favours rice over dairy as rice remains extremely protected and imports are marginal, unlike the case of dairy, which exhibits significant import penetration and low self-sufficiency ratios, but this phenomena is occurring in processed dairy markets, not in the fluid milk market. The analysis of the regulatory system of the dairy sector shows how its incentive structure affects the long-term prospects of various segments of the industry. Further imports may not expand in this round of negotiations, as actual TRQs are already above import commitments (minimum import levels as 5% [URAA] or 8% [Harbinson proposal] of consumption) (Martin and Anderson, 2005).

### **2.1.8 K. Umeda, 2007**

Dairy is counted as one of the strongest sectors of politics, along with rice, dairy influence the ups and downs of the region is the way of policies and institutions. It was nothing with raw milk planned production system, which was introduced in 1979, the change in corporate strategy due to the wide-area raw milk distribution, and re-captured the reorganization mechanism of dairy space that reflects the changes in the regional adjustment style. Trends and issues of dairy area studies in economic geography reorganization of raw milk production and placement of dairy development in Japan including Kyushu. Reorganization of the dairy region and the progress of vertical integration under a major dairy.

### **2.1.9 K. Shinichi, 2011**

Democratic Party announced as a pillar of Japan's agricultural policy a "door-to-door income compensation system", the path of the Japanese dairy crisis and import liberalization, such as TPP and WTO or milk consumption. He described the subsistence diet increased and income compensation system of dairy and livestock management. He also described sale adjustment vertical alliance of dairy between the trends of agricultural cooperative based dairy manufacturer and vertical partnership with dairy manufacturers in Hokkaido. He specified status of the organization function maintenance, etc. and direction of future realities of organizational restructuring in three prefectures butyric overview of the investigation and prediction "dairy medium-and long-term plan". He also described the relationship between dairy farmers and small organization based on New Zealand dairy.

## **2.2 Literature related on dairy farming in Bangladesh**

### **2.2.1 M. H. Kabir et.al., 1994**

The financial performance of small scale dairy farms participating in the government subsidy program and the impact of the government intervention on the number of animals owned, production and consumption of milk and labor employment in the farm households have been examined. After receiving the subsidy, dairy farmers expanded their herd size. The major changes occurred in the ownership of calves, heifers and cows in all categories of farms. Significant increases in production and consumption of milk as well as in labor employment were observed. The rates of increase for all the parameters studied were much higher in farms adopting cross breeding compared to those in only local-breed farms. The analysis showed that dairying was a profitable business. However, profitability was greater with cross-bred than with local bred animals.

### **2.2.2 M. Sadullah, 1995**

Dairying is nearly always a part of mixed farming systems in Bangladesh. It has a direct impact on income generation, poverty alleviation and availability of animal protein. Quantification of the contribution of livestock, including poultry, shows that dairying is the predominant source of income generation (Miyan 1996). Although the supply of domestically produced animal products (milk, meat and eggs) has increased by about 1.2% annually (DLS 2000), the per capita daily availability of milk and meat is only 32.6 ml and 10.2 g against the requirement of 250 ml and 120 g, respectively. Consequently, consumers face an acute shortage of livestock products like milk, meat and eggs for which supply fails to meet the requirements of 85, 89 and 75% of the population, respectively. The major constraints to dairy cattle production are the shortages of quality feeds and fodder, the breeds of cattle, poor

management practices, and limited access to veterinary care and disorganised marketing systems. In addition, there is a lack of institutional support, research and training, which would be beneficial to the farming environment.

### **2.2.3 A.K. Shamsuddoha et.al., 2000**

Although, dairying is the most ancient occupation established in the rural setting of Bangladesh, its development is unsatisfactory due to several problems. The main problems concern breeding, feeding, management, diseases and marketing. The dairy sector has also not received adequate attention in respect of information and research with present policies and issues. National milk production can only meet 13% of the current milk consumption. The demand for milk is growing at a faster rate than supply because of the rapid increase in population, creating a widening imbalance between demand and supply. There is a need to have knowledge of the existing demand, its growth over time, and the existing supply possibilities. There are also many types of information needed for proper functioning of markets. In the light of such knowledge it would be necessary to take policy measures for providing strong institutional support to increase domestic production and reduce the imbalance between supply and demand. To address the industry's problems effectively, sources of market failures and of government policies in contributing to its poor performance are discussed in this paper.

### **2.2.4 G. C. Saha, et.al. 2000**

Milk Vita has emerged as a successful co-operative endeavour in Bangladesh. It provides poor, landless and marginal milk producer farmers and women in the associated communities with regular supplementary incomes. It has shown itself capable of strengthening its activities further to increase dairy production and thereby to contribute effectively to the national

economy through a strong and viable organization of small farmers. Therefore, Milk Vita recommends such as 1) framing, within a given period of time, of an appropriate dairy policy for the country depicting all pertinent issues 2) formation of the Dairy Development Board of Bangladesh with professionals of the sector assuring adequate authority and autonomy (Rahman et al. 2000) 3) acquisition of *bathan* land for farmers' cattle grazing 4) government, national and international assistance in the milk sector both for plant establishment and infrastructural support 5) replication of the Milk Vita model in other parts of Bangladesh through government initiatives and funding for the benefit of both farmers and consumers and 6) channelling the government's poverty alleviation programmes through the infrastructure of Milk Vita in all the milk-shed areas of the country.

#### **2.2.5 Ghosh and Maharjan 2001**

The author highlighted the small dairy farmers in Bangladesh are collectively operating their dairy farming and generating employment for better earnings through a cooperative system. The findings of this study suggested that agriculture (crop production) is no longer the predominant occupation among the dairy cooperative members. In fact, dairy has emerged as a parallel occupation. Another trend observed in the study area is the diversification of income sources. The rural households have secondary and tertiary occupations. Thus, this trend of dairy development in farming through cooperative initiatives can play a very significant role in rural development.

#### **2.2.6 Hemme. T., et.al., 2002**

The author's estimate of milk demand in Bangladesh demand is over two and half times FAO's recorded national milk production for the country (for 2002). Therefore, meeting Bangladesh's potential milk demand is a huge national task and the question arises how well-

positioned Bangladesh is to meet this milk demand. This study shows that the 2 cow farms (BD-2) not only cover full economic costs, but can produce milk at a cost almost as low as the larger farms included in the study. This should be very encouraging for more than 7.2 million Bangladeshi families involved in small scale cattle rearing, of which few make a profit and most consider it a highly risky activity. The small farm (BD-2) is competitive at the national level but not at the international level. The cost of milk production of all farms in comparison to larger farms in India, Pakistan and Oceania is around 50% higher. Assuming a liberal trade of dairy products in the future all farms analyzed will have to improve the production systems significantly to gain from the growing demand of dairy products in the country. Further studies of small dairy farms in Bangladesh need to include a land-less milk production system, a typical goat milk production system and a more exhaustive evaluation of the non-cash benefits obtained from dairy cattle (like draught power). Moreover the cost reduction potential of the farms by improvements in farm management should be analyzed.

### **2.2.7 Ghosh and Maharjan 2002**

The authors showed a general feature of milk marketing in Bangladesh and explore some of the issues on milk production among dairy households and their conditions under various milk marketing channels. Further development of dairy farming depends upon the organized marketing channel in which farmer can get fair price. Collective marketing like cooperative system can also reduce the transportation cost. Majority of the dairy farmers are satisfied with cooperative marketing system. So, keeping in mind for mass of the small producer, cooperative milk marketing system can be developed for betterment of the rural dairy farmers.

### **2.2.8 M. S. Zaedi, et.al. 2004**

This study was to investigate Milk Vita member dairy farmers' profitability in the selected study area. The study was conducted in three villages of Baghabarighat under the Shahjadpur Upazila in Sirajganj District in Bangladesh. With this view, the empirical data were collected to identify the member dairy farmers' profitability. The findings of the study were as follows. First, regardless of farm size, dairy farming under Milk Vita is profitable and farmers' income ranged between the middle and higher income group in the country. Second, all the sample farmers' number of milking cows and profit also increased significantly after becoming a member of Milk Vita. The profitability of dairy farming under Milk Vita has attracted the farmers to become its members, which ensures dairy farmers better economic life.

### **2.2.9 M.M. Hossain et.al., 2005**

They studied to determine the status including general information, feeding breeding housing milking etc. and costs & returns of small dairy farms, to compare the productive and reproductive performance of crossbred and indigenous cows and to make recommendation for development of small scales dairy farm. With this view, the empirical data were collected by using protested questionnaire. The study was conducted at 8 thanas in Rangpur district, and four months-long survey was diminished on thirty small dairy owners. It appeared from the study that 57% farm owners belong to business class and remaining 43 per cent to different categories. Fifty three per cent took dairying as a side-business whereas only 47 per cent took it as a main business enterprise. Major percentage of farm owner education level that was Higher Secondary level (60%) and the average number of animal per farm was 13.01. The average monthly income of farm owners found in the study area was Tk. 4387. It was observed that farm owners had 85.4% crossbred (like Friesian cross and Jersey cross) and was 14.6% indigenous cattle, and 87% farmers used artificial insemination and rest used both

artificial and natural services. Daily milk yield/cow/farm was 4.27 and 1.78 liters for a crossbred and indigenous dairy cow, respectively. It was estimated that the rearing cost of dairy cow was Tk. 67.5/cow/day and return from rearing dairy cow was Tk. 85.2/cow/day. The net return was Tk. 17.7/cow/day from crossbred in the study area and cost benefit ratio was 1: 1.26. The study showed that there were significant ( $P<0.01$ ) differences within the dry period, service per conception, calving to first service, highest and lowest milk production and lactation period of crossbred and indigenous dairy cows. The study also showed non-significant differences within calving interval for crossbred and indigenous. In case of small dairy farming, the farms were facing a lot of problems such as scarcity of feeds and fodder, high price of concentrate and lack of technical knowledge. Although the dairy cow owners face problems, the study observed that there were potentials particularly for the small dairy farmers. The small farmers by keeping 8-10 crossbred cows could earn a modest living by adopting small dairy farming as a profession.

#### **2.2.10 M. Shamsuddin, et.al 2007**

Author used ten participatory rural appraisal (PRA) tools, namely social mapping, semi structured interview, activity profiles, seasonal calendar, pie charts, mobility diagram, matrix ranking, preference ranking and scoring, system analysis diagram and focus group discussion in 57 PRA sessions from September through October 2002. Dairying contributed more to family income (63 to 74%) and utilized a smaller portion of land than did crops. Twenty seven to 49% of cattle feed is rice straw. Only Sirajganj and Chittagong had limited, periodic grazing facilities. Fodder (Napier, *Pennisetum purpureum*) cultivation was practised in Sirajganj and Satkhira. Fodder availability increased milk production and decreased disease occurrence. Friesian crossbred cows were ranked best as dairy cattle. The present utilization of veterinary and AI services were ranked highly. Farmers outside the milk union desired

milk purchasing centers as the most required service in the future. They identified veterinary and AI services as inadequate and desired significant improvements. The PRA tools effectively identified resources, constraints, opportunities and farmers' perspectives related to the dairy industries in Bangladesh.

#### **2.2.11 M.M. Uddin et.al. 2010**

The study showed different milk production systems with the magnitude of inputs (feed, land, labor etc) and output (milk). The degree of intensification and potential availability of input and support services play a great role in reducing the costs with increasing the return and improving productivity. The institutional arrangements and natural resource endowments in each system also influence the costs of inputs and support services. Therefore, intensive dairy farming system produces higher milk with lower cost and hence it is more competitive. On the other hand, the extensive and traditional farming systems produce low amount of milk with a reasonably high cost. The intensive farmers are in better position in terms of costs and profits than extensive and traditional systems and are more competitive due to lower per unit costs, higher milk prices, higher milk production, higher land, and labor productivity. From these results, the one option might be that it is necessary to take initiatives by the policy makers and development planners to intensify the dairy production systems for sustainable dairy development.

## **2.3 Literature related on farmers' loyalty to dairy cooperative**

### **2.3.1 J.L. Cain et.al. (1989)**

They examine farmers' assessment of the effectiveness of cooperatives as compared with proprietary firms in providing goods and services. The areas of consideration were marketing, market share, business functions, service, stability, and public involvement. Farmers indicated that cooperatives greatest advantages were in the areas of service and public involvement. Respondents indicated that cooperatives were more willing to provide low profit products and services, establish programs that best met needs, and provide low profit products and services, establish programs that best met needs, and provide a more dependable source of supplies and services. They also provided a greater enhancement of welfare and in general reduced the risks facing farmers.

### **2.3.2 L. Burt and M.E. Wirth (1990)**

Cooperative managers and farmers frequently made significantly different responses to questionnaire statements. With a few exceptions, farm size and farmer age did not appear to influence perceptions about supply cooperatives. Whether a farmer was a cooperative member was important in some cases. Lower prices in lieu of easy credit and patronage refunds were found to be acceptable to farmers, but not at the expense of good service. Managers placed great importance on member loyalty to the supply cooperative without regard to price considerations.

### **2.3.3 Borgen S.O., (2001)**

Trust is a crucial mechanism for coordination and control in cooperatives. The elusive nature of trust is also emphasised. What seems to be less discussed is where trust and distrust come from, as well as the shifting conditions under which trust is developed, maintained and

sometimes disposed of. This article explores one trust-making mechanism which seems to be of particular interest in cooperatives and other membership-based organisations. The mechanism in question is members' identification to the cooperative organizations. The empirical test supports the proposition that strong identification is a significant trust-making mechanism in cooperative organizations.

#### **2.3.4 Peter O. et.al., 2007**

This study explores to which extent the members' assessment of their cooperatives' degree of success are related to various member attributes, with special reference to the members' perception of their participation in the governance of the cooperatives. Three categories of member attributes are identified: Satisfaction with the profitability of farm operations, Age, and Experience from board work. The cooperatives' degree of success is measured as members' commitment towards cooperatives, and members' trust in the board of directors. The results indicate differences in members' cooperative commitment and their trust towards directors to be due to farm operations profitability, age and experience as directors. After adding members' perception of their participation in the governance as a covariate, most of the other differences are explained by this variable. Age is still to some extent associated with trust towards directors, as older farmers have less trust in directors.

#### **2.3.5 Bhuyan S., (2007)**

Members' attitudes and perceptions play a significant role in their behavior toward their organization and the performance of such organizations. This study examines the role of these "people" factors in a sample of fruit and vegetable growers' cooperatives in the Mid-Atlantic United States. Although the Theory of Planned Behavior is used as the framework of analysis, the objective of this study was not to test the theory. Study findings provide

additional insights into how cooperative members' beliefs and knowledge may shape their attitudes and the consequent behavior. Given the gradual decline of both cooperative memberships and the number of cooperatives in the United States and other countries, a good understanding of members' attitudes and behaviors is necessary because a cooperative's success may depend on it.

### **2.3.6 Fahlbeck E. (2007)**

Modern agricultural cooperatives need considerable amounts of capital. Theoretically the financing of cooperatives has been identified as one problem area for their future success. In part, the difficulties associated with raising capital are asserted to stem from heterogeneity among cooperative members, not the least of which is the so-called horizon problem. Here a number of potential heterogeneity dimensions are empirically investigated, in relation to financing and ownership of cooperatives. Almost all the hypotheses surrounding conflicting interests in relation to ownership and financing building on heterogeneity must be rejected. Reported answers provide no support for a horizon problem in agricultural cooperatives.

### **2.3.7 Li Feng et.al. (2011)**

Their study indicates that farmers' loyalty to their agricultural cooperatives is to a high degree determined by "soft" factors such as their conception of cooperative membership as a shelter against large trading partners, their appreciation of the cooperatives' information being honest, and their long-term experience of cooperatives. The empirical basis of the study is a survey among farmers in Finland.

## **2.4 Research conducted on present study**

### **2.4.1 Changes of Central Dairy Farming Area of Saga Prefecture**

Rice is main agricultural production all over Japan. But after economic development in 1955, rice production has been decreased and others (such as: vegetable, fruits, Livestock etc) production has been increased. This scenario is same in Saga prefecture as well. Among livestock production, Dairy farming is very significant in National and Saga Prefecture as well. Until 1970s, dairy cattle was high in Saga Plain area and it has been decreased afterwards. There are many research done on compound dairy farming in Saga Plain area until early 1970s. But, after 1970s, we don't understand almost what is the condition of dairy farming in Saga Prefecture as there is a few research done on dairy farming. Therefore, we want to study on dairy flows from 1970 to 2005 and present dairy condition of Saga prefecture. In 1960, number of dairy cattle in Saga Plain number of dairy cattle was 62% and has been decreased to 33% in 2005. But, in 1960, the number of dairy cattle in Uwaba-Daichi and Karatsu area was 7% and has been increased to 40% in 2005 that showed that the central dairy farming area was in Saga plian area and it has been changed to Uwaba-Daichi and Karatsu area.

### **2.4.2 Scale Classification and Practices (Case Study of Saga Prefecture)**

Scale size of a farm will make interest to give full effort to dairy farming. About 93% of dairy households have less than 50 milking cows in Japan (except Hokkaido). Although, herd size of dairy household are increasing in Japan, less than 50 milking cows holder plays vital role in milk production. Unwillingness of young people to continue dairy farming will be major constraints for future development of small scale farms. Farmers have keen knowledge about husbandary practices and health care of the cows. Medium scale farmers have sucessor to continue as this enterprise may become profitable earning source in near future.

Productivity of large scale farms have increased with advancement of labor in agricultural sector as well as dairy farming. The structural peakness has been becoming larger and larger not only in specialized rice farming but also in dairy farming. About 13% of the households have more than 50 milking cows in 2010 while that was less than 1% in 1980 in Saga Prefecture. As large scale farms, are increasing in this area day by day, that will attract others to continue their farms. Large scale farmers also adopting new technology that gives good impression to small and medium scale farmers about dairy farming practices.

#### **2.4.3 Structure and Strategy of Industrialized Farm (case study of Saga Prefecture)**

This paper describes the farm structure and strategy of dairy farmers who sell milk and milk products to the consumer directly. Among 86 dairy farms, only 3 farms are involved in direct marketing channel in Saga Prefecture. These 3 farms are selected for this research. Farmers are concerned about income from milk sales which has been decreased since 1990. Most of the dairy farmers are prisoners of market price. They could cut their costs, but stuck with the market price. They have no control over that price. Even though, very efficient farmers watch their potential profits drive off the farm with the milk truck. That's why, these 3 farmers tried to develop farm structure and strategy to retain in the market.

#### **2.4.4 Present Condition and Contribution of Dairy (case study of Jessore District, Bangladesh)**

Dairy farming in Jessore District contributes a great deal to the household welfare in terms of food security, shelter, income generation and other social services. It may also be concluded from this study that dairy farming in this area is mainly carried out as main source of income in which women (34.4% of the respondents) contributes in agricultural activities. The role of animals in development programmes are generally underrated, in spite of the

increasing demand, especially in the developing countries, for animal products and services. Allegations about dairy's role in resource and environmental degradation are generally not fully documented. Integrated dairy farming and agriculture increases short term benefits to and long term sustainability of agriculture. Improved efficiency of animal agriculture with its various commodities and service products is critical to achieving sustainable agricultural development and food security, particularly in low income food deficit countries. Where Dairy also contributes to run Biogas which reduces usage of biomass fuel for cooking and saves about Tk. 2060 for each respondents (whose have biogas plant i.e. 31 % of the respondents) as household income in the study area. Income from dairying can contribute for meeting various types of household expenses such as children's educational expenses, purchase of household appliances, assets etc. Engaging in integrated farming with dairying increased the sustainability of rural livelihoods by ensuring malnutrition of children, increasing interaction to government and banks official, increasing participation to village activities, ensuring women empowerment etc.

#### **2.4.5 Farming Practices and Resource Circulation System (case study of Maulavibazar District, Bangladesh)**

This article tries to explore the situation of dairying in Maulavibazar District of Bangladesh. The study has shown that dairying in Maulavibazar district is traditional and labor intensive. The data reveal a greater use of family labor in dairy cows' care and delivering milk. Income from the dairy activities was used to meet/provide household expenses, savings, investment and insurance. Finding of the study reveals that Local Resource Circulation System (LRCSs) by means of farm management to decrease the cost, and increase the income and labor utilization in dairy-crop farming in the farm level. It has contributed to provide year-round working opportunities for the local people, utilize family

labor effectively and provide a place for milk market low shipping and no storage cost. Integrated agriculture as the primary activity among most of the people has good chance to develop dairying as reducing stress and shock of farming household. The empirical basis of the study is a survey among farmers of Maulavibazar district at random selection.

#### **2.4.6 Different Milk Marketing System (Case study of three districts of Bangladesh )**

Dairy farming played a vital role in village and suburban economy of Bangladesh. They hold a vital share of agricultural gross income and also their households' income. Income from milk in producers' level is less due to poor marketing system as one of the obstacle in Bangladesh. Middlemen are performing various intermediary marketing functions such as transportation and retailing of the milk and link the dairy farmers (producers) and the consumers. The main interest of the marketing intermediaries is to gain the highest profit possible from their particular business operation (FAO, 2002). However, the milk marketing and processing systems in Bangladesh are not yet developed. Milk being perishable item, needing timely and special attention to market, makes the marketing more difficult (FAO, 1990). Generally, rural milk producers sell their surplus milk to various marketing intermediaries prevailing locally who in turn sell the milk to the individual consumers, restaurants & tea stalls in the urban area. Lack of organized milk marketing system in the grass-root level is a drawback for the farmers' position in selling milk. Earning money and improving production will be vulnerable if they are unorganized. Under these circumstances the farmers are unable to improve their socio-economic conditions. Cooperative marketing system could play a vital role in providing a channel that can link the farmers to the urban markets/consumers smoothly and ensure higher price for their products.

#### **2.4.7 Role of Cooperative Services on Dairy Development (case study of Sirajgonj District, Bangladesh)**

Scarcity of milk has reached in top priority along with other food products during post liberation war. In 1973, Bangladesh Government has taken initiatives to develop dairy industry under 'Dairy Cooperative project' to take care of farmers' benefit for increasing milk production. In October 1973, Potazia Milk Producers co-operative Society has been established to retrain milk producers' benefit from middlemen by ensuring fixed milk market. Potazia has its own milk collection centre at the village. It was observed that cooperative members were bringing milk to the milk collecting point twice a day, morning and evening. It was also observed the veterinary team and extension officials from Baghabarighat milk shed area are visiting Potazia primary cooperative at least once a week. Available services provide them an opportunity to develop their cooperative and dairying.

#### **2.4.8 Farmers' Loyalty to Dairy Cooperative (case study of Sirajgonj, District, Bangladesh )**

BMPCUL became the dominant milk producing organization, marketing more than 60% of the total marketed milk in Bangladesh. Last two decades, milk collection capacity of BMPCUL has increased drastically. The level of adoption of improved dairy breeds was considerably superior in cooperative villages. At the same time, milk production per cooperative member also has greatly improved (General Section, Cooperative office). This significant improvement occurs because of rendering veterinary extension and feed support service by BMPCUL is remarkable. That's why farmers are continuing membership in the cooperative for a long term as the average membership age is 20.15 years. Members show repeated behavior over years which exhibit the members' loyalty to cooperative. The findings of this study partially supported the hypothesis that a member's positive attitude would

significantly influence his positive behavior toward the cooperative. TRUST, VOICE, SHELTER, RELATION, FEED SUPPORT and EXTENSION SERVICE are 7 factors positively effect on members' loyalty. COMPLAIN is the only factor that affect negatively on members' loyalty. If the members don't have more complaints against cooperative then members' are more loyal to the cooperative. There were some important lessons that we learned from this study. For instance, we found that members' satisfaction with the cooperative management led to significantly higher members' loyalty.

#### **2.4.9 Dairy Contribution to Biogas Production and Farmers' Livelihood (case study of Jessore District, Bangladesh)**

Biogas is a promising renewable energy source to meet energy demand of rural Bangladesh. As per, NDBMP program cattle's manure is the major source of biogas production where dairy cattle accounts for significant share in Bangladesh as well as Jessore district. Jessore district was considered to be a significant place for biogas production in both phases of NDBMP plan. Biogas reduces consumption of biomass fuel and cost for cooking. It also reduces cooking time, hazard and smoke pollution in the kitchen that leads to good environment of kitchen. This environment reduces the prevalence of diseases of farming family members especially women members (IDCOL, 2011). Women members are getting more time for other activities such as income generation, recreation, and more attention to children's education and also in dairy farming activities, etc. Bioslurry improves the nutrient property of soil at an acceptable level, since due to continuous mining of nutrients the soil is losing its productive capacity at an endangering stage. In organic system (using bioslurry in land) had higher fertility and organic crops had higher yields and starch content than the inorganic system. In contrast, long term use of synthetic fertilizers depletes soil organism of organic matter they need.

# Chapter 3

## Dairy Farming in Japan

### 3.1 Introduction

The Japanese livestock sector continues to be heavily protected from international competition, despite recent reforms. Economic and environmental constraints have led to a stagnation or decline in output of livestock products over recent years. Rapid structural change has also seen the emergence of large-scale intensive production units. Its reliance on imported grains has reduced Japan's overall agricultural self-sufficiency to around 40%. The 1980s saw Japan's imports of feed grains level off, but imports of meats and dairy products grew at a faster rate than previously. Hence self-sufficiency in livestock products has declined, substantially in the cases of beef and pig meat. When the Japanese economy recovers from the current depression, income growth rates may reflect those of other developed industrial economies, rather than those of the newly industrializing economies. This, plus the facts that the urbanization phenomena in Japan is long over and that livestock

protection is high, suggests that Japan's potential demand growth for livestock products is likely to be driven mainly by lower consumer prices should protection be reduced. This is already evident from trade policy reforms for beef and cheese. Using a global general equilibrium model, projections of the Japanese economy indicated that, even without policy reforms, self-sufficiency and the trade balance in livestock products will continue to fall. Should Uruguay Round reforms have been factored in, self-sufficiency would likely have declined further and import volumes would have grown even faster. Despite some recent reductions in guaranteed prices and tariffs (noticeable for beef and cheeses) Japan's livestock sector remains one of the most highly protected in the world.

### **3.1.1 Dairy Farming as efficient Japanese Agriculture**

The total annual raw milk production in Japan is about 8.3 million tons, second only to rice as the country's biggest agricultural product. About 60% of production is used to produce milk for drinking, while the remaining 40% of raw milk is processed into other dairy products such as cheese and butter. This production is supported by approximately 19,400 dairy farms and about 1.42 million dairy cows. The average number of cows per farm was about 73 as of February 2013. The average annual production per head is about 7,103kg. Relative to rice farming, a single producing dairy cow provides an equivalent income as that generated by 52ares of rice field. When applied to an average dairy farm of 37.6 producing cows, this provides an equivalent of about 19.5 hectares of cultivated rice. The number of equivalent rice producers on this scale in Japan can be counted on the fingers of one hand. Apart from the sparsely settled island of Hokkaido, where pasture dairy farming is common, most Japanese dairy farmers operate farms in narrow valleys or on land located on the outskirts of urban areas. Even these small-scale farms have the income potential of all but the very largest

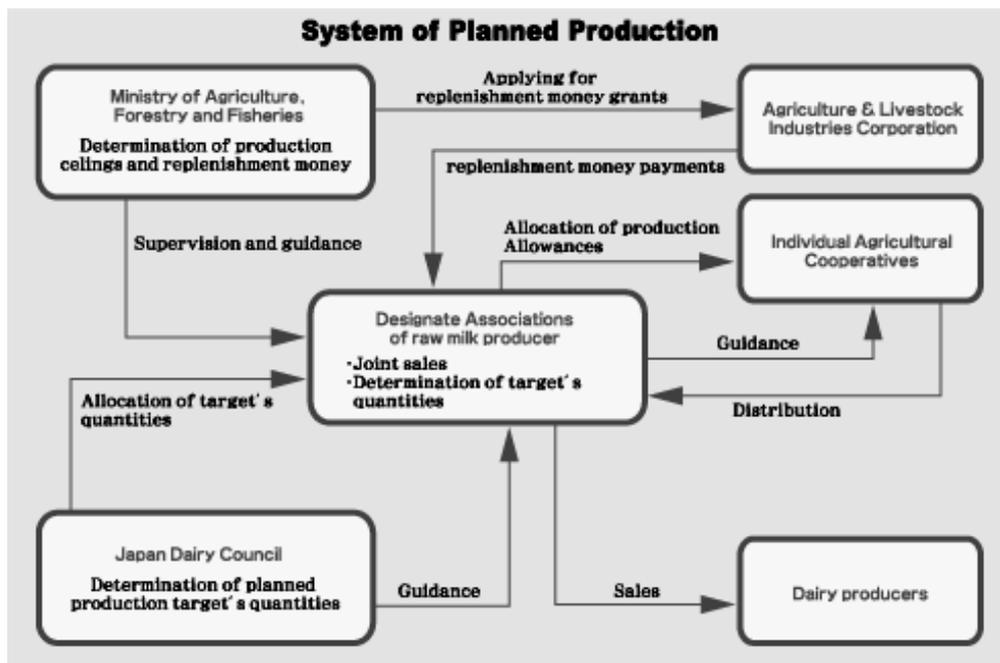
rice and dry field farms. Indeed, Japanese dairy farming is a model of agricultural efficiency in Japan.

### **3.1.2 Growing Era of Japanese Dairy**

Commercial dairy farming began in Japan in the late Meiji era, about 100 years ago. However, it was not until the early 1950s that it developed on a full scale, about the same time that the school lunch system was introduced in elementary schools. Compared to rice cultivation and dry field farming, dairy farms earn income throughout the year rather than seasonally, and are not affected by the vagaries of the weather. Consequently, commercial dairy farming was an immediate success, with the total number of dairy farmers reaching a peak of about 410,000 in 1962. However, during this period, most dairy farmers kept only 2-3 dairy cows as a supplement to their rice and/or dry field farming operations, and the annual production of raw milk was only about 2.44 million tons, or about 30% of current production. Subsequently, as the Japanese economy began to flourish, young people moved from farm villages to urban areas, and many farms that had been in the same family for generations were left without successors. As a result, farms were combined; farming operations became larger, more efficient, and more intensive. In 1975 there were about 160,000 dairy farmers in Japan, and by 1985 this number had declined sharply to about 82,000 farmers. Since then, an average annual decline of 5% has resulted in the current figure of only 19,400 dairy farmers, approximately one-fourteenth of the number in 1962. On the other hand, the number of dairy cows has steadily increased per farm. Currently, Japanese dairy farming is on par with, or exceeds, dairy farming operations in EC countries, while providing a safe and stable supply of milk and other dairy products.

### 3.1.3 Planned Production of Dairy Farming

The Japanese dairy industry conforms to production guidelines set by the government and based on supply/demand data provided by the Agriculture & Livestock Industry Corporation. In order to assure the stable supply of raw milk, a subsidy system for dairy producers was established in 1965. Since then, the government has set production ceilings in order to



**Figure 3-1: Planned Production System**

Source: Japan Dairy Council

prevent market surpluses and consequent market and price instability. Furthermore, to protect their operations from demand and supply imbalances and depressed prices, dairy producers voluntarily organized a planned production system in 1979. Since this system has no legal binding power, some dairy farmers choose to operate outside the planned production

guidelines. However, these outside operators account for only about 5% of total dairy producers, a remarkable figure for a truly volunteer program.

### **3.1.4 Government Subsidies in Dairy Farm abide by Law**

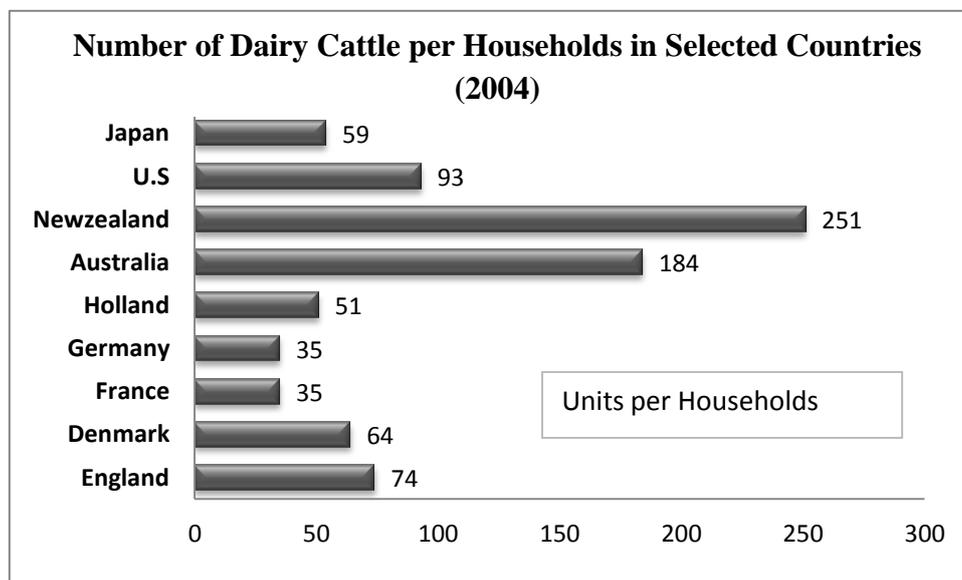
Under the law of Japan, the raw milk subjected to government subsidies is only material milk for manufacturing use [authorized milk products (butter, skimmed milk powder, condensed whole milk with sugar added) and other milk product determined by government ordinance (whole milk powder, sugar added milk powder, condensed whole milk with no sugar added, and skimmed milk for animal consumption)] which makes up 1/4 of the overall raw milk output. Between fiscal year 1966 [ the year when "temporary Law for Compensation Price for Producers of Milk for Manufacturing Use"( Deficiency Payment Law ) was enforced ] and 2000, the government had determined the average production cost per 1kg of raw milk and the actual price negotiated between dairy businesses ( standard transaction price ) each year. The balance had been paid to producers as subsidies. In other words, the producers had received guaranteed amount of money from the government as milk price, which was the total of the standard transaction price and subsidies (=guaranteed price). However, as the Deficiency Payment Law was amended in May 2000 and re-enforced from fiscal year 2001, the government-determined guaranteed price and standard transaction price were abolished and subsidies system, which has allowed deficiency payment, has disappeared. In the new calculation method of subsidy price, rate of change, calculated from the past three-year's average production cost and amount of milk, is multiplied by aid unit value of the previous fiscal year. In fiscal year 2001, the subsidy was determined to be the same price as 2000(10.30yen/kg) in order to shift the system smoothly. Therefore, from the fiscal year 2001, the price of material milk for manufacturing use is to be determined by negotiation between designated raw milk producer groups and dairy services. The aid unit value in 2004 was

10.52yen/kg, 2005 is 10.40yen/kg. The upper limit (number limit) of material milk for manufacturing use, which was determined in conjunction with subsidies, was set in a same manner both before and after the amendment. Under the new system, the price of material milk for manufacturing use has to be referred to in the free trading between the designated raw milk producer groups and the daily services. Therefore, the price is likely to drop significantly expending on unexpected demand and supply changes. Accordingly, "Budget Allocation for Projects to Stabilized Business by Producers of material milk for manufacturing use" is enforced along with the subsidies, as a measure to absorb abrupt change against such situation. The budget allocations grant 80% of the balance of the transaction price for material milk for manufacturing use ( without subsidies ) and compensation standard price ( =average transaction price for the past three years. The compensation standard price in 2001 was the same price as the standard transaction price of 61.83yen/kg in 2000) to producers as a compensation, with relying on the fund from 0.40-yen contribution from producer per 1kg of material milk for manufacturing use plus 1.20-yen government bounty per 1kg of material milk for manufacturing use.

### **3.1.5 Japanese and Global Dairy farming**

Full-scale dairy farming began in Japan after World War II. Most farmers operated on a very small scale, maintaining two or three dairy cows "on the side" in addition to their main occupation of rice cultivation and/or dry field farming. After 50 years, however, dairy farming is being conducted on a much larger scale, with an average of 58.7% dairy cows per farm, of which 37.6% head are producing cows. When compared with European and American countries, where the dairy industry has developed over 200 years, the Japanese dairy industry has shown remarkable growth, already outperforming France, Italy, and Germany in terms of size and efficiency. During the 15 years from 1975 to 1990, the number

of adult cows placed in production in European countries increased by 60% - 80%, while the increase in Japan amounted to 160%, doubles that of European countries. During the same period, per capita consumption of milk and dairy products increased by about 48%, even while the number of dairy farmers declined by 42%. When these two factors are taken into account, it is clear that Japanese dairy farmers have been extraordinarily successful in their efforts to move to large-scale farming while responding to consumer demand for higher production and stable supplies.



**Figure 3-2: Number of Dairy Cattle per Households in Selected Countries**

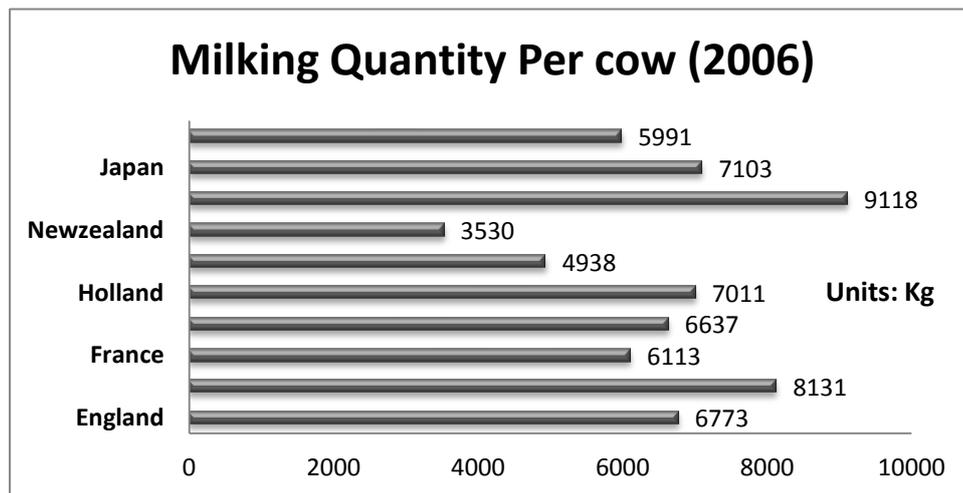
Sources: "Statistics of Livestock in Japan" Ministry of Agriculture, Forestry and Fisheries.

Note 1: The U.S. figure is by the census December.

Note 2: The figure of Australia and New Zealand are by the census June.

### 3.1.6 Highest production

Unlike European and American dairy farmers, Japanese dairy farmers operate at a distinct disadvantage - as most of their farms are located in the narrow valleys formed by the country's rugged mountain topography. To overcome this handicap and meet increasing consumer demand, efforts were made to increase the milk yield of individual cows. In 1975, about 1.78 million cows produced approximately five million tons of raw milk, an average of 2.8 tons per cow. By 2004, however, 1.69million cows produced approximately 8.3 million tons, or 4.9 tons per cow. When non-producing cows are taken out of the equation, the average annual production of Japanese dairy cows is 7,400kg per cow, or 7.5tons. This measure of efficiency is very close to that achieved by U.S. dairy farmers (9.1 tons), and outranks that recorded by the dairy industries in France, England, Australia, and New Zealand. It has been through the efforts of Japanese dairy farmers to expand their scale of operations while at the same time increasing production per cow that the present stable supply of milk has been maintained.



**Figure 3-3: Milking Quantity per cows in various countries**

Sources:ZMP,National Statistics,EUROSTAT,FAO.

Note 1: ※ = The Newzealand figure is on 2005.

### **3.1.7 Individualized and multifaceted dairy**

Farmers actively seek "dairy educational farm" campaigns to make good use of various resources on their ranches and farms for education. These farmers are receiving high evaluation marks mainly from educators in terms of utilizing the ranches and farms as a place to perform "comprehensive learning" and "education to foster children's mind and zest for living" which was introduced in 2002. Based on these trends of the times, in July 1998, the Japan Dairy Council proposed to establish the "Committee for the Promotion of Dairy Educational Farms" by cooperation of educators and dairy farmers for the purposes of diffusing and promoting the dairy educational farm in Japan. For about two and a half years after the establishment, we have researched and examined the activity in Europe, which is a group of advanced countries with educational farms, and domestic cases of on-site dairy training. Based on the result, in January 2001, the "Dairy Educational Farm Certification System" was established to certify ranches that meet the appropriate criteria in safety and hygiene management and educational capability, as "appropriate ranches to seek education from." As of April 2005, there are 183 certified ranches throughout Japan.

## **3.2 Scale Classification and Practices of Dairy Farms**

Scale size of a farm will make interest to give full effort to dairy farming. About 93% of dairy households have less than 50 milking cows in Japan (except Hokkaido). Although, herd size of dairy household are increasing in Japan, less than 50 milking cows holder plays vital role in milk production. Unwillingness of young people to continue dairy farming will be major constraints for future development of small scale farms. Farmers have keen knowledge about husbandary practices and health care of the cows. Medium scale farmers have sucessor to continue as this enterprise may become profitable earning source in near future.

Productivity of large scale farms have increased with advancement of labor in agricultural sector as well as dairy farming. The structural peakness has been becoming larger and larger not only in specialized rice farming but also in dairy farming. About 13% of the households have more than 50 milking cows in 2010 while that was less than 1% in 1980 in Saga Prefecture. As large scale farms, are increasing in this area day by day, that will attract others to continue their farms. Large scale farmers also adopting new technology that gives good impression to small and medium scale farmers about dairy farming practices.

### 3.2.1 Classification of Scale Size of Dairy Households

Realistic scale size of a farm will make interest to give the full effort to dairy farming. In most situations the ultimate size of the dairy will depend on the following factors: (1) land base available on site or in the area for land application of manure, (2) availability of labor, (3) people and business management skills of the owner, and (4) income goals of the owner. In this study area, farmer's are mostly concerned about their income level as other factors are not their limiting factor. In this regards, we have considered the income of households can be the factor to classify of scale size.

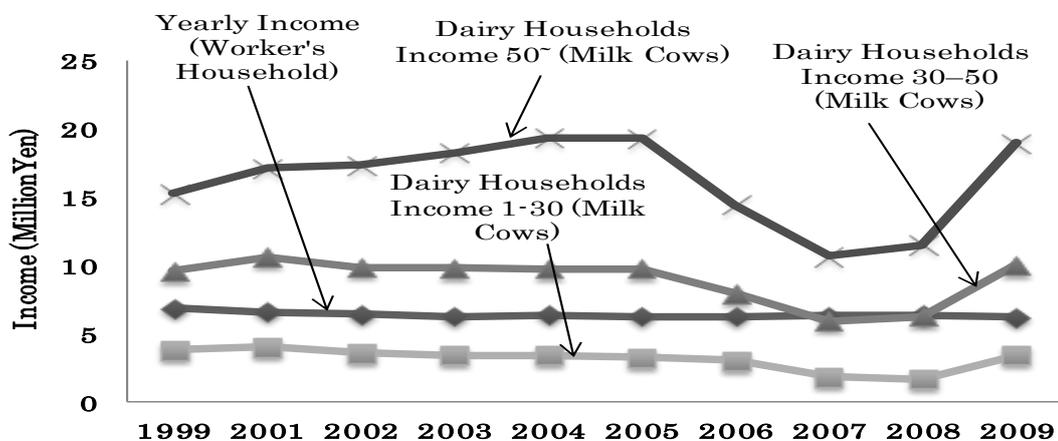


Figure 3-4: Average Annual Income of Households (Worker's and dairy)

Source: 1. Annual Report on Agricultural Management Survey (Livestock Production Cost)

## 2. Annual Report on the Family income and Expenditure Survey

Above figure describes annual income of households including dairy households and worker's households. If average annual income of dairy household lies above the line of worker's households then they can give their full effort to any business. In this regards, if one household has above 30 milking cows then household income lies over the line of worker's household. But, the income of dairy household has been reduced to equal as worker's household because of concentrated feed price has increased suddenly in 2007-08, but it lies on the worker's household income line. That's why; we have divided scale size in 30-50 milking cows as medium scale dairy farms. We have calculated the number of total cows of each scale size of dairy households using the following formula:

$$\text{Total cows (Lower or upper limit)} = \text{Lower or upper limit of milking cows} \times \frac{\text{Total cows of Japan (except Hokkaido)}}{\text{Milking cows of Japan (except Hokkaido)}}$$

According to above formula, we have classified the scale size of dairy households in the following table:

**Table 3-1: Scale Size of Dairy Households of Tofuken, Japan**

Milking Cows	Total Cows	Scale
1-30	2-48	Small
30-50	48-80	Medium
Above 50	Above 80	Large

Source: Authors have calculated based on data of Livestock Statistics of Japan in 2011

## 3.2.2 General Characteristics of Farmers

### 3.2.2.1 Different Scale Households

All the dairy farmers were classified into three groups such as small, medium and large scale. As per classification of scale size, 60% of the responded farmers belonged to small scale households those have 1-30 milking cows or total 2-48 cows. 16% of the responded farmers belonged to medium scale households those have 30-50 milking cows or total 48-80

**Table 3-2: General Characteristics of Farmers**

Particulars		All farms (%)	Small (%)	Medium (%)	Large (%)
Owner's occupation	Agriculture	25 (100)	15 (60)	4 (16)	6 (24)
Income source (Dairy Farm)	Main	23 (92)	13(87)	4 (100)	6 (100)
	Side	2 (8)	2 (13)	0 (0)	0 (0)
Education	Junior High School	8 (32)	6 (40)	1(25)	1 (17)
	Senior High School	11(44)	7 (47)	1(25)	3 (50)
	Specialized College/ Above	6 (24)	2 (13)	2 (50)	2 (33)
Age	21-39	2 (8)	0 (0)	1 (25)	1(17)
	40-60	14 (56)	11 (73)	2 (50)	1 (17)
	Above 60	9 (36)	4 (27)	1 (25)	4 (66)

Source: Survey Data of 2011

cows. And households, those have above 50 milking cows or above 80 total cows have belonged to large scale households, are 24% of the responded farmers.

### **3.2.2.2 Age of Farmers**

All of the respondents have been categorized into two groups according to age: below 60 years and above 60 years. The average age of the responded farmers is 56 years. Among the respondents of survey, 64% of the farmers belonged to the group of below 60 years and rest 36% belonged to the group of above 60 years. From which, 73% of small holder belonged to the group of below 60 years and 27% of small holder belonged to the group of above 60 years. On the other hand, 75% of medium scale farmers belonged to the below 60 years group and 25% of the medium holder belonged to the group of above 60 years. But, 66% of responded farmers those are large scale farmers belong to above 60 years group.

### **3.2.2.3 Education**

More than two-third of farm holders have a senior high school or higher degree. Among those, quarter of farmers have completed two year diploma course from specialized agricultural college. Most of the farmers have keen knowledge to perform dairy farming activities. Medium and large scale farmers have either received training from other farmers or completed diploma relates to livestock practices.

### **3.2.2.4 Other Farming Activities**

Most of the small scale farmers have been producing rice with dairy farming i.e. is called compound dairy farming and it was very popular in SP area. Each small scale dairy farmers have produced rice about 1.49 ha of land. But, medium and large scale farmers rarely have done other farming beside dairy activities. They have produced some rice for their personal consumption. Some farmers also produced vegetable for their own consumption. Small scale farmers produced roughage including rice straw (self rice field and collected from other farmers) to feed the cows.

### 3.2.3 Overall Management Practices of Dairy Farms

#### 3.2.3.1 Number of Cows Per Farm

In small scale households, average number of cows are 30 ranges varying from 10-45. In medium scale households, average number of cows are 65 ranges varying from 52-71. Highest Average number of cows per farm in large scale farms i.e. 145 cows per farm ranges varying from 80-225 cows. But, among total cows 62% are milking cows in small scale dairy farms while among total cows 57% and 54% of are milking cows in medium and large scale farms respectively.

#### 3.2.3.2 Roughage Production and Purchase Scenario

Small scale farmers used highest land area for roughage production by themselves. Farmers produce 0.10 ha per cow for roughage production in the small scale farms. On the other hand, medium and large scale farmers produce 0.019 ha per cow and 0.017 ha per cow respectively. About 12% (3 households) of the respondent whose are mainly small scale farmers produced roughage for feeding their cows. There is no medium and large scale farmer's whose are fed their cows by produced roughage only. But, large scale farmers are fed their cows by purchasing roughage only is about 12% (3 households) of the respondents as they don't have enough land, time and labor to produce roughage.

**Table 3-3: Produced and Purchased Scenario of Roughage**

Scale	Produced Only		Produced &		Purchased Only	
	Households	%	Households	%	Households	%
Small	3	20	11	73	1	7
Medium	0	0	3	75	1	25
Large	0	0	3	50	3	50

Source: Survey Data of 2011

### 3.2.3.3 Milking System

Most of the farmers used hygienic way for milking their cows as they have washed the udder before milking the cows and also cleaned the milker, pipeline, parlour and bucket regularly. Large scale farmers mostly used milking parlours for milking their cows that attracts the small and medium scale farmers. But, almost 72% of the surveyed respondents used pipeline for milking their cows. Among those, 48% of pipeline milking system used by small scale farmers and others used by medium and large scale farmers. About 12% of the farmers used bucket milking system, those all are small scale farmers.

### 3.2.3.4 Cow Barn System

There are three major systems of feeding, which are practiced by dairy farmers in the study area. Mostly, large scale farmers are practiced free stall feeding system in the study area. Small and medium scale farmers are mainly practiced stanchion or rope tie system to feed their cows. In recent years, farmers changed the feeding system from stanchion to rope tie system. Because, cow's legs are becoming painful in stanchion system in the long run. Now a day, rope tie and free stall feeding system is becoming popular in the study area.

**Table 3-4: Cow Barn System Practiced by dairy Households**

<b>Feeding System</b>	<b>Small Scale</b>	<b>Medium Scale</b>	<b>Large Scale</b>
Stanchion	6 (40%)	0	1 (17%)
Tie	8 (53%)	3 (75%)	0
Free Stall	1 (7%)	1 (25%)	5 (83%)

Source: Survey Data of 2011, within brackets () indicate percentage

### **3.2.3.5 Labor Use**

Mostly family members used as a labor force in small and medium scale dairy farms. Most of the small scale households are managed by two or three family persons in the study area i.e. are 52%. Medium scale household are managed by three or four family persons. Small and medium scale farmers are getting help from designated helper in once in a month. Large scale farmers hired employee in their farms. Most of the hired employees are mainly middle aged people.

### **3.2.3.6 Milk Selling Frequency and Place**

Milk has been stored in bulk cooler of the farms that has been collected twice in a day. Milk will not be contaminated 2-3 days in the bulk cooler [9]. About 76% of stored milk picked once in everyday by tank lorry of processing company and 72 % milk solely picked by Guriko Milk Processing Company, Yamato, Saga. Other 28% of milk goes to Meiji, Fukuoka and Murayama, Karatsu Milk processing company. Murayama milk processing company mainly supplied milk to school.

### **3.2.3.7 Water Supply**

Water is important for dairy cows for drinking and washing the households, for spraying to cows for feeling cool in the summer season. About 76 % of the farmers used water from underground water and others used supply water although commercial supply water is expensive and most of the study area is high land. There is no significant difference of water supply in different scale size.

### **3.2.3.8 Roughage Used to Feed**

Almost all roughage has imported from abroad that includes: Italian, Sudan, Alfalfa, Otsuhay etc. Some farmers fed WCS (Whole crop silage) produced their own rice field. Some are also fed rice straw collected from others and their own rice production. Rice straw used as feed mainly by small scale farmers for heifer and heifer calves. Other than roughage, concentrated feed also used to feed in all scale farms.

### **3.2.3.9 Disposal of Manure**

Almost all of the farmers prepared compost shed for making the manure useable as fertilizer. About 368 m<sup>2</sup> land per households used as compost shed ranges varying from 40 m<sup>2</sup> to 2000 m<sup>2</sup>. In compost shed, they prepared the manure and used in their grass land, paddy field, given to other farmers, and some also sold out the prepared manure to other farmers. Specially, small and medium scale farmers used compost to their grass land and paddy field as fertilizer. But, large scale farmers are dumping to uncultivated land or sold or giving to other farmers.

### **3.2.3.10 Successor of the Farm**

Successor's keen interest may continue the farm in the long run. But, lack of willingness of young people to continue farming, is a major problem in agricultural sector in Japan. 13 out of 15 small scale farmers doesn't have successor to continue their farm into next generation. Among those, 4 farmer's age has crossed 60 years. On the other hand, 1 out of 4 medium and 1 out of 6 large scale farmers doesn't have successor to continue their farm in the next future.

**Table 3-5: Successor's Condition of Different Scale Dairy Households**

Farmer's Age	Small Scale		Medium Scale		Large Scale	
	Successor		Successor		Successor	
	Yes	No	Yes	No	Yes	No
Below 60 Years	0	11	2	1	2	0
Above 60 Years	2	2	1	0	3	1

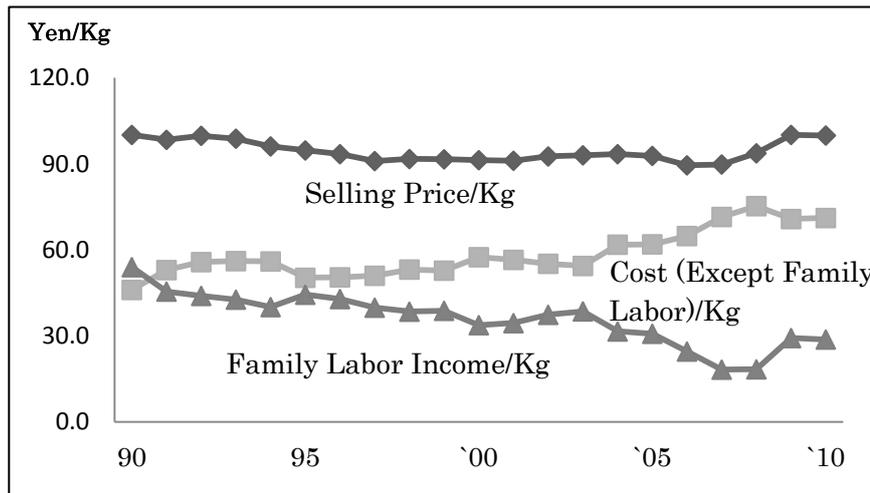
Source: Survey data of 2011

Dairy households have been classified into three scales on the basis of average household's income per year such as: small scale – those have 2-48 cows; medium scale – those have 48-80 cows and large scale – those have above 80 cows. 60% of households belong to small scale, 16% of households belong to medium scale and 24% of households belong to large scale. Classification of scale size has made us clear about different management practices of different scale farms. Family labor plays vital role in small and medium scale farms whereas workers are hired in large scale farms. Young people have involved in medium and large scale farms but aged people mostly managed small scale farms. Grass has produced by small and medium scale farms but purchased by large scale farms. 13 out of 15 small scale farmers doesn't have successor, on the other hand, 3 out of 4 medium and 5 out 6 large scale farms have successor which attracts small scale farmers' successor. Government and other private organization have to take initiative i.e. motivational activities for retaining the successor in small scale dairy farms. Bucket milking system is practiced by small scale farmers yet whereas parlour milking system is practices by large scale farmers. Cow barn system and Milking system of large scale farms attract small scale farms. These differences opened the arena to carry out further study about performances of different scale dairy farms.

### **3.3 Sustainable Development through Sixth Industrialization**

Family labor income from raw milk has been decreasing day by day in Tofuken. In Addition, feed price has increased in 2007-08 suddenly that affected on the cost of production (i.e. cost of milk) and ultimately income from raw milk has drastically reduced (Figure 1). To re-construct the income, authority has taken decision to increase the farm-gate price of raw milk by 10 yen per kg which has directly contribute to increase the income level of dairy farmer. Although, the sales price has been increased, the income from raw milk is less than 30 yen per kg in 2010 while that was more than 50 yen in 1990. But in these circumstances, income can be increasing through expanding the scale size of farms that means increasing the herd size or establishing processing unit i.e. direct marketing to the customers.

Therefore, this study concerned to identify possibilities of direct marketing of dairy products to the customers. In Saga Prefecture, most dairies do not do direct marketing to the customers now. Only 3 farmers in Saga Prefecture are doing direct marketing to the customers. They are legally sold raw and pasteurized; homogenized and non-homogenized milk and milk products. Additionally niche products such as cheese, yogurts, milk coffee and milk pudding are emerging. Most of the dairy farmers are prisoners of market price. They could cut their costs, but stuck with the market price. They have no control over that price. Even though, very efficient farmers watch their potential profits drive off the farm with the milk truck.



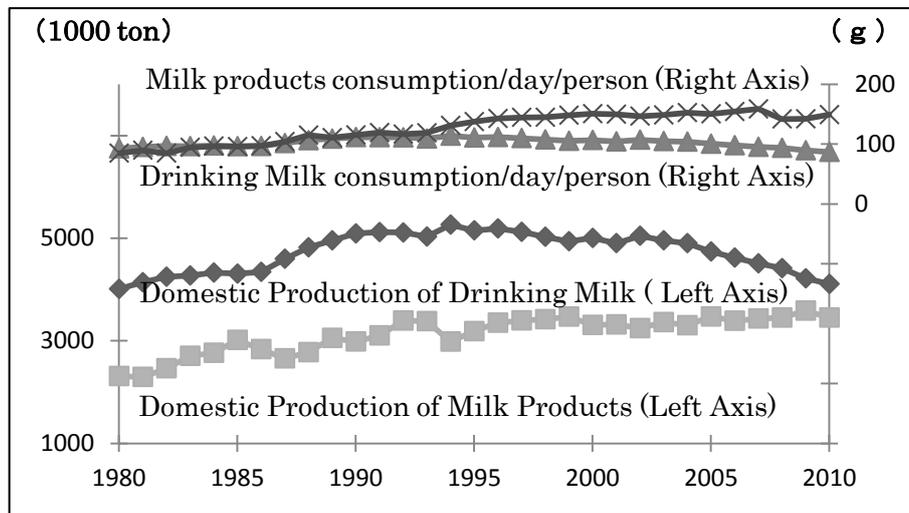
**Figure 3-5: Family Labor Income from Raw Milk/Kg in Tofuken**

Source: “Livestock Production Cost” Ministry of Agriculture, Forestry and Fisheries, Japan

Farmers concerned that their more income has gone away through tank lorry when raw milk picked form their bulk cooler. They were thinking about this situation and tried to find out the alternative way to increase the income of family labour. Direct selling to the customers can revive the income level of the farm. Therefore the study has concerned the objectives: to find out how to take back income on the farm through direct marketing, to find out ease supply chain channel, to find out distinguish features of milk products that can attract customers.

Consumption of drinking milk has reduced to 87 g/day/person in 2010 while it was 92.9 g/day/person in 1980. It indicates that Japanese habits of drinking milk have been reducing day by day. But, consumption of milk products (butter, cheese, yogurt, ice-cream etc.) has been increased to 149.2 g/day/person in 2010 while it was 84.9 g/day/person in 1980. Specially, consumption of milk products has been increased after 1990s (Figure 2). This data shows that food habit of dairy products of Japanese people has been changing from drinking milk to milk products. Whereas, domestic production of milk and milk products has also been increased to 3451 thousands ton in 2010 from 2311 thousands ton in 1980. Domestic

production of raw milk has also been decreased to 4107 thousands ton in 2010 while it was highest in 1994 (5263 thousands ton).



**Figure 3-6: Production and Consumption pattern of Milk and Milk Products, Japan**

Source: “Food Supply and Demand” Ministry of Agriculture, Forestry and Fisheries, Japan

### 3.3.1 Importance of Distribution in Marketing Channel

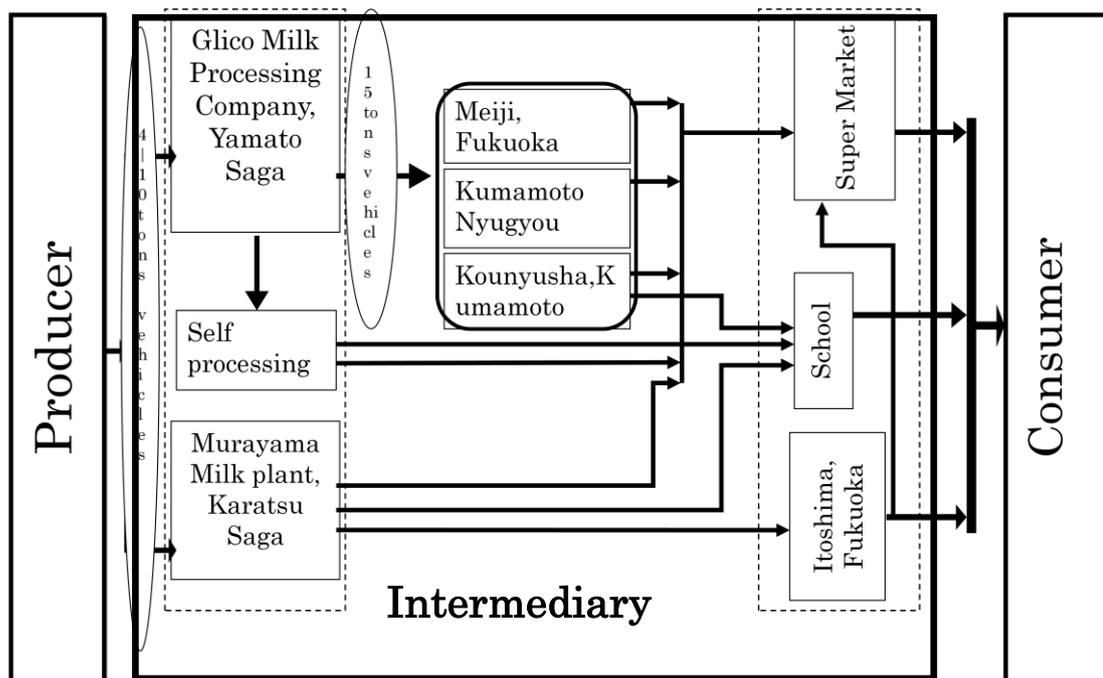
The purpose of the marketing channel is to satisfy the end users in the market, whose objective is to use or consume the product or service that, have being sold.

The distribution and marketing channels consist of three entities: producers or manufacturers, intermediaries, and consumers. The producers and (food) manufacturers are channel components typically involved in the creation of products. They are the creators of the product’s brand, highly visible, and are considered as channel origin. The intermediaries are all the institutions and individuals that facilitate the task of the manufacturer to promote, sell, and distribute the products to their end consumers. Consumers are classified as marketing channel members because they can perform and frequently do perform channel flows, as do the other members of the channel.

The importance of intermediaries increases in the channel structure as they adjust assortment discrepancies between the product supply from the manufacturer and the demand from the consumer. The discrepancy results from the fact that the manufacturers produce a large quantity of a limited variety of goods, whereas the consumers desire, generally, a limited quantity of a wide range of goods.

Distribution channel performs the function of facilitating search, adjusting discrepancy of supply, breaking bulks, creation of routines and reduction of transaction costs. They can also be responsible for creation of competitive advantage to the company, becoming possible access to a wide net of intermediaries and consumers, supplying services, reducing the distribution's costs, accessing the target market by using advanced technologies.

The distribution channel of raw milk of Saga Prefecture as follows:



**Figure 3-7: Milk Distribution channel of Saga Prefecture**

Source: Survey Data 2012

The description of the distribution channel of raw milk of Saga Prefecture will start at farm level (Figure 3-7). First, there is group of farmers whose are known as raw milk producer. Second, intermediaries include two milk processing company inside prefecture and three milk processing company outside prefecture, supermarket, school and other sellers. At first, raw milk has supplied to Glico Milk processing company (excludes Murayama Milk Plant's requirement) through 4-10 tons capacity tank lorry for storing in cooling station. Then, raw milk supply to 3 milk processing company outside prefecture (Meiji, Fukuoka; Kumamoto Nyugyou, Kumamoto and Kounyusha, Kumamoto) trough 15 tons tank lorry. Murayama Milk plant collets raw milk from farmers directly. This part of the distribution channel is monitored and managed by Kyushu Seinyu Hanren. The processing company supplies their milk products through school and supermarket in this area. Murayama Milk Plant also supplies milk products to Itoshima's Itomonogatari. Three farms of the case study not includes in this distribution channel. One of the key issues which influence the operation of the channel is "liquidity", with relationships between participants, particularly dairy farmers, milk processors and intermediaries.

### **3.3.2 Concept of Sixth industry**

"Sixth industry" concept is an honorary professor of Tokyo University, Nara, agricultural experts Imamura Robinson in the 20th century first proposed. With *economic development* and industrialization process forward, the second industry, food processing, catering services of tertiary industry are flourishing, increasing its added value, and as the primary industry accounted for the value of Agricultural production itself continuously reduced, farmers and the Agricultural industry in the breeding industry is increasingly profitable enterprise. how to do? minister made this village of Nara, is not only engaged in agricultural crops (primary industry), but also engaged in the processing of *agricultural products* (the second industry)

with sales of *agricultural products* and processed products (tertiary sector), in order to get more added value. " $1 + 2 + 3 = 6$ ", " $1 \ 2 \ 3$ " is equivalent to 6. This is the "sixth industry" origin for the Sustainable Development of agriculture and rural opened up a bright road.

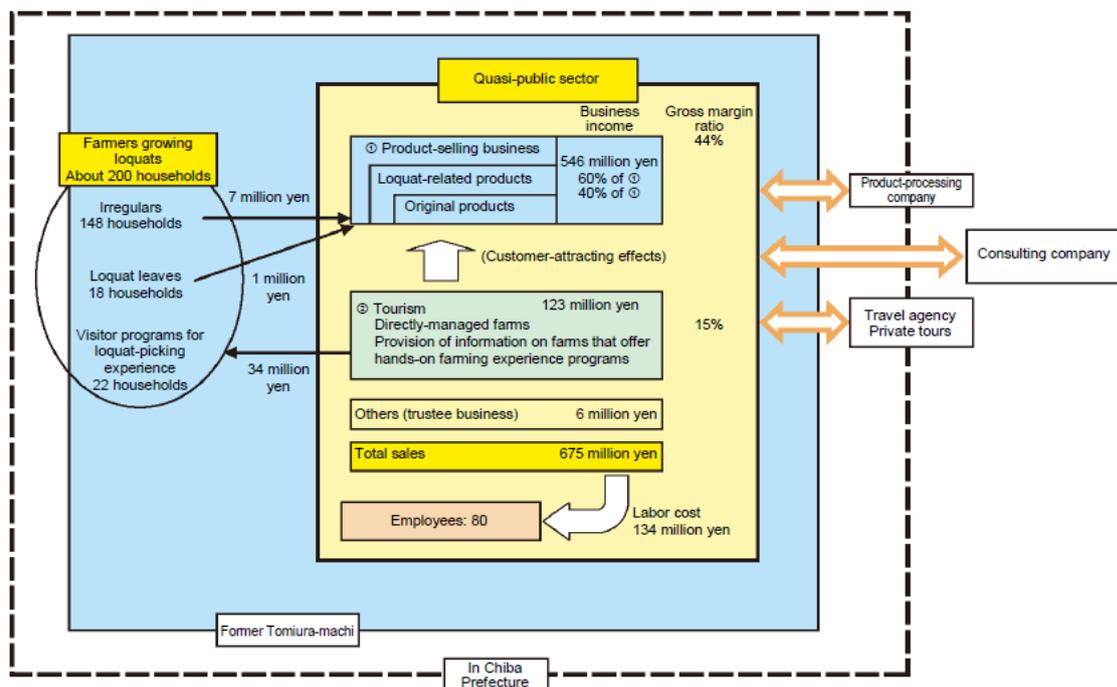
"Sixth industry" is the essence of the first, second and tertiary industries merging, so that the original as the first industry to transform into integrated agricultural industry, the agricultural added value, farmers and increase agricultural industrialization enterprises. "Sixth industry" finds the essence of Modern Agriculture, and agricultural industrialization enterprises development goals and objectives coincide. Twelve fifth promoting agricultural modernizations is an important task. To achieve agricultural modernization and construction of upstream investment alone is not enough, we must strive to foster the release of agricultural resources, promoting agricultural value-added products, formed through breeding, processing, and marketing of large industrial chain. From the perspective of industry chain, the ultimate goal of agriculture food, therefore, no advanced *food industry*, there is no modern animal husbandry and fishery industries of agriculture to the *food industry* to upgrade Engines and locomotives.

"Sixth industry" is the concept of a large agricultural food is great from farm to fork through a large integrated agricultural industrialization enterprises represent the future of advanced development.

As Japan's total final consumption expenditure on food and drink shows a declining trend, the vitality of agriculture and rural areas has been diminishing. One indication of this is the fact that, of the above-mentioned expenditure, the percentage comprised by the country's agriculture, forestry and fisheries sector is also declining. To address this issue, an important future task is to improve the agricultural business environment by such means as introducing an individual household income compensation system for farmers, so that they can continue agricultural operations. It is also important to promote initiatives to develop agriculture into

the “sixth industry” that can help revitalize rural areas. This effort will encourage regional business development and the creation of new types of business. Specific measures to this end include: encouraging farmer efforts to integrate production, processing and marketing practices through more effective use of resources available in rural areas, such as agricultural, forestry and fishery products; and promoting integration among agriculture (as a primary industry), manufacturing (as a secondary industry) and retailing (as a tertiary industry).

In view of the fact that non-farming households comprise between 70 and 80% of all households in rural areas, these initiatives must be undertaken by both farmers and non-farmers. It is also essential that the agricultural, forestry and fisheries sector collaborate with commercial and industrial sectors, and other industries in different fields, to make use of the latter’s’ processing and marketing knowledge, expertise and techniques.



**Figure 3-8: Economic effects achieved through promotion of “Sixth-industry”**

Source: Policy Research Institute, Ministry of Agriculture, Forestry and Fisheries

### **3.3.2.1 The Norinchukin Bank initiatives for “Sixth Industry”**

The Bank is offering support for initiatives for the sixth industrialization by agricultural, forestry and fisheries industry workers that promote consolidation of production, processing and distribution and cooperation with the secondary and tertiary industries. Leveraging its distinctive characteristic as the central organization for cooperatives, the Bank has been conducting business matching services between commercial enterprises and cooperative members, successfully opening markets for brand-name products and local produce, and developing new products in cooperation with food-processing companies.

In fiscal 2011, we held the Sixth Annual JA Group National Agricultural and Livestock Producers’ Conference, which was jointly sponsored by the Central Union of Agricultural Cooperatives (JA Zenchu), National Federation of Agricultural Cooperative Associations (JA Zen-Noh), and JA Bank. In addition, we held local business conferences in cooperation with regional JA and JF, including conferences in the Kyushu Bloc (in Fukuoka), Hokuriku Bloc (in Kanazawa), and Kochi Prefecture (in Tokyo), and for Miyagi Prefecture (in Sendai).

They also proactively supported domestic agricultural and livestock exports. In January 2012, they invited overseas buyers to Tokyo and held the Asia Food Market Opening Seminar for our members and agricultural, forestry and fisheries workers.

### 3.3.3 Structure and Strategy of Sixth Industrialized Farm

General characteristics of three farms have described below:

**Table 3-6: General Characteristics of Farm A, B & C**

Particulars	Farm A	Farm B	Farm C
Starting of Direct Marketing	1988	2002	1995
Processing Unit	1988	2012	1997
No of Cows	30 Milking Cows	62 Milking Cows	75 Milking cows
Milk Sells to No processing Company	No	Yes (other than self processing)	Yes (other than self processing)
Setting up cost	100 Million Yen	7 Million Yen	15 Million Yen
Annual Sales Turnover	-	90 Million Yen (Including Milk Sales Turnover)	100 Million Yen (Including Milk Sales Turnover)
Annual Profit	-	20% of sales (Family Labor wage not Deducted)	15 Million Yen (Family Labor wage not Deducted)
Labor	4 Permanent & 6 Temporary (Processing unit) with Family Labor	Family labor only	3 Employees for Farming and 2 employees for processing unit with Family Labor
Initial Products of this channel	Pasteurized milk and Ice cream	Ice-cream	Ice-cream
Present Products	Non-homogenous pasteurized milk, Plain Yogurt, Drinking Yogurt, Macha and Coffee Milk, Various Kinds of Cheese & Ice-cream.	Cheese and Ice Cream.	Raw material for Soft Ice-cream.

Source: Survey Data, 2012, Note: (-) denotes data is not available

### 3.3.3.1 Structure and Strategy of Farm A

Crop production could not be easily expanded to increase the income of households. That's why, he has attracted to the constant price of milk. He has started dairy farm. In 1988, he thought that income will not be increased only to sell milk then he started to produce ice-cream and sold it through own restaurant. He also got order from other farmers to produce ice-cream for them. After 1997, he expanded his processing unit to produce other kinds of milk and milk products such as: Non-homogenous pasteurized milk, Plain Yogurt, Drinking Yogurt, Macha and Coffee Milk, Various Kinds of Cheese etc. This farm posses its own structure to supply in farmer's market, supermarket within the region. Completing analysis about farms structure, Marketing Mix and SWOT analysis of the farm has been analyzed:

**Table 3-7: Marketing Mix Analysis of Farm A**

Marketing Mix Analysis of Farm A in 2012			
Price	Promotion	Place (Distribution)	Product
❖ Direct Marketing has higher prices than other channels	❖ Investment for launching new products.	❖ Farmer's Market and Supermarket is main distribution channel	❖ Regional preferences considered
	❖ Sold out tools	❖ Through Other Farmers	

Source: Authors, based on data and interviews

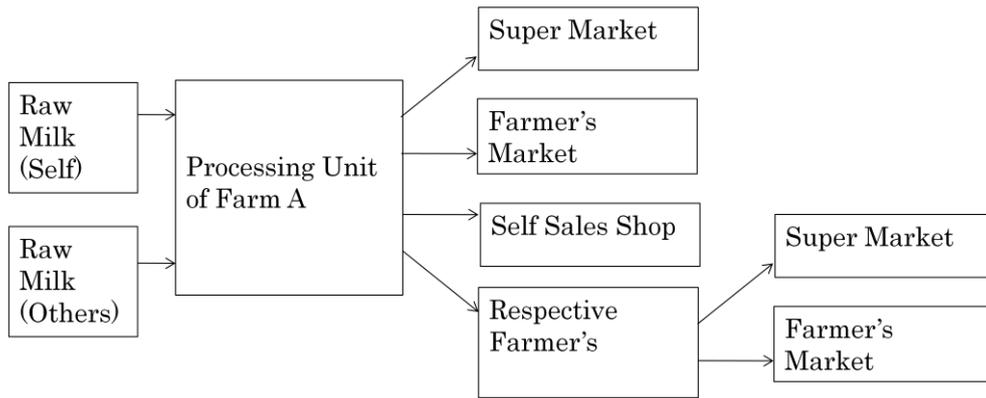
**Table 3-8: SWOT Analysis of Direct Marketing Channel for Farm A**

SWOT	
<u>Strengths</u>	<u>Weakness</u>
<ul style="list-style-type: none"> <li>- Income has been increased</li> <li>- Ease supply channel</li> <li>- Produced for other farmers</li> <li>- No-homogeneous milk products</li> </ul>	<ul style="list-style-type: none"> <li>- High Risk of credit</li> <li>- Intermediary Dependence</li> <li>- Low chain fidelity</li> </ul>
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> <li>- Exploring regional preferences</li> <li>- Direct communication to consumers</li> <li>- Food habits of people changed to dairy products</li> <li>- Bulk of raw milk also sold to other than prefecture</li> </ul>	<ul style="list-style-type: none"> <li>- New Entrants – low barriers to entry</li> <li>- Competition from Big Companies</li> <li>- Enter into TPP</li> <li>- Learning time for farm A</li> </ul>

Source: Developed by Authors based on interviews, using Porter’s Model (1997).

Note: TPP denotes Trans-Pacific Partnership Agreement.

Farm A’s strategic objectives to reach the direct marketing channel is closely linked to a greater satisfaction of end user, providing the maximum in spatial convenience, aligned with minimal wait time, given that product delivery is immediate. Hence, value is added to the product. With this, the action of the farm in this channel was heavily focused on a strategy of overcoming the price perception and convenience of local traditional retail, offering a value proposition (product plus service/convenience) that is more attractive to the consumer. The farm supplied their products through the following channel:



**Figure 3-9: Supply Chain Channel of Farm A**

Source: Survey Data 2012

### 3.3.3.2 Structure and Strategy Farm B

In 2002, he thought to produce some products from his own produced milk. Then he contacted with Farm A for producing cup ice-cream for his farm. After that, he was thinking to produce milk products by himself. When his son has returned home after his graduation, he planned to engage his son into farming activities through establishing processing unit of cheese. In May 2012, they have started to produce unique cheese in their farm. For completing about farm's structure, Marketing Mix and SWOT analysis of the farm has been done:

**Table 3-9: Marketing Mix Analysis of Farm B**

Marketing Mix Analysis of Farm B in 2012			
Price	Promotion	Place (Distribution)	Product
❖ Higher prices than other channels	❖ Investment for launching new products	❖ Farmer's Market, Restaurant and Internet are main distribution channel	❖ Unique and tasty cheese
	❖ Sell out through restaurant		

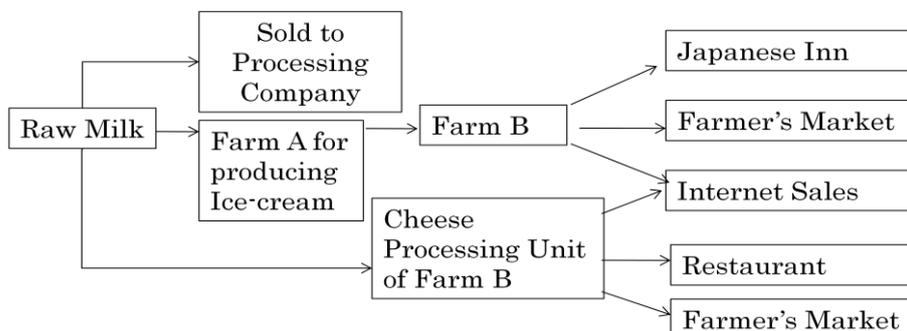
Source: Authors, based on data and interviews

**Table 3-10: SWOT Analysis of Direct Marketing Channel for Farm B**

SWOT	
<u>Strengths</u>	<u>Weakness</u>
<ul style="list-style-type: none"> <li>- Profitability has been increased</li> <li>- Ease supply channel</li> <li>- Successor has engaged</li> <li>- Unique Taste</li> </ul>	<ul style="list-style-type: none"> <li>- Time consuming</li> <li>- High Risk of credit</li> <li>- Intermediary Dependence</li> <li>- Low chain fidelity</li> </ul>
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> <li>- Exploring regional preferences</li> <li>- Direct communication to consumers</li> <li>- Consumption of cheese increased</li> </ul>	<ul style="list-style-type: none"> <li>- New Entrants – low barriers to entry.</li> <li>- Enter into TPP</li> <li>- Learning time for farm A</li> </ul>

Source: Developed by Authors based on interviews, using Porter’s Model (1997).

Farm B’s strategic objectives to reach the direct marketing channel is providing the fresh and unique products to achieve greater satisfaction of end user. The farm has then a strategy to “skip over” the traditional intermediaries of the traditional distribution channels, so as to offer its products with more added services directly to the end consumer, reducing the number of intermediaries and focusing the channel flows with reliable agent. The supply chain channel of Farm B is as follows:



**Figure 3-10: Supply Chain Channel of Farm B**

Source: Survey Data 2012

### 3.3.3.3 Structure and Strategy Farm C

This farm also started to sell ice-cream which was produced by Farm A. But, raw milk and other raw material supplied by Farm C. In 1997, they started to produce milk (raw material) for soft ice-cream and sold through own sales shop and other soft ice-cream seller's shop. In 2011, they have established dairy academy for delivering the speech about milk production and care of the animals, also teach how to make butter from raw milk. This is one kind of advertisement for the farm. For completing about farm's structure, Marketing Mix and SWOT analysis of the farm has been done:

**Table 3-11: Marketing Mix Analysis of Farm C**

Marketing Mix Analysis of Farm C in 2012			
Price	Promotion	Place (Distribution)	Product
❖ High prices than other channels	❖ Dairy Academy for awareness of people	❖ Farmer's Market and soft ice-cream sellers shop is main distribution channel	❖ Tasty raw material for Soft ice-cream
	❖ Sell through soft ice-cream sellers		❖ Create awareness through Dairy Academy

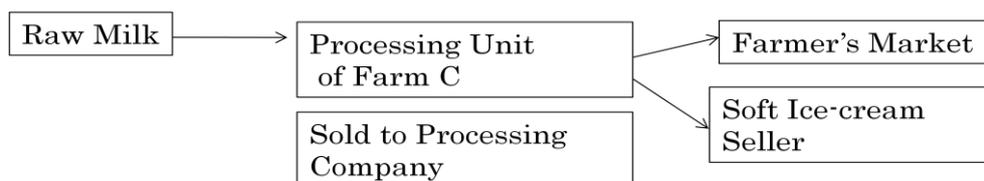
Source: Authors, based on data and interviews

**Table 3-12: SWOT Analysis of Direct Marketing Channel for farm C**

SWOT	
<u>Strengths</u>	<u>Weakness</u>
<ul style="list-style-type: none"> <li>- Profitability and awareness increased</li> <li>- Ease supply channel</li> <li>- Resource circulation</li> </ul>	<ul style="list-style-type: none"> <li>- Soft Ice cream sellers shop reduced</li> <li>- High Risk of credit</li> <li>- Low chain fidelity</li> </ul>
<u>Opportunities</u>	<u>Threats</u>
<ul style="list-style-type: none"> <li>- Approaching Exploring to all consumers</li> <li>- Direct communication to consumers</li> <li>- Consumption of milk products increased</li> <li>- Possibility to start dairy schooling</li> </ul>	<ul style="list-style-type: none"> <li>- New Entrants – low barriers to entry</li> <li>- Enter into TPP</li> <li>- Learning time for farm A</li> </ul>

Source: Developed by Authors based on interviews, using Porter’s Model (1997).

Farm B’s strategic objectives to reach the direct marketing channel is providing the good quality raw material for soft ice-cream and sharing knowledge to achieve greater satisfaction of end user. The farm has then a strategy to “skip over” the traditional intermediaries of the traditional distribution channels, so as to offer its products with more added services directly to the end consumer. The supply chain channel of Farm C is as follows:



**Figure 3-11: Supply Chain Channel of Farm C**

Source: Survey Data 2012

All those three farms took raw milk from their own production for producing milk products as there is law regarding that farmers can use the facility for taking raw milk from their farm by themselves up to 1500 Kg per day for processing.

An analysis regarding performance of three dairy farms and their distribution strategies, and the market opportunities to support the decision regarding the structure of direct marketing possibility for other farmers has been developed. Therefore, an attempt was made to relate the theoretical bases on the channel structure and flows to the practical development of a direct marketing channel structured by specific farm, which initiated its activities in 2012. The main strategic choices involved the definition about how to reach the chosen segments, how marketing flows should operate and which members of the channel would be responsible for these flows. Hence, decisions of how to fulfil the needs of the targeted segments were structured, along with the objectives of the channel analyzed, and how marketing channel members should be chosen and evaluated in the structuring process. As managerial implications and contributions, a sequence of analysis that was used by these three farms to decide whether to enter in direct marketing channel. Direct marketing channel can ensures the freshness of the product, ease supply chain channel that can earn additional income for the farmers as family labour income decreased rapidly.

Important advice to other farmers for considering an alternative enterprise through direct marketing channel such as: distinguish and high quality product has to be produced, has to work hard with this marketing channel, has to maintain comfortable environment for cattle, has to gather knowledge to minimize labor requirements and build relationships through channel contacts as income allows.

# Chapter 4

## Dairy Farming in Bangladesh

### 4.1 Introduction

#### 4.1.1 Overview of Livestock Sector

During the last three decades a structural transformation has taken place in the Bangladesh economy. The country has achieved self-sufficiency in food grain production due to appreciable growth rate in the sector but the share of agriculture in GDP has declined relative to other sectors and within the agriculture sector, the share of livestock sub-sector has increased relative to crop, fisheries and forestry. Livestock share of agricultural income increased from 7.6% in 1973-74 to 12.9% in 1998-99 and is projected to increase to 19.9% in 2020. During 1973/74-89/90, livestock output grew at 5.2% per annum compared to 1.7% for crop output and 2.6% for agricultural output in general (Hossain and Bose, 2000). These

changes have been prompted by a rapid growth in demand for livestock products due to income and population growth and urbanisation.

This is a part of phenomena observed throughout the developing world. From the beginning of the 1970s to the mid 1990s, the market value of the increase in meat and milk consumption in the developing countries was approximately US\$155 billion (in 1990 dollars), more than twice the market value of increased cereals consumption under the green revolution. The demand growth for livestock products in the developing world is expected to continue well into the new millennium, creating the opportunity for a veritable livestock revolution if the increased demand can be met from increased domestic production. Producers may gain through increased income and employment and consumers through access to cheaper livestock products. Evidence from field studies in developing countries show that rural poor and landless households typically derive a larger share of their cash income from livestock than do well-off farmers (Delgado et al., 1999).

In Bangladesh dairy is the most important livestock product produced by smallholder crop-livestock farmers. Milk production in Bangladesh increased from 1.29 million metric tons in 1987-88 to 1.62 million metric tons in 1997-98, to 1.74 million metric tons in 2001. However, current national production is inadequate to meet demand. Due to increased production import of powdered milk decreased from 55,000 metric tons in 1991-92 to 17,000 metric tons in 2001. Income elasticity of demand for milk is estimated to be 1.62 compared to 1.19 for meat and eggs in 1995-96, and these are projected to be 0.65 and 0.63 respectively in 2020. Milk production in the country need to grow by 4.2- 5.6 percent per annum to meet increased demand (Hossian and Bose, 2000). Achievement of such a high growth rate in the sector has the potential to get large number of smallholder producers and others involved in milk processing and marketing out of poverty through employment and income generation. Dairy generates more regular cash income and dairy production, processing and marketing

generate more employment per unit value added compared to crops (Asaduzzaman, 2000; Omore et al., 2002). However, achievement of high growth rate over the projected period and beyond will require a major transformation of the dairy sector and removal of current and potential constraints in dairy production, processing and marketing.

In general, dairying in Bangladesh is practiced as a part of mixed crop farming system where most of the rural household keep cow in order to cultivate land and also to produce milk for family consumption. Cows are reared in very primitive way. It is seen from the history that, milk may not have been sold in many parts of Bangladesh where production was mainly aimed at subsistence consumption. In Bangladesh, most of the cow (about 80%) is owned by smallholder households (Saadullah). In terms of small farmers, dairy production is a family operation. Some poor farmers who used to sell their excess milk were considered as a low class segment of the society. The rapid growth of population, poverty, inequality and lack of employment opportunity has forced farmers to start selling milk. Recently in Bangladesh, almost rural households rear dairy cows as their supplementary income. There are many families in Bangladesh they do not have any land for cultivation, but they have nearly 2 or 3 milking cows for their livelihood (Kabir). During the last three decades the agricultural farming system of Bangladesh has changed and dairy farming is getting popularity as a new farming venture. However, there are not enough available dairy infrastructures in the village level. Generally, regardless of size, most of the dairy farms seen in the Bangladesh are not well organized. As lack of the well organized markets for selling milk in rural areas, dairy farmers have to depend on the middlemen for selling their produced milk. In general, in rural areas milk is sold through different types of middlemen where farmers are being deprived and exploited by these middlemen groups in many ways such as; they do not give fair milk price and sometimes cheat them in weight. There are also some villages where there is no market; therefore farmers have to travel some distance to sell their

produced milk. Although they travel some distance to sell their milk, sometimes they cannot sell their produced milk even at low price.

There were not many commercial dairy farms in Bangladesh. The commercial dairy farming in Bangladesh was started mainly after the Chernobyl disaster in former Soviet Union. Imports of dairy products from European countries were banned temporarily by the Bangladesh government in 1987. As a result, a number of dairy farms have grown up in private initiatives under incentive bonus program and dairy loan program that have been taken by the government (Paul). In general, most of the commercial dairy farms are operating their activities under cooperative system in Bangladesh.

Most of the cows found in Bangladesh are Bos Indicos (Zebu) type, which are generally small in size (180 kg). They have low yields (1.5-2.5 litres /day), short lactation periods (on average 180 days) and long calving interval on average 2.5 years Gahao and Rahman). Despite the low productivity, indigenous cows have some positive characteristics, such as low maintenance cost, strong adaptability to the local environment and resistance power to local diseases. Recently, through the use of artificial insemination, there have been remarkable genetic improvements of cow in some part of Bangladesh.

#### **4.1.2 Traditional Dairy Farming**

Dairy animal rearing is a component of farming system in Bangladesh since ancient time. The animal are reared by farmers for milk production and the cow gives birth female calf is used as future milking animal and male calf is used as future bullock for traction, transport and to sale for cash money. Small farmers keep 1-2 milch animals of low genetic production potential. Most of the dairy farms are small holders and are located in different regions of the country with more concentration to north-west of the country. The average family size of the

smallholder dairy farms consists of 5-6 persons, where the adult male and female take cares the animals on a part time work in addition to their normal work.

Rice straw is the main roughage for dairy cows, which is low in nutritive value and palatability but it contributes 90% of the roughage feed to animals. The amount of green fodder fed to the cattle each day depends on the time given by the farmers to collect the grass or weeds from roadsides, agricultural land or weeds harvested from the crop fields, rather than the requirement of the cattle. Most of the time of the year, the cattle did not get adequate feed. In the rainy season lush green grass grows in the roadside, embankment and fellow lands, but the farmers cannot preserve the surplus green grass because of lack of knowledge, labour and infrastructure. It is left in the field and gets too old, consequently low in quality where the dry matter digestibility becomes lower than 50% and available nutrients do not reach the minimum requirement level of the cow. Dairy farmer are recommended to feed 1 kg concentrate for 2-3 kg of milk yield. Generally, the concentrate feed contain rice polish, wheat bran and oil cakes. Farmers who have low milk production could not afford to buy required amount of concentrate. Under these circumstances, malnutrition induces problems of decreasing milk production and low conception rate. Some farmers maintain 2-3 cross bred cows (crossing local with pure Holstein Friesian and Jersey through A. I.) with milk production 4-6 folds higher than local cattle. These groups of farmers fed concentrate regularly to their animals and grow fodder crops in limited amounts. On the other hand, due to shortage of knowledge some rich farmers fed their cows concentrate *adlibitum* basis, which makes the animals fatty leads to lower conception rate. The main component of the operating cost of dairy farming is the feed cost. Some available technologies have been applied and demonstrated to farmers at the farm level but the farmers are reluctant to utilize the technologies due to time consuming and botheration of the process.

The traditional feeding system for dairy cattle is based on the use of rice straw, natural grasses supplemented with a little or no concentrates. The quantity and quality of fodder available from natural pasture shows seasonal fluctuation. There is an acute shortage of feed supply during the dry season and the available feed during this period is of very poor quality. Poor nutrition results in low production and reproductive performance slow growth rate, loss of body condition and increased susceptibility to diseases and parasites. Thus, effective utilization of the available feed resources (agricultural and agro-industrial by-products, natural pastures and browse) and appropriate supplementation of poor quality natural pasture and crop residue based diets appear to be the necessary steps to alleviate the nutritional problems of dairy animals. Different supplementation strategies could be applied depending upon the type, accessibility and price of supplementary feeds in a given area. Fodder conservation practices particularly hay and silage making should be developed in order to enable a stable of feed throughout the year.

#### **4.1.2.1 Constraints in production system**

##### **a Feed resources**

Dairy farms face problems with the availability of feeds and fodder; there are problems with both quality and quantity and a lack of economical technology for optimum utilisation of local feed resources. Rice straw is by far the most important crop residue, contributing >90% of feed energy available to ruminants (Tareque and Saadullah 1988). However, animals fed on this diet fail to get adequate nutrients for maintenance and production. Efforts are being made to examine the possibilities and economic feasibility of utilising non-conventional feeds, to improve feeding value of various agricultural and industrial by-products, and to prohibit the export of by-products such as bran, oilseed cake and molasses from Bangladesh.

Furthermore, it has been established that fodder legumes can be integrated into rice production without having a negative impact on the yield of rice (Akbar et al. 2000).

#### **b Breeds of cattle**

Cattle breeds available are mostly indigenous and only 2.8% of cattle are crossbred. The average level of milk production of the indigenous cows is about 221 litres/lactation (Miyan 1996). However, crossbred cows in some milk pocket areas produce 600–800 litres/lactation. The local cattle are nondescript and are crossbred with Sahiwal, Sindhi or Haryana. The major disadvantages of the local cattle are (i) low productivity, (ii) failure to let milk down without presence of the calf, and (iii) late maturation. However, these cattle are well adapted to the local feed resources, local housing facilities and scavenging systems. They have low nutritional requirements, heat tolerance, larger rumen volumes and possibly a more efficient digestion of low quality feed (Mould et al. 1982). Most importantly, their performance is also good in terms of feed efficiency (kg feed required/kg of product). Efforts are being made to improve milk production through crossbreeding with exotic breeds.

#### **c Artificial insemination (AI) and reproductive performance**

Presently, AI activities are carried out by the Bangladeshi Government's Department of Livestock Services (DLS) from 22 centres, 423 sub centres and 554 AI point. The total number of AIs carried out each year is about 1.5 million (DLS 2000). In order to extend AI activities, a massive development project focusing on AI is being undertaken for the development of cattle for milk and meat production.

As regards the reproductive performance of dairy cows, Khan et al. (1999) reported that the number of services per conception, interval before first post-partum heat and calving

interval, respectively, were 1.57, 138 and 450 days in Pabna (local cows), 1.63, 142 and 482 days in Sindhi crossbreds and 1.61, 185 and 532 days in Jersey crossbreds. Traits such as interval before first post-partum heat and calving interval differed markedly ( $P < 0.01$ ) between the local and crossbred dairy cows. However, it has been reported that the management practices of the smallholder farms under scavenging conditions promote the occurrence of post-partum anoestrus and limit behavioural manifestations of oestrus (quoted by Ahmed 2000). Ahmed (2000) also concluded that detection of oestrus and of the return of oestrus after unsuccessful AI is clearly difficult under these conditions; he noted that such inefficiencies have been documented. Moreover, it was observed that cows managed intensively tended to conceive at a higher rate (53%) than those reared extensively (43%).

#### **d Climate and disease**

Diseases present a major constraint to cattle production in Bangladesh; the extent of losses due to disease is very high. The country's climate, along with the poor nutritional status of cattle, contributes to a high incidence of cattle diseases, especially in the calves. The major diseases are anthrax, haemorrhagic septicaemia (HS), foot-and-mouth disease (FMD), black quarter (BQ), diseases caused by infestation with liver flukes and calf diarrhoea (Ahmed 2000). Khan et al. (1999) reported that most crossbred cows suffered very badly from parasitic infestations compared with the local cattle; moreover, they reported that the incidence of parasitic diseases was very high in calves. FMD was found to cause heavy loss to farmers. Incidence of some cattle diseases differs between the seasons. For example, the incidence of HS is highest in the rainy season. In contrast, the incidence of other diseases, such as anthrax and BQ, is sporadic. In response to the dire need for preventive vaccines against livestock and poultry diseases, 11 different types of vaccine (anthrax, HS, FMD, BQ and various poultry vaccines) are produced at two research institutes in Bangladesh. The total

quantity of vaccine produced each year is about 250 million doses (DLS 2000). There are eight field disease investigation laboratories located in different parts of the country including a central laboratory in Dhaka; they are managed by the Bangladeshi Government's DLS. These laboratories serve as centres to help DLS veterinary officers to make correct and prompt diagnoses of livestock diseases.

#### **4.1.3 Cooperative Dairy Farming**

Cooperation and competition are two basic social processes and fundamental theme of sociological literature. However, for an agrarian developing country cooperation can act as an effective and efficient instrument to bring positive socio-economic changes for the masses. Cooperation in its modern perspective started in British India (Bangladesh was a part) with the enactment of the Cooperative Societies Act. of 1904. The main aim was to provide cheap credit to the farmers. Thus cooperative in Bangladesh is not a new concept. After independence in 1971, the cooperatives gained popularity to some extent. But it could not significantly fulfil their basic aims such as agricultural development and the income generation for the rural poor people (Ahmed, 1989).

The basic mechanism of the cooperative could be the capital formation by productive work, and the development of infrastructure such as agriculture crop storage, transportation, and the stability of the market. To do so, it needs to provide loans to the cooperative, rather than the individual cooperative members. Bangladesh Milk Producers' Cooperative Union Ltd. (BMPCUL), a newly emerging unique type of cooperative, is not providing any significant amount of credits to the individual dairy farmers, but is functioning as an agent of income generation for the dairy farmers. The Government took initiatives to organize poor dairy farmers under a cooperative umbrella (BMPCUL), in which the Government gave credit to establish the dairy infrastructures such as, milk processing centers, factory and

veterinary services, transportation and a stable market. BMPCUL started its function with the aims of establishing a dairy base in Bangladesh as well as rural development by providing inputs to the farmers at low cost and ensuring fair price to the small rural milk producers. Presently the BMPCUL has been running seven dairy plants for processing and/or pasteurizing at Dhaka, Baghabarighat, Tangail, Manikganj, Tekerhat, Sreenagar and Rangpur region. In 1946 a dairy plant with a processing capacity of 2,000 liters of milk per day was established by National Nutrients Company at Lahirimohanpur, Pabna district (presently Sirajganj district) with the target to send milk products through railroad to Calcutta (India) market, (Haque, 1998). However, this could not be materialized due to the partition of India and Pakistan. Thereafter, in 1952, Eastern Milk Producers Limited, a private company, purchased this dairy plant from the original owner. Within a couple of years the plant started its production activities and marketed butter, *ghee* (one type of butter), cheese and powder milk under the trade name of Milk Vita. Even with all-round efforts by the owner of the company, regarded as pioneer of dairying in the country the plant could not attain the level of proven success. As a result, in 1965, its ownership was transferred to newly formed first Milk Producers Cooperative Union, under the name of Eastern Milk Producers Cooperative Union Limited (EMPCUL). Around the plant at Lahirimohanpur about 100 village milk producers' cooperative societies were formed for the collection of milk needed by the plant (Hanif, 1996 and Haque, 1998). In 1973, soon after the liberation, the Government of the People' Republic Of Bangladesh undertook a development scheme titled Cooperative Dairy Complex based on the recommendations from United Nations Development Program, Danish Agency for Development Assistance (DANIDA) and Food and Agriculture Organization of the United Nations. The scheme had the proposal of establishing dairy plants in some milk surplus area of the country, i.e. Tangail, Manikganj, Tekerhat, and Baghabarighat with a city plant at Dhaka. Taking over the overall responsibilities, viz; debts, assets and liabilities of the

previous dairy plant, the EMPCUL changed its name Milk Producers Cooperative Union Ltd. in 1977. However, the brand name of the products remained same. Under a bilateral loan agreement with DANIDA, the Government awarded a contract to Danish Turkey Dairy of Denmark (DTD) to plan designs and established 5 dairy plants. DTD supplied the machinery and all the 5 dairy plants were established within the project period (1973-1978). The total cost of the project amounted to TK.155.61 million. The plants, though donated by DANIDA to the government, were given to the milk union as a loan. Around this plant area, there were about 335 primary milk producers' cooperatives with membership of over 28 thousand small and landless farmers. They supplied milk at a daily average of 6 million liters, by which the Milk Union produces butter, cheese, ice cream, milk powder, pasteurized milk, etc., and marketed these products under the brand name of Milk Vita. The union conducted cattle development program comprising supply of improved semen, mobile veterinary services, feed and fodder. The Primary Milk Producers Cooperative, which was self-reliant with little or no financial support under the project, earned TK. 650 (U.S. \$ 1 = TK.54, in the year of 2001) million in 1997-98 and distributed patronage refund to members. The Milk Union, through its primary milk producer's cooperatives, had thus created additional earning opportunity for the poor and contributed to national health and nutrition by providing fresh milk and milk products to the urban dwellers (Haque, 1998 and Hanif, 1996).

Before the cooperative was formed, farmers had to depend on middlemen to market their milk and as a result they were exploited in various ways. Not only were they paid low price but also cheated in weighing. To improve the situations, the BMPCUL has been helping the rural milk producers in organizing their own village Primary Milk Producers Cooperative so that they can help themselves and become responsible for marketing their own milk. They no longer have to depend upon middlemen and a relatively unstable market. A village milk producer cooperative consists of one to three villages covering an area of approximately 1-2

sq. km., having a marketing surplus of 180-200 liters of milk per day. To establish a cooperative first the group of dairy farmers needs to inform the BMPCUL regional authority of their intentions. Generally, the authority considers the first year as the observation period. At that time the authority verifies the milk production capacity of this group. If the group can fulfil the required amount of milk production then it will be formally registered as a cooperative under BMPCUL system. (Haque, 1998, Ghosh & Maharjan, 2001).

#### **4.1.4 Contribution to Farmers' Livelihood**

##### **4.1.4.1 Energy balance of cattle**

Table 4-1 presents an energy balance sheet for cattle in Bangladesh (Reza 1986). About 44%, 53% and 78% of the energy consumed in feeds and fodder by adult male, female and immature cattle is used to meet their needs for maintenance and growth. The remainder of energy intake is used to produce products that are of use to humans, such as milk, draft power and dung.

##### **4.1.4.2 Cows as a source of draft power**

It has been reported that 36% of cows between 3 and 10 years old and 60% of cows >10 years are used for milk production and draft power (BBS 1986). Saadullah (1995) found that the work involved in moving draft loads significantly decreased cows' milk yields; however, the situation could be improved in terms of milk yield by supplementing improved diet during work.

**Table 4-1: Energy balance sheet for cattle in Bangladesh**

Category of cattle	Energy input	Energy output					% used for self maintenance
		Amount of energy (kcal/day per animal)					
	Intake (kcal/day per animal)	Work	Milk	Dung	Total		
Adult male	9489	602	–	4638	5240	44	
Adult female	10,756	545	825	4351	5721	53	
Immature	7200	–	–	2805	2805	78	

Source: Reza (1986).

#### 4.1.4.3 Cattle as a source of fuel and fertiliser

As an input to cropping systems, manure continues to be an important link between crop and animal production in Bangladesh. The yearly total cattle manure/dung production in Bangladesh is estimated to be 80 million tonnes of which 68 and 52% is used as manure in rural and urban areas, respectively. The use of dung as a household fuel is mostly on small farms and represents 25% of total production (DLS 2000).

#### 4.1.4.4 Employment generation

The livestock sector generates 20% of full-time employment in Bangladesh (DLS 2000). Generation of self-employment and the total income shares of dairy cows and goat raising tend to increase with a decrease in farmer's resources, especially land area, suggesting that animals are of particular importance for landless and small-scale farmers (Alam 1994). The pattern of utilisation of labour on dairy farms (Alam 1994) is shown in Table 3. Alam (1994) also reported that, on average, each mini dairy farm created the opportunity for employment of 1.78 man-days/day. The number of employed labourers was highest with large farms (2.50

man-days/day) followed by medium (1.65 man-days/day) and small farms (1.50 man-days/day). On average, each farm employed 1.07 male labourers and 0.71 female labourers each day. The use of female family labourers was highest (1 labourer/day) in the case of small farms. Alam (1994) did not interpret his findings in terms of labour used per livestock unit.

**Table 4-2: Pattern of utilisation of labour on dairy farms**

Type of farm	Man-days used/farm family per day						Total (man-days)		Overall total (man-days)
	Family labour		Casual labour		Permanent labour				
	Male	Female	Male	Female	Male	Female	Male	Female	Male + female
Large	0.25	–	0.5	–	1.5	0.25	2.25	0.25	2.5
Medium	0.5	0.75	0.4	–	–	–	0.9	0.75	1.65
Small	0.5	1	–	–	–	–	0.5	1	1.5

Source: Alam (1994).

#### 4.1.4.5 Dairying as a means of livelihood

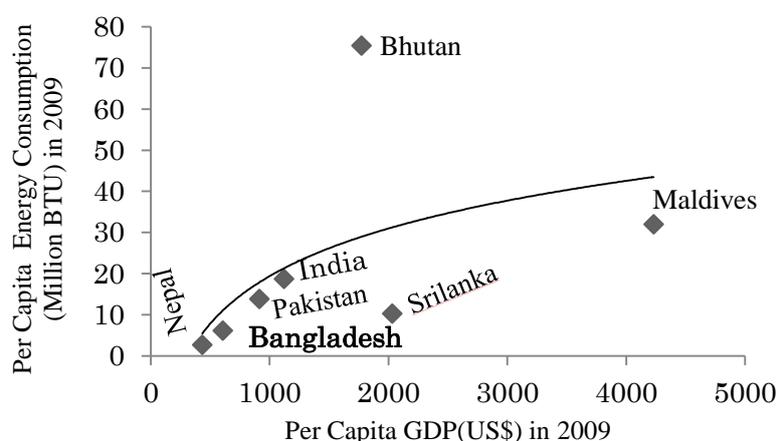
Rearing of dairy cattle has been increasingly viewed as a means of alleviating poverty in Bangladesh and is believed to improve the livelihoods of landless and small households. Many non-governmental organisations (NGOs), such as Proshika Manobik Unnayan Kendra (PROSHIKA), BRAC (Bangladesh Rural Advancement Committee), Grameen Bank and Aftab Dairy, are involved in the promotion of micro-credit for small livestock enterprises including dairy cattle, poultry and goat production. Many smallholders, particularly in mixed farming systems, prefer the flow products (milk, draft power and manure) rather than the end products (meat, hides and skins) since selling their animals for slaughter entails the permanent loss of flow products. Individuals can expand their labour force by raising cows and processing primary products into marketable secondary products, such as butter, cheese

and yoghurt and by selling manure as fuel and fertiliser. Income from the sale of these primary and secondary products and by-products can be used to meet/provide farm household expenses, savings, investments and insurance, and its value tends to increase over time.

#### 4.1.4.6 Manure as a Biogas Production

Biomass fuel accounts for significant share of the total energy consumption in Bangladesh. It provides basic energy requirements for cooking and heating in rural households and processing in a variety of traditional cottage industries in urban and semi-urban areas. Due to rapid increase in commercial energy consumption in most of the developed and rapidly developing countries, the share of traditional fuels in the total national energy use has been falling in recent years. However, actual biomass energy consumption in Bangladesh is still increasing like in other South Asian countries (Haq et. al, 2003). Infrastructure Development Company Ltd. (IDCOL), a Govt. owned Investment Company, which has proven success of dissemination of energy project across Bangladesh to implement National Domestic Biogas and Manure Programme (NDBMP). The overall objective of NDBMP is to further develop and disseminate domestic biogas in rural areas with the ultimate goal to establish a sustainable and commercial biogas sector in the country.

Bangladesh has a long history in bio gas extension program since 1972, which started experimenting under the auspices of Bangladesh Agricultural University, followed by Bangladesh



**Figure 4-1: per capita GDP and energy consumption in South Asia**

Source: US energy information Administration and United Nations static Division

Academy for Rural Development (BARD) and Bangladesh Council of Scientific and

Industrial Research (BSCIR) on a pure primary Experimental basis. A part of their research work and their adopted technology for the utilization of farmers showed a very poor picture up to 1984. Eventually putting the biogas program in harness, actually the Govt. started the extension program in 1995 that continued by Netherlands Development Organization (SNV) which showed a ray of hope for its performance of the years and helped the rural farmers depending on the cattle live up to certain number which felt below the expectation giving rise to the cost analysis for consumptions at domestic level. Meanwhile, other NGOs showed their interest to participate in this ongoing programme like Grammenschakti and other Partner Organizations (Pos) and Govt.

As per NDBMP, manure is a major source of biogas production and cattle manure shares the major part of this source. Among this cattle manure, dairy cattle manure accounts for significant share of manure in Bangladesh. There are 26.83 million cattle out of which 15.81 million are dairy cattle. The majority of the dairy cattle are in the hands of smallholder dairy producers. Also dairying is a part of the mixed farming systems in Bangladesh (Saadullah, 2001). 80% of the country's people live in the rural areas and are highly dependent on agricultural system that is finely attuned to a tropical monsoon climate (UNDP, 2005). About 2.0% of GDP comes from livestock and poultry sector. About 42% of agricultural households engaged in dairy farming (BBS, 2008). Dairying is also considered a strong tool to develop a village micro economy of Bangladesh in order to improve rural livelihoods (Shamsuddin et al., 2007). On the other hand, renewable energy policy of Bangladesh states that energy is one of the basic ingredients required to alleviate poverty and ensure socioeconomic development. Better access to energy can improve the quality of life especially for developing country like Bangladesh. Per capita energy consumption in Bangladesh is very much low among South Asian countries (Figure 4-1).

Renewable energy is one of the most promising options to make energy system of the country. Biogas is a promising renewable energy source to meet energy demand of rural Bangladesh. Manure of cattle is the raw material to run the biogas plant. In that regards, biogas plant contributes to farmer's livelihood.

## **4.2 Farming Practices and Resource Circulation System**

Income from the dairy activities used to meet/provide household expenses, savings, investment and insurance. Finding of the study reveals that Local Resource Circulation System (LRCSs) by means of farm management to decrease the cost, and increase the income and labor utilization in dairy-crop farming in the farm level. It has contributed to provide year-round working opportunities for the local people, utilize family labor effectively and provide a place for milk market low shipping and no storage cost. Integrated agriculture as the primary activity among most of the people has good chance to develop dairying as reducing stress and shock of farming household.

### **4.2.1 Socioeconomic Characteristics of dairy Farmers**

The major farm and household characteristics of the respondents are shown in Table 4-3. The respondents ranged in age between 41 to 50 years. The survey results indicated that most of the respondents (64%) were less than or equal to 50 years old whereas 80% were male. The level of education had no significant effect on the level of milk production of the dairy cattle. The educational level of the respondents ranged from primary school education to university education. More than 40% (48%) of the respondents had received a secondary or higher education. The results of the survey also show that dairy production constitutes the major source of income of the households.

**Table 4-3: Socio-economic characteristics of respondents**

Particulars		Maulavibazar
Owner's occupation	Agriculture	14 (56.0)
	Business and others	11 (44.0)
Income source (Dairy Farm)	Main	14 (56.0)
	Side	11 (44.0)
Education	Up to class 5	6 (24.0)
	Class 6 to S.S.C	7 (28.0)
	H.S.C	3 (12.0)
	Above H.S.C	9 (36.0)
Age	21-40	6 (24.0)
	41-50	10 (40.0)
	More than 50	9 (36.0)
Gender	Man	20 (80.0)
	Woman	5 (20.0)
Cattle owned by dairy farms	1-6 cows	8 (32.0)
	6-25 cows	9 (36.0)
	26 or more cows	8 (32.0)

Source: Survey Data 2011

## 4.2.2 Management Practices of Dairy Farms

### 4.2.2.1 Number of cows per farm

About 99% of the cows are crossbreed in the study area and 45% cows are milking cows. Averages are 19 cows per households which range from 3 to 60 cows in one household.

### 4.2.2.2 Dairy cattle feeding

The survey results show that 8% respondents take their cows to the outside of the stall for feeding, and 92%, of the respondents fed their cows inside the stall as shown in Table 2. Farmers primarily prefer the zero grazing concepts because it reduces the risk of disease, especially foot and mouth disease (FMD), which can result in very strict isolation. The survey results also show that all of the respondents supplemented their cattle's feed.

**Table 4-4: Feeding of dairy cattle by farmers**

Particulars	Fq.	%
Feeding System		
Partial grazing	2	8.0
Zero grazing	23	92.0
Supplementary feeding		
Green grass & other feeds	24	96.0
Only other feeds	1	4.0

Source: Survey Data 2011

#### **4.2.2.3 Milking system**

All of the farmers in this area milk their cows by hand. Most of the farmers use hygienic procedures for milking their cows, i.e., washing the udders before milking and cleaning their buckets and hands regularly. Milking of cows is performed primarily by hired people who have experienced in milking.

#### **4.2.2.4 Cow barn systems**

Most of the dairy farmers in this district feed their cows in stalls in which the cows are tied by the neck (92% of respondents). Some of the dairy farmers (8% of respondents) let their cows out of their stalls, e.g., onto a common-land river bank, to feed. Most of the cow stalls consist of concrete floors with half walls and tin roofs (96% of respondents) and only respondents have mud floor and tin walls and tin roofs.

#### **4.2.2.5 Labor use**

Most of the labor force of dairy farms consists of family members (63% of total labor). Women (20% of the respondents) are very enthusiastic about taking care of cows in the stalls. However, employees (37%) are hired to take care of cows and perform other work related to dairy production.

#### 4.2.2.6 Water supply

Water is important for dairy cows for drinking, washing out stalls, and spraying cows to keep them cool in the summer season. Approximately 64% of the respondents surveyed use underground water from boreholes and others use tube-well (20% of respondents) water, although it is very difficult to obtain water from this source. Others use supply water in dairy farming activities.

#### 4.2.2.7 Disposal of manure

None of the farmers prepared compost sheds for managing cow manure properly. However, most of the farmers (92% of the respondents) put manure to holes alongside their farms or short distances from farm. After a few days, they use the manure in rice fields, and some of the manure is sold to other farmers especially to tea garden farmers or fruits farmers.

#### 4.2.2.8 Costs and income of rearing milking cows

Rearing dairy cows has increasingly been viewed as a means of alleviating poverty and is believed to improve the living conditions of landless and small households (Saadullah, 2002).

According to Saadullah (2002), many smallholders in developing countries, particularly in mixed farming systems, prefer the flow products (milk, draft power and manure) rather than the end products (meat, hides and skins) of keeping livestock because slaughtering their animals results in the permanent loss of flow products. The respondents thought that the income from

**Table 4-5: Costs and income of rearing one milking cow per day**

Items	Quantity (Kg)	Amount
Feed Cost		
Paddy straw	10.0	15.00
Green grass	12.0	18.00
Concentrates	4.5	45.00
Labor costs -		18.00
Housing costs -		4.50
Veterinary costs -		8.10
A.I. costs -		2.20
Transport -		2.50
Tools and equipment		4.00
<b>Total cost</b>		<b>117.30</b>
<b>Sales of milk</b>	<b>12.0</b>	<b>552.00</b>
<b>Income from milk</b>		<b>434.70</b>

Source: Survey Data of 2011

milk is main income that's why Table 3 summarizes the costs of and income from rearing one dairy milking cow per day. The costs shown in this table do not include the cost of purchasing cows because nearly all of the farmers surveyed obtained their cows as a family inheritance and also excludes the family labor cost in calculations. Farmers are asked the cost in one month in every item except the housing and tolls and equipments costs are in annually. Then, the authors have calculated in per day basis as 1 year equals to 365 days and 1 month equals to 30 days. The results show that the costs of rearing dairy cows are Tk.117.30 and net income after operating costs are Tk. 434.70. Income from milk can be used to meet farm household daily expenses and provide savings, investment and insurance.

#### 4.2.2.9 Milk production and consumption and income generation

Milk production ranges from 8 to 352 liters per day and average milk production per day is 122 liters in Moulavibazar. The gross daily income from milk sales ranged from Tk. 336 to Tk. 15840 in Moulavibazar per day. The average daily incomes from milk production for the respondents are 5526 Tk. in Moulavibazar (Table 4). Per capita daily milk consumption is 188 ml in Moulavibazar District. The milk consumption of dairy farmers in this district is higher than that in Bangladesh as a whole (the national average per capita daily milk consumption is 44.3 ml) in Table 5.

**Table 4-6: Milk Production and Gross Income for Dairy Farmers**

kg	Fq	GI (Tk)
0	- (-)	NA
1-5	1 (4)	NA
6-10	10 (40)	NA
11-20	12 (48)	NA
Above 20	2 (8)	NA
kg	Fq	GI (Tk)
1-10	1 (4)	336
11-50	11 (44)	506-2300
51-100	3 (12)	2346-4600
Above 100	10 (40)	Above 4600
Average	122 liters	5526

Source: Survey data 2011

**Table 4-7: Milk Consumption of Dairy Farmers**

Milk Consumption (ml/day)	Bangladesh	Moulavibazar
Average household size	4.8 persons	6.2 persons
Per capita milk consumption	44.3 ml	188 ml

Source: Survey data 2011

#### 4.2.2.10 Dairy farming to farmers' livelihoods

The study revealed that dairy farming contributed considerably to the livelihood of dairy farmers in the studied district in Bangladesh. Dairy production provides continuous income to these farmers and prevents starvation even during times of flood and stress. Out of the farmers interviewed, approximately 96% in Maulavibazar indicated that dairy farming reduces their vulnerability as it provides regular income that can be used to meeting household expenditures (Table 6).

**Table 4-8: Farmer's perceptions of their vulnerability reduction due to dairy farming**

Parameter	Moulavibazar	
	Yes	No
Dairy cattle rearing reduces vulnerability	24 (96.0)	1 (4.0)
Dairy farming provides a sustainable livelihood	23 (92.0)	2 (8.0)
Dairy farming family faces stresses and shocks	2 (8.0)	23 (92.0)
Integrated farming provides a sustainable livelihood	22 (88.0)	3 (12.0)

Source: Survey data 2011

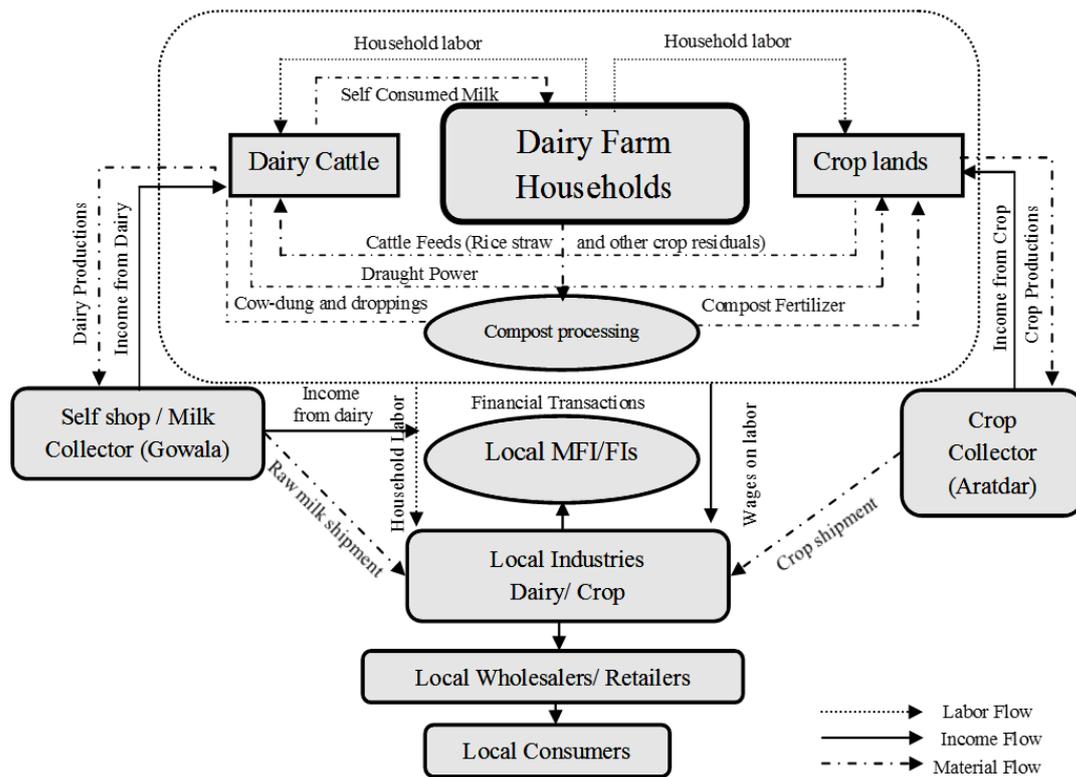
About 92% of farmers expressed that dairy farming provided them with sustainable livelihoods. The farmers interviewed also reported that women members used income from milk to pay children's school fees, purchase school uniforms and books, and meet petty expenses without having to depend on husbands or elders. Dairy farming also enhances the status of women, and the self-respect and dignity of farming family members. Dairy farming

contributes reductions in the levels of infant mortality, labor migration, school dropouts, and malnutrition. Dairy farming made it possible for the respondents to purchase household assets such as utensils, gas stoves, farms, TVs, bicycles, etc. Their participation in village activities has increased, as has their association with government agencies, banks and other organizations. This data can't be expressed in quantitative value but it is revealed through qualitative descriptions of the respondents. In light of these benefits, it is evident that the income from dairy farming has contributed to improving the living conditions of farmers in the study area.

#### **4.2.3 Local resource Circulation System of Dairy Farms**

LRCS has good linkages with local raw materials, labor, milk marketing etc. It is mainly both way circulation systems. First, it circulates the resources by means of farm management to decrease the cost of milk production and increase the income and labor utilization in integrated dairy farming in the farm-level. Second, it circulates the resources such as local raw milk as local nutritional intake, local labor, and local capital by means of related industries in local economy-level. This system is to promote the local economic development through proper utilization of local resources (animal feed, cow-dung, and other farm residues, family or local labor, local land and capital, local nutritional intake). It provides employment opportunities of local people in farm households as well as self processing shop such as sweets shop and self selling outlet directed by farmers. Figure 4-2 illustrates the mechanism of LRCS of dairy in the study area. In this system, farmers get the animal feed from the crop lands that they simultaneously operate with cattle farming. During post harvesting time, farmers collect and store crop residuals (rice straw and other crop residuals) for timely and year round feed supply. The cow-dung and other droppings of dairy cattle used to produce compost fertilizer for crop cultivation instead of chemical fertilizer. Compost fertilizer leads

to high yield crop production (Bangladesh Agricultural Research Institute, 2011). The survey results revealed that per capita milk consumption is 188 ml which is higher than that of Bangladesh (44.3 ml in 2007, FAO). All the functions related to the farm economy handled by family labor particularly female member of households.



**Figure 4-2: Local Resource Circulation System of Dairy Farming**

Source: Own illustration from Survey Data of 2011 based on Prasanna, 2012

Note: Local processing industries in the study area produce sweets, yogurt, curd etc. Farmers sell their milk to Gowala or self shop owner who paid money weekly and deposited in the commercial bank/ Financial Institutions (FIs) and farmers paid loan instalment to Micro Finance Institutions (MFIs) and FIs

Dairy farming involves a very stable composition of cows at the household level and offers good prospects for improving farming families' living conditions. Integrated dairy farming and agriculture in this district increase the short-term benefits and long-term sustainability of agriculture, especially dairy farming. Dairy farming in this district is labor-intensive especially family labor. The survey results revealed the rationality of developing the domestic dairy sector through circulation of LRCSs. Milk consumption by members of dairy

farming households is considerably higher than the country's average per capita milk consumption. However, the income from dairy farming contributes to meeting various types of household expenses, such as children's educational expenses, purchase of household appliances and assets, etc. Engaging in integrated farming with dairy farming increases the sustainability of rural livelihoods by reducing malnutrition of children, increasing interaction with the government and banks, increasing participation in village activities, empowering women, etc. In these and other ways, dairy farming contributes to the betterment of poor farmers' livelihoods.

### **4.3 Role of Cooperative Services in Dairy Development**

In order to analyze the role, global extend of cooperative development and the role of these forms of horizontal coordination in assisting farmers' access to input and output markets as well as credit market have to be studied. This section presents the global extend of cooperative role in dairy farming as well as agricultural development including the empirical studies on role of cooperative on dairy farming.

#### **4.3.1 Definition of cooperative**

The International Cooperative Alliance (ICA) defines "cooperative as an autonomous association of people united voluntarily to meet their common economic, social and cultural needs as well as aspirations through a jointly owned and democratically controlled enterprise."

It implies

- ✚ The y are formed by groups of people who have specified need or problem
- ✚ The organization is formed freely by members after contributing its assets
- ✚ It is formed and governed democratically to achieve desired objectives

- ✚ It is an autonomous enterprise promoted, owned and controlled by its members to meet their own needs

Another widely accepted cooperative definition is the one adopted by the United States Department of Agriculture (USDA) in 1987: “A cooperative is a user-owned, user controlled business that distributes benefits on the basis of use.”

It considered

- ✚ **User ownership principle-** the people who use the co-op (members) help finance the co-op and therefore, own the co-op. Members are responsible for providing at least some of the cooperative’s capital. The equity capital contribution of each member should be in equal proportion to that member’s use (patronage) of the co-op.
- ✚ **User-Controll principle-** means that members of the co-op govern the business directly by voting on significant and long term business decisions and indirectly through their representatives on the the board of directors. Cooperative statutes and bylaws usually dedicate that only active co-op members voting directors.
- ✚ **Benefits distribution principle-** equal proportionally distribution of benefits of the co-op members. The proportional basis is fair, easily and explained (transparent), and entirely feasible from an operational stand point.

Cooperatives can be formed in any sector of the economy and they vary greatly in terms of size and scale with regard to the functions they perform (Rondon & Collion, 2001:2 ). They can operate at village level, regional and even national levels.

Center for Cooperatives (2004) defined cooperative as a private business organization that is owned and controlled by the people who use its products, supplies or services. Although cooperatives 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.

Koopmans (2006) also defined a cooperative as a member-controlled association for producing goods and services in which the participating members, individual farmers or households, share the risks and profits of a jointly established and owned economic enterprise. According to this definition a cooperative is established by farmers in response to unfavourable market conditions, which is a shared problem. This could be a problem related to the marketing of produce resulting in low farm-gate prices, to the supply of good-quality and reasonably priced farm inputs, such as seed and fertilizer, or to the supply of sufficient and cheap credit.

Cooperatives differ from other organizations in the sense that profit is returned as benefits depending on the type and structure of the cooperative (Suber, 2005:5). Member benefits are relative to the amount that a member utilizes the cooperative services. Generally, benefits includes quality supplies at discount rates, increased market power; a share of the earnings relative to the percent to the percent relative business performed with the cooperative as well as increased economic activity within the local community.

#### **4.3.2 History of Cooperatives in Dairy Industry**

Milk is unique among farm commodities. It is highly perishable, produced, and "harvested" on a daily basis, and moved from farm to market every other day, if not every day. The volume of milk produced varies seasonally and daily for biological reasons. This variation is not coordinated with changes in demand, which also vary from day to day and from season to season. The task of balancing, or coordinating, the amount of milk supplied with the volume of milk demanded is thus problematical.

Storage to balance supplies with demand is feasible only after processing, except in the very short term. As technology developed, conversion of milk from raw product to various intermediate and final products with longer shelf-lives became possible, but required increasingly capital-intensive facilities and technologies that are subject to significant

economies of scale. These fundamental characteristics of milk production, in concert with adverse marketing conditions and the economies available from jointly owned milk handling facilities and manufacturing plants, led dairy farmers to pioneer the application of cooperative principles to marketing U.S. farm products.

**Initial organization**—in the early days of the Nation, dairy farms were relatively small and remotely located. Cooperatives sprang up spontaneously, formed by groups of farmers seeking solutions to common problems. These groups drew upon cooperative traditions that immigrant dairy farmers had brought with them from Northern Europe. Milk from several farms was pooled in one location (either by hauling milk or cream in cans or by taking cows to the factory to be milked) and made into cheese or butter.

Part of the net proceeds was returned to patrons in proportion to the amount of milk each furnished. Cooperative creameries were generally organized in areas where a large portion of the milk produced could best be marketed for butter production, thereby avoiding the high cost of transporting whole milk to distant city markets. The first reported cooperative cheese factories were established in the mid-1800s. The number of creameries grew slowly until mechanical cream separators were introduced around 1890.

By 1900, there were around 6,000 creameries and almost 3,000 cheese factories. About one-third were organized as cooperatives. Milk evaporating and drying facilities emerged in the 1920s and subsequently some creameries installed milk drying facilities to provide a market for buttermilk and skim milk.

Concurrently, the organized marketing of raw milk for fluid consumption began during the latter part of the 18th century in cities where families were unable to obtain milk from nearby producers. A system of “middle-men” between producers and consumers began to emerge in the 1800s. Fewer and fewer producers carried out all marketing functions. Milk price was determined by negotiation; both buyers and sellers were small and numerous. During the

mid-1800s, the rapid construction of railroads permitted increased movement of "fresh country" milk to the cities. Expanding urbanization made it necessary for families to obtain milk from distant dairy farms in the country. Dairy farmers formed associations to arrange these early shipments of "pure" country milk to the cities. By the late 1800s, the milk marketing system was steadily moving toward a structure where hundreds or thousands of dairy farmers sold to only a handful of large fluid milk dealers. Consequently, cooperative associations developed around the major cities in the eastern part of the United States and in Chicago to negotiate milk prices with milk dealers and distributors. One tactic the early cooperatives employed to compel reluctant milk dealers to negotiate with them was the "milk strike."

Farmers would withhold milk from the market which would tighten supplies. This had short-term success in enforcing cooperative demands. Even so, the dealers began to develop a bargaining edge over farmers, primarily due to better market information through their powerful organizations. In addition, the rural isolation and the generally independent nature of most dairy farmers combined to restrain cooperative growth at that time. Nonetheless, early cooperative associations laid the foundation upon which later ones were built.

In the early 20th century, unfavourable economic conditions, chaotic pricing of fluid milk and dealers who balanced fluctuating supply needs by refusing to accept some producers' milk spurred the successful formation of large-scale cooperative bargaining organizations for raw whole milk. Another important stimulus to cooperative development was government policy for food control during World War I.

The Federal Food Administration, operating from 1917 to 1919, preferred to deal with groups rather than individuals. Cooperative associations were the only representatives of milk producers and the government advised milk distributors to accommodate producers' price demands. They complied rather than oppose the Federal Government. Furthermore, in a

number of instances at that time, the right of producers to join in negotiating price and terms of sale with distributors in a particular market was questioned. On several occasions, leaders of an association were criminally prosecuted for violating antitrust laws—attempting to increase and fix the price of milk. Even though they were found not guilty, the prosecutions were a disturbing element in the advancement of dairy cooperative associations. Enactment of the Capper-Volstead Act of 1922 granted cooperatives limited exemption from Federal antitrust acts and such prosecutions abated. By 1925, cooperative dairy associations were reported in all but 6 of the 48 States. In many cases, government action had helped to give producer cooperatives a foothold strong enough to ensure their lasting establishment. Dairy cooperatives were thus positioned to provide an effective solution for dairy producers' marketing problems.

#### **4.3.3 Dairy Cooperative in Bangladesh**

Bangladesh Milk Producers' Cooperative Union Ltd. (BMPCUL), a newly emerging unique type of cooperative, is not providing any significant amount of credits to the individual dairy farmers, but is functioning as an agent of income generation for the dairy farmers. The Government took initiatives to organize poor dairy farmers under a cooperative umbrella (BMPCUL), in which the Government gave credit to establish the dairy infrastructures such as, milk processing centres, factory and veterinary services, transportation and a stable market. BMPCUL started its function with the aims of establishing a dairy base in Bangladesh as well as rural development by providing inputs to the farmers at low cost and ensuring fair price to the small rural milk producers. Presently the BMPCUL has been running seven dairy plants for processing and/or pasteurizing at Dhaka, Baghabarighat, Tangail, Manikganj, Tekerhat, Sreenagar and Rangpur region. In 1946 a dairy plant with a processing capacity of 2,000 liters of milk per day was established by National Nutrients

Company at Lahirimohanpur, Pabna district (presently Serajganj district) with the target to send milk products through railroad to Calcutta (India) market, (Haque, 1998). However, this could not be materialized due to the partition of India and Pakistan. Thereafter, in 1952, Eastern Milk Producers Limited, a private company, purchased this dairy plant from the original owner. Within a couple of years the plant started its production activities and marketed butter, *ghee* (one type of butter), cheese and powder milk under the trade name of Milk Vita. Even with all-round efforts by the owner of the company, regarded as pioneer of dairying in the country the plant could not attain the level of proven success. As a result, in 1965, its ownership was transferred to newly form first Milk Producers Cooperative Union, under the name of Eastern Milk Producers Cooperative Union Limited (EMPCUL). Around the plant at Lahirimohanpur about 100 village milk producers' cooperative societies were formed for the collection of milk needed by the plant (Hanif, 1996 and Haque, 1998). In 1973, soon after the liberation, the Government of the People' Republic Of Bangladesh undertook a development scheme titled Cooperative Dairy Complex based on the recommendations from United Nations Development Program, Danish Agency for Development Assistance (DANIDA) and Food and Agriculture Organization of the United Nations. The scheme had the proposal of establishing dairy plants in some milk surplus area of the country, i.e. Tangail, Manikganj, Tekerhat, and Baghabarighat with a city plant at Dhaka. Taking over the overall responsibilities, viz; debts, assets and liabilities of the previous dairy plant, the EMPCUL changed its name Milk Producers Cooperative Union Ltd. in 1977. However, the brand name of the products remained same. Under a bilateral loan agreement with DANIDA, the Government awarded a contract to Danish Turkey Dairy of Denmark (DTD) to plan designs and established 5 dairy plants. DTD supplied the machinery and all the 5 dairy plants were established within the project period (1973-1978). The total cost of the project amounted to TK.155.61 million. The plants, though donated by DANIDA to the government, were given

to the milk union as a loan. Around this plant area, there were about 335 primary milk producers' cooperatives with membership of over 28 thousand small and landless farmers. They supplied milk at a daily average of 6 million liters, by which the Milk Union produces butter, cheese, ice cream, milk powder, pasteurized milk, etc., and marketed these products under the brand name of Milk Vita. The union conducted cattle development program comprising supply of improved semen, mobile veterinary services, feed and fodder. The Primary Milk Producers Cooperative, which was self-reliant with little or no financial support under the project, earned TK. 650 (U.S. \$ 1 = TK.54, in the year of 2001) million in 1997-98 and distributed patronage refund to members. The Milk Union, through its primary milk producer's cooperatives, had thus created additional earning opportunity for the poor and contributed to national health and nutrition by providing fresh milk and milk products to the urban dwellers (Haque, 1998 and Hanif, 1996).

Before the cooperative was formed, farmers had to depend on middlemen to market their milk and as a result they were exploited in various ways. Not only were they paid low price but also cheated in weighing. To improve the situations, the BMPCUL has been helping the rural milk producers in organizing their own village Primary Milk Producers Cooperative so that they can help themselves and become responsible for marketing their own milk. They no longer have to depend upon middlemen and a relatively unstable market. A village milk producer cooperative consists of one to three villages covering an area of approximately 1-2 sq. km., having a marketing surplus of 180-200 litres of milk per day. To establish a cooperative first the group of dairy farmers needs to inform the BMPCUL regional authority of their intentions. Generally, the authority considers the first year as the observation period. At that time the authority verifies the milk production capacity of this group. If the group can fulfil the required amount of milk production then it will be formally registered as a cooperative under BMPCUL system. (Haque, 1998, Ghosh & Maharjan, 2001).

#### **4.3.4 Cooperative Services in Dairy Development**

This section presents the descriptive analysis of the role played by cooperatives in dairy production and marketing of dairy farmers in Sirajgonj District, Bangladesh. Characteristics of both cooperative and non-cooperative farmers, their production system, marketing system as well as their performance indicators presented and described in details. The benefits of the cooperative members and constraints experienced in cooperative are presented and described.

Being the largest dairy organization, BMPCUL has the responsibility of developing the country's dairies to attain the self-sufficiency in milk production. In this way, activities are extended in the selected milk producing areas of Bangladesh for the development of the economic conditions of the rural milk producers, and to encourage dairy cows keeping by giving members remunerative milk prices. Keeping this as the main objective, the BMPCUL has been dedicated, since the early 70's to dairy development in Bangladesh.

Dairy development activities include the genetic improvement of dairy cows coupled with vaccination, better food and fodder, and improved dairy farm management, which in turn increase milk production. Higher milk production per cow means higher income for dairy cow keepers.

##### **4.3.4.1 Socio-economic Characteristics of Cooperative and Non-cooperative Respondents**

Farmers interviewed derived living expenses from different activities apart from dairy production. Most of the farmers depend on agricultural activities as a source of income, indicating that farmers are doing integrated or compound dairy farming. The results confirmed that approximately 89% of cooperative farmers depend on only dairy farming as a major source of income whereas approximately 77% of non-cooperative members depend on

dairy farming only as a major source of household income. However, non-cooperative members depend more on other activities compared to cooperative members.

**Table 4-9: Socio-economic Characteristics of Respondents**

Particulars		Cooperative N=52	Non-Cooperative N=43
Owner's occupation	Agriculture	45 (86.5)	33 (76.7)
	Business and others	7 (13.5)	10 (23.3)
Major Income source of Households	Dairy	46 (88.5)	32 (74.4)
	Dairy and other Business	4 (7.7)	8 (18.6)
	Dairy and Remittances	1 (1.9)	2 (4.7)
	Other Agricultural Activities	1 (1.9)	1 (2.3)
Education	No Formal Education	20 (38.5)	20 (46.5)
	Primary Education	15 (28.7)	14 (32.6)
	Secondary Education	11 (21.2)	9 (20.9)
	Higher Secondary Education	3 (5.8)	0 (0)
	Above H.S.C	3 (5.8)	0 (0)
Age	20-30	4 (7.7)	1 (2.3)
	31-40	18 (34.6)	12 (27.9)
	41-50	10 (19.2)	16 (37.2)
	51-60	14 (27.0)	12 (27.9)
	More than 60	6 (11.5)	2 (4.7)
Gender	Man	52 (100)	40 (93.0)
	Woman	0 (0)	3 (7.0)

Source: Authors calculate from survey data, December 2012

Note: Parenthese indicate percentage

Education level of farmers' household head is importance, given that it play a vital role on adopting new technologies that will have a positive influence in dairy farm management. Results indicate that among the interviewed farmers, more non-cooperative members (46.5%)

are illiterate compared to cooperative members (38.5%). It also indicate that majority of interviewd farmers' level pof education lies on primary to secondary education wether some (approximately 12%) cooperative farmers have higher education. It implies that relatively educated farmers joined in cooperative dairy society.

Age of household head is very important for decision making. Younger farmers have courage to take risk than older farmers; on the otherhand, older farmers have experienced than younger to take proper decision. According to table 4-9, modal age class of cooperative farmers lie on 31-40 years group and that of non-cooperative members lie on 41-50 years group. It implies that cooperative farmers are relatively younger than non-cooperative farmers.

#### **4.3.4.2 Production System**

##### **4.3.4.2.1 Variable inputs cost**

Table 4-10 illustrates the monetary values of variable inputs were used for both cooperative and non-cooperative dairy fams. Calculating of variable inputs, amount of different inputs and prices were obtained from farmers, and then multiplied by units used and then cost of inputs was divided by the herd size/farm to get average cost and then divied by 365 to get average cost per day per cow.

According to below table, highly employed inputs for cooperative farmers were feed, labor and drugs. These accounts for 93.4%, 2.3% and 3.4% respectively. Whereas, highly employed inputs for non-cooperative farmers were feed, Drugs and Veterinary and AI servicecost, laborand transport. These inputs account for 87.5%, 4.7,3.6 and 3.2 respectively. Feed is the most important inputs for dairy cattle to be more productive. Coopertive society supplied part of feed quantity at a break-even price among members. Rearing the cross breed cows is the reason for high feed cost for cooperative farmers. The feed cost is 30% less when

the y took their cows in the BATHAN for rearing. BATHAN is a place borrowed from cooperative union (BMPCUL) where farmers took cows for feeding green grass for 6-7 months. This system helps farmers to reduce the feeding cost by 30% in those 6-7 months. As a result, it reduces the total annual feeding cost.

Cooperative farmers are enjoying free veterinary services from their cooperative society, but they have to buy drugs required for better treatment of cows. Cooperative members got transport facility for carrying milk to plant from society office. But, non-cooperative farmers have to pay 3.2% of total inputs cost as transportation cost. This is one of the competitive benefits for cooperative farmers.

**Table 4-10: Variable inputs cost per day**

Particulars	Cooperative Members N=52		Non Cooperative Members N=43	
	Costs/Cow	%	Costs/Cow	%
Feed***	308.79 (58.45)	93.4	242.03 (29.31)	87.5
Drugs, Veterinary and AI**	11.33 (2.63)	3.4	12.90 (5.29)	4.7
Labor	7.21 (7.12)	2.3	9.89 (7.99)	3.6
Transport	0.00 (0.00)	0.0	8.97 (4.00)	3.2
Tools and Equipments	3.17 (3.16)	0.9	2.80 (1.02)	1.0
Total	330.5	100	276.59	100

Source: Authors calculate from survey data, December 2012

Note: \*Parenthese indicate Standard Deviation.

\*\* Veterinary and AI service cost is for non-cooperative farmers as they are getting service from Government or other private veterinary doctors.

\*\*\*Feed Costs are being 30% less for cooperative members for 6-7 months when the farmers take the cows in the BHATAN: land getting from cooperative for grass production.

#### 4.3.4.2.2 Milk production and reproductive performance

Cooperative farmers have slightly bigger herd size as table 4-11 indicates that cooperative and non-cooperative farmers had 10.5 and 6.5 dairy cattle respectively. Cooperative farmers' herd size can be attributed to an improvement in access to dairy breeds through cooperatives. Cooperative farmers are rearing only cross breed cows (such as  $\frac{1}{2}$  Sahiwal  $\times$   $\frac{1}{2}$  Pabna Milking = G<sub>1</sub>,  $\frac{3}{4}$  Sahiwal  $\times$   $\frac{1}{4}$  Pabna Milking = G<sub>2</sub>,  $\frac{1}{2}$  Friesian  $\times$   $\frac{1}{2}$  Pabna Milking = G<sub>3</sub>,  $\frac{3}{4}$  Friesian  $\times$   $\frac{1}{4}$  Pabna Milking = G<sub>4</sub>,  $\frac{1}{2}$  Sahiwal  $\times$   $\frac{1}{4}$  Friesian  $\times$   $\frac{1}{4}$  Pabna Milking = G<sub>5</sub>,  $\frac{1}{2}$  Jersey  $\times$   $\frac{1}{4}$  Sahiwal  $\times$   $\frac{1}{4}$  Pabna Milking = G<sub>6</sub>, Pabna Milk Cow (100 %) = G<sub>7</sub> and Non Descriptive = G<sub>8</sub>), whereas non-cooperative farmers rear crossbreed as well as indigenous cows.

Cooperative and non-cooperative farmers were milking 4.8 and 3.7 cows respectively during study period as per table 4-11. Results reveal that the average lactation period for cooperative farmers was higher than that of non-cooperative farmers. Average lactation period is lower than 290-300 days which affects negatively in milk production.

Average milk yield was 46.7 and 27.9 litres per day for cooperative and non-cooperative farmers respectively. Productivity of milk per cow was 9.7 and 7.5 litres for cooperative and non-cooperative farmers respectively. It suggests that cooperative farmers enjoy 29.33% higher productivity compared to non-cooperative farmers.

**Table 4-11: Milk yield, lactation period and herd composition**

Particulars	Cooperative Members		Non Cooperative Members	
	N=52		N=43	
	Average	Std. Dev.	Average	Std. Dev.
Lactating Cows	4.8	3.4	3.7	2.2
Lactation period (Days)	288.8	18.7	238.8	8.8
Milk Yield (Litre/Day)	46.7	41.3	27.9	33.0
Milk Yield (Litre/Day/cow)	9.7	3.2	7.5	3.84
Herd Composition	N	%		%
Crossbreed	42	80.8	32	74.4
Indigenous	0	0.0	6	14.0
Crossbreed and Indigenous	10	19.2	5	11.6
Herd Size	10.5 (8.6)		6.5 (3.1)	

Source: Authors calculate from survey data, December 2012

#### 4.3.4.2.3 Milk marketed and consumption pattern of respondents

Milk marketed and consumption pattern of the responded farmers described in table 4-12. There is a significant difference between cooperative (45.4 litres/day) and non-cooperative farmers (26.9 litres/day) in milk marketed but not in milk consumed. Cooperative farmers sold higher quantity of milk than that of non-cooperative farmers. This scenerio tells us about free veterinary services, tarining programes, adviced about improved husbandary practices and fixed and reliable market ensured by cooperative society in the study area. Cooperative farmers bear less risk in spoilage of milk compared to non-cooperative farmers as they tarvelled long distance to sell their milk.

Milk price for cooperative and non-cooperative farmers were 36.3 Tk./litre and 34.9 Tk./litre respectively. It implies that cooperative farmers enjoyed high milk price compared to non-cooperative farmers. Non-cooperative farmers sold milk in fluctuated market and it varied day to day. Cooperative farmers eliminated price fluctuation risk factors through guaranteed market ensured by cooperative society.

**Table 4-12: Milk marketed and consumed by respondents**

Particulars	Cooperative Members		Non Cooperative Members	
	N=52		N=43	
	Average	Std. Dev.	Average	Std. Dev.
Quantity Marketed (Litre/Per Day)	45.4	40.7	26.9	32.7
Quantity Consumed (Litre/ Per Day)	1.3	0.7	1.0	0.7
Price	36.3	1.1	34.9	8.2

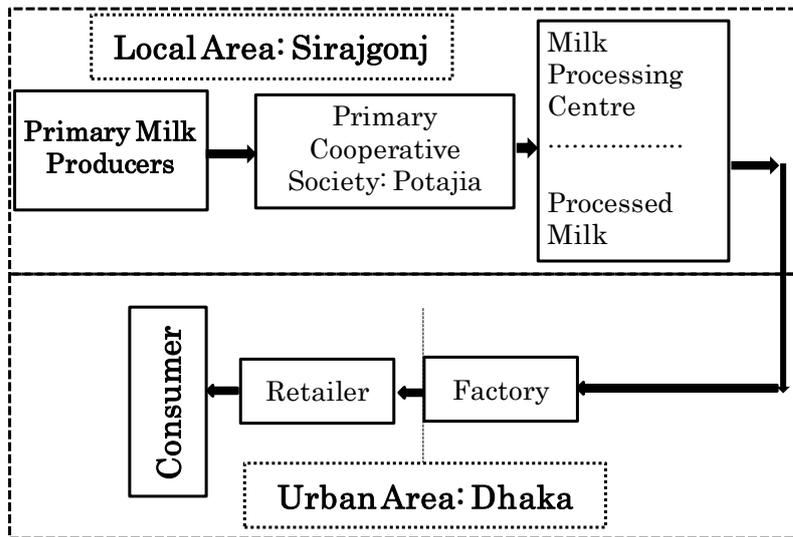
Source: Authors calculate from survey data, December 2012

#### 4.3.4.3 Marketing System

##### 4.3.4.3.1 Cooperative Milk Supply Chain

Milk marketing channel under cooperative production system is integrated and structured channel in Bangladesh. Fig. 4-3 shows that individual farmers are bringing their milk at collection centre of primary cooperative society in the village. Then, collected milk is sent to Baghabarighat Milk processing centre of BMPCUL for chilling and pasteurizing. BMPCUL provides transport for carrying the milk to Processing centre. About 97% of milk supplied to the processing centre. 3% of milk consumed by primary milk producers or farmers households. After chilling and pasteurizing, milk carried to the factory of BMPCUL, Dhaka where it is processed into cheese, ice cream, butter and homogenized fresh milk into small plastic bags. These milk and milk products are sold to the consumers in urban market through

the distributors, shopkeeper/ retailer from on the milk sales depot at a fixed price. There are no other intermediaries involved in the marketing channel and the milk price is also fixed for the primary producers according to their fat content.



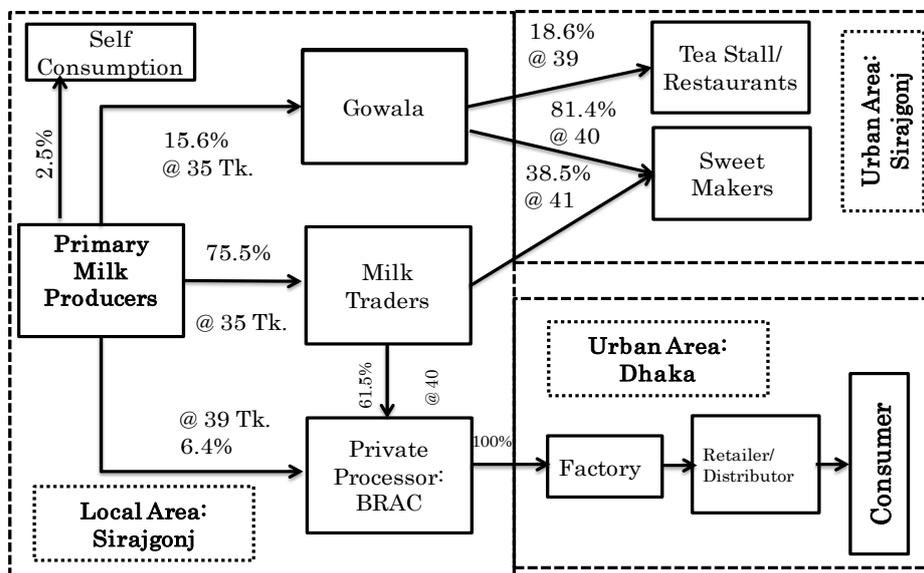
**Figure 4-3: Milk Supply Chain of Cooperative Dairy Farmers**

Source: Own illustration based on survey, 2012

#### 4.3.4.3.2 Non-cooperative milk supply chain

This is very common milk marketing channel in Bangladesh. It is not regular, and not structured, as shown in **Fig. 4-4**. Producers sell some of (15.6%) their milk to the local Gowala. In most of the cases (75.5%), producers sell their marketable milk to the Milk Traders, and rest of the marketable milk (6.4%) sell to private producers named BRAC. Gowalas collect milk from primary producers and sells to urban market such as tea stall, restaurant, sweet industries and contact households etc. They mixed water and milk powder with fresh milk and sold this to market for more profit. It is observed that Gowalas and Milk Traders are earning handsome amount of profit as a middlemen. Producers also sell milk to milk traders who gave advance payment to milk producers at no interest rate but they took

collateral and pay 1-2 Tk. /litre less as milk price. The different types of middlemen earn a major share of profit from unorganized milk marketing system, which could have been earned by farmers if they could do collective marketing like cooperative farmers.



**Figure 4-4: Milk Supply Chain of Non-Cooperative Dairy Farmers**

Source: Own illustration based on survey,2012

**Table 4-13: Strategy in different milk marketing channel**

Particulars	Milk Marketing Channel	
	Cooperative	Non-cooperative
Services Strategy	<ul style="list-style-type: none"> <li>• Free veterinary extension services includes: cattle treatment, Vaccination, Artificial insemination.</li> <li>• Cow loan with 5% interest</li> <li>• Concentrated feed supply at break-even point</li> <li>• Land lent for green grass production named as 'Bhatan'</li> </ul>	<ul style="list-style-type: none"> <li>• Gowalas milking the cows for primary milk producers</li> <li>• Advance payment at no interest, but with collateral by Aratdar or retailer</li> <li>• Free veterinary advices</li> </ul>
Testing Strategy	SNF, TSL	Water contained ratios
Pricing Strategy	It depends on SNF but fair	Mutual negotiation, but 1-2 Tk. less from market price
Milk Collection Strategy	Through 1705 primary society collection points by organizational transport	Door to door of primary milk producers, Bazar (Farmers' market), Milk Traders by self transport of collectors

Source: Survey data of 2012

The processors have developed these strategies to attract dairy farmers with services, raw milk prices and collection systems. As shown in Table 4-13, some strategy differences between cooperative society (Milk Vita) and non-cooperative (Milk Traders) were observed. First, Milk Vita freely provided expensive services such as treatment, vaccination, artificial insemination and a supply of no-profit no-loss based feed while Milk Traders did not offer these essential services to dairy farmers to keep cows and calves healthy. Milk Vita also provided a cow loan with 5% interest to its members without mortgage while Milk Traders provide micro credit that required a mortgage without interest. Milk Vita collected raw milk through its primary milk producers' society in each hamlet. Members carried milk to the society's collection point by themselves to sell while Milk Traders collected directly from the selected farmers, traders and markets. On the above discussion, it can be conclude that the private processors adopted the above mentioned strategies to maximize their profit. They did not offer expensive services to dairy farmers and rarely if ever checked water levels in raw milk.

However, Milk Vita took risks of the farming by giving free services to members. Non-members dairy farmers relied on government veterinary services, which were insufficient. Private veterinary doctors were limited and lived in urban areas rather than rural areas. If farmers called, the doctor could not respond quickly due to distances, the limited number of doctors and limited transportations. Often doctors arrived after the cows have died. Farmers also had to pay fees. The costs of other services provided by private doctors were also very high. Therefore, the strategies of private processors were miss- guiding the members of Milk Vita.

#### 4.3.4.4 Benefits of being member of cooperative society

Respondents that are member of dairy cooperative were asked to state the benefits of being a cooperative member compared to the period when they were operating individually. It is revealed from the results (Table 4-13) that farmers are getting free veterinary services from the cooperative society which affects their dairy production and income (Ghosh and Maharjan also found same findings in 2001). And then, the second most important benefit is the secured market for produced milk at fixed price. They are getting bonus according to milk quantity sold to cooperative from which they can used as an capital to the farm. Payment of milk price has paid once in a week that they can pay their input expenses in weekly basis. They also get cow loan from the society at low interest in convenient installment system from weekly payment. More than 60% (64%) of the responded farmers believed that BATHAN (land lent for grass production) is very helpful for rearing cows. They are also benefited from quality feed getting from cooperative society at break-even price that affects on production positively.

**Table 4-14: Farmers' benefits as a member of being cooperative society**

Benefits	N=52	%	Rank
1. Marketing of Milk	43	83	2
2. Provision of inputs	28	54	6
3. Procurement of Cows	7	14	9
4. Veterinary Services	48	92	1
5. Other Extension Services	22	42	7
6. AI Services	36	69	4
7. Access to credit	40	77	3
8. Milk Quality assessment	6	12	10
9. Training	13	25	8
10. Land for Grass Production	33	64	5

Source: Authors calculate from survey data, December 2012

#### **4.3.5 Production and Marketing constraints of Cooperative and non-cooperative farmers**

Constraints or problems faced by dairy farmers as or not as a member of a cooperative hinder their performance as well as fulfilling the objectives of self and national economic development and reduction of nutritional deficit of the country. Identification of the problems help to formulate development activities for dairy farmers. That's why, farmers were asked to give their own view on major problems regarding production and marketing. These were tabulated and tried to find out the importance of the problems.

##### **4.3.5.1 Production constraints**

Table 4-14 describes the constraints faced by cooperative and non-cooperative farmers regarding farm management and production. Both cooperative and non-cooperative farmers believed that feeding cost is very high that reduces their farm's income. But, cooperative farmers are getting part of quality feed at break-even price from the society that helps to fulfill inadequate supply of feed. Whereas, non-cooperative farmers are facing the problems of inadequate supply and quality of feed in the market. Non-cooperative farmers experienced poor veterinary services more compared to cooperative farmers. Cooperative farmers faced less in breed procurement than non-cooperative farmers. Non-cooperative farmers also faced lack of grazing land compared to cooperative farmers. Non-cooperative farmers faced water crisis during farming activities. Prevalence of diseases experienced by both cooperative and non-cooperative farmers as a hindrance of dairy development in the study area.

**Table 4-15: Constraints Faced by Cooperative and Non Cooperative Members Regarding Production**

Constraints	Cooperative		Non-Cooperative	
	N=52	%	N=43	%
Lack of Grazing Land	19	37	34	79
Inadequate Water Supply	0	0	14	33
Inadequate Feed	19	37	27	63
Prevalence of Disease	23	44	20	47
Dairy Cattle Procurement	10	19	23	54
Poor Veterinary Services	13	25	41	95
High Feeding Cost	35	67	36	84

Source: Authors calculate from survey data, December 2012

#### 4.3.5.2 Marketing constraints

Marketing of milk is a major hindrance of dairy development in the country. Although, cooperative society has established secured market for their members, they also faced some problems related to market. That's why, farmers were asked to state their own view about obstacles related to marketing of milk.

Table 4-15 presents the constraints faced by cooperative and non-cooperative members regarding marketing of milk. It is evident from results that major problems faced by both cooperative and non-cooperative members were infrastructure of market, information regarding market price and others, access to adequate market. In addition, non-cooperative farmers have to travel long distance to collection centre that can spoilage milk during transportation. They also could not sell their milk during political strike in the country but cooperative members can sell their milk to the society.

**Table 4-16: Constraints Faced by Cooperative and Non Cooperative Members Regarding Marketing**

Constraints	Cooperative		Non-Cooperative	
	N=52	%	N=43	%
Distance of milk Collection Centre	2	4	15	35
Lack of access to adequate market	25	48	41	95
Inadequacy of labor to transport Milk	2	4	18	42
Milk Spoilage during Transportation	4	8	14	33
Inadequate Market information	29	56	25	58
Inadequate Infrastructure Development	40	77	41	95
Strike Stopped milk marketing	0	0	17	40

Source: Authors calculate from survey data, December 2012

#### **4.4 Sustainable development ascertain through Cooperative**

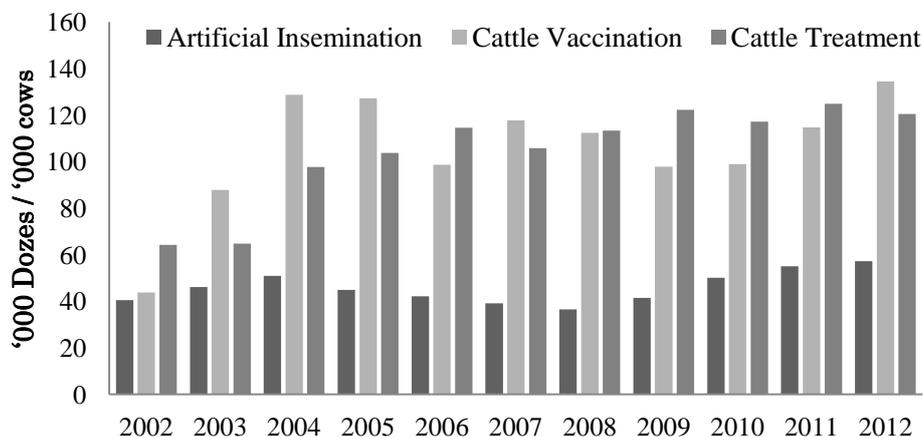
Cooperation can act as an effective and efficient instrument to bring positive socioeconomic changes for the masses in agro-based developing countries like Bangladesh. Cooperation in its modern perspective started in British India (Bangladesh was a part) with the enactment of the Cooperative Societies Act. of 1904. After independence in 1971, the cooperatives gained popularity to some extent in Bangladesh. Bangladesh Milk Producers' Cooperative Union Ltd. (BMPCUL), a newly emerging unique type of cooperative, is not providing any significant amount of credits to the individual dairy farmers, but is functioning as an agent of income generation for the dairy farmers. BMPCUL started its function with the aims of establishing a dairy base in Bangladesh as well as rural development by providing inputs to the farmers at low cost and ensuring fair price to the small rural milk producers since 1973. (Ghosh and Maharjan, 2001) have found the milk vita extension services; Artificial Insemination (AI), numbers of cooperatives, number of cooperative members, number of milk cows and milk production have increased within the last 30 years in Baghabarighat area. (Asharafuzzaman, 1995), (Rahaman and Mian, 1996 and Roy 2000)

found that cooperative dairy members are enjoying an ensured milk market for selling their milk and earning better price compared to other milk marketing channels in Bangladesh.

Many agricultural cooperatives are facing challenges with respect to globalization, industrialization of agriculture, and competition from large multinational corporations in the agro-food and forest industries. The cooperative organizations respond by mergers – increasingly often across borders – sometimes by de-mutualisation or by seeking new organizational forms.

#### 4.4.1 Development activities of dairy cooperative

BMPCUL’s activities are extended in milk producing areas of Bangladesh for the development of the economic conditions of the rural milk producers by giving members remunerative milk prices. Dairy development activities include the genetic improvement of dairy cows coupled with vaccination, better food and fodder, and improved dairy farm



**Figure 4-5: Veterinary extension services of Dairy Cooperative, Baghabarighat**

Source: General Section, Cooperative office

management, which in turn increase milk production. **Fig. 4-5** shows that the veterinary services of the BMPCUL. In 1977-1978, the BMPCUL started their services in cattle treatment. Gradually they adopted cattle vaccinations, and artificial insemination, which led

to increase the numbers of AI calves. It is found that cattle treatment incidents are increasing rapidly as number of cows treated raised from 64,138 in 2001-02 to 120,456 in 2011-12. The same trend was observed for cattle vaccinations. In 1980/1981, the provision of cattle vaccinations was introduced to 1,000 cattle, which increased to 134,423 cattle vaccinations in 2012. AI services were also introduced in 1990 also increased drastically during the decade of 1991-2012. More incidences of artificial insemination has resulted more AI calves, which are growing with the incidences of AI services since 1990-91 to 2012. Data show that, within a short period of time, BMPCUL extended their activities in dairy development in the country. This also indicates that the demand for veterinary service is increasing. In other words, people are adopting AI services and becoming more aware of treatment and vaccinations that became a positive factor for their dairy development.

BMPCUL provide some quality feed support to members for better production of milk.

Feed distribution has risen to 823.24 ton in 2003-04 to 1100.40 ton in 2011-12. In 2007-08, the world feed price especially corn price has increased suddenly which affects the feed distribution during 2008-10. They also lend land to members for cultivating green grass which is called BATHAN with Tk 300 per

**Table 4-17: Feed Support to Members by BMPCUL**

Year	Feed Distribution (Ton)	Lent Land (Acre)
<b>2003-04</b>	823.24	900
<b>2005-06</b>	1477.36	2000
<b>2007-08</b>	1043.06	2000
<b>2009-10</b>	41.85	1800
<b>2011-12</b>	1100.40	2000

Source: General Section, Cooperative Office

acre. They also supplied grass seeds to members for cultivation. Amount of lent land has increased 900 acre in 2003-04 to 2000 acre in 2011-12. In BATHAN, farmers can rear their cows for six to seven months.

#### **4.4.2 Farmer's Loyalty to dairy Cooperative**

Loyalty of farmers to cooperative is defined in this study as the willingness of farmers to maintain their present support to cooperatives even if prices and services are better elsewhere. Various authors use more or less different concepts, though related. Loyalty can be regarded as a behavioral or an attitudinal concept. The former means that a loyal person exhibits repeat behavior, implying that he or she tends to patronize the same trading partner over and over again. The attitudinal dimension means that the person has a predestination to patronize the same partner repeatedly. This study focuses on the behavioural interpretation of loyalty. In a cooperative context the concept loyalty may express a member's behavior as an investor in the cooperative as well as his or her behavior in the governance role, i.e. the member's acts in order to monitor the cooperative. Likewise all members have the right and the possibility to exert influence in the cooperative organization, even though many members do not take this opportunity. As loyalty is interpreted as members' actual behaviour in the patron, investor and governance roles, it is in principle possible to make objective measurements.

#### **4.4.3 Factors affecting farmers' loyalty to dairy cooperative**

BMPCUL has 36 factories among those 8 are processing factory and rest of them are chilling station. Baghabarighat, Sirajgonj is one of the oldest, biggest and most important processing factories of BMPCUL. More than 95% of Dairy farmers are member of dairy cooperative in Baghabarighat; Sirajgonj Milk shed area (Cooperative Office, Baghabarighat, 2012). More than 60% of Milk of BMPCUL has collected from Baghabarighat Milk Shed area. (BMPCUL, Dhaka, 2012). It has 656 (out of total 1705) primary society consists of 28,820 members i.e. dairy farmers (2012).

**Table 4-18: Demographic Characteristics of Respondents**

Particulars	Mean	Std. Dev.	Min	Max
Age (Yrs)	3.2	1.094	1	5
Land (Bigha)	8.49	6.534	1	50
Education (Level)	2.16	1.075	1	5
Membership (Yrs)	20.15	9.718	5	40

Source: Calculated by author from primary data

Note: Age scaling 20-30 Yrs=1, 31-40 Yrs=2, 41-50 Yrs=3, 51-60 Yrs=4, >60=5  
 No education=1, Primary=2, Secondary=3, Higher Secondary=4 and above=5  
 3 Bighas = 1 Acre approx. (1600 square yards)

Data for this study comes from a farm household survey in Sirajgonj district and cooperative office of Baghabarighat Milk Shed Area. We have interviewed 118 farm households with 111 households used in final analysis because there were 7 households with incomplete information. Survey questionnaire included the questions for acquiring information about households' characteristics, perception about cooperatives' activities and services etc.

Table 4-19 presents the descriptive statistics of respondents' demographic characteristics. It is observed that average age of the households heads lies on the 51-60 years group. 87% of respondents have a secondary education or below. Average land holds per households are 8.49 bighas. Average experiences as a member of a cooperative are 20.15 years.

An OLS linear regression model was applied to find out the factors that affect members' perception about continuation of membership to cooperative (members' loyalty). Members' loyalty represented dependent variable (Y). Dependent variable (Y) is the set of hypothesized to be affected by 9 explanatory variables described in Table 4-19. The final formulation of the model was represented as below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \mu$$

**Table 4-19: Descriptions of Variables**

Variables		Descriptions	Values	Mean
Dependent	(Y)	Farmers' perception about continuing membership	5 point Likert Scale	4.68
Complain	(X <sub>1</sub> )	Complain against Cooperative	Discrete	0.89
Trust	(X <sub>2</sub> )	Trust to cooperative about information	5 point Likert Scale	4.10
Ideology	(X <sub>3</sub> )	Cooperative Ideology	5 point Likert Scale	2.27
Voice	(X <sub>4</sub> )	Voice about own interest to Cooperative and acceptance by cooperative	5 point Likert Scale	2.28
Shelter	(X <sub>5</sub> )	Shelter against other trader	5 point Likert Scale	4.36
Relation	(X <sub>6</sub> )	Relation with cooperative by supplying portion of milk produced	5 point Likert Scale	4.13
Benefit	(X <sub>7</sub> )	Benefit opportunity from other trader	5 point Likert Scale	2.19
Feed Support	(X <sub>8</sub> )	Feed Support from Cooperative	5 point Likert Scale	4.23
Extension Service	(X <sub>9</sub> )	Extension service from cooperative	5 point Likert Scale	4.04

Source: Household Survey in 2012

#### 4.4.4 Econometric Results of factors affecting farmers' loyalty to BMPCUL

The OLS regression results are shown in Table 4-20. Results show that  $R^2 = 0.875$  that means that about 88% of members' perception about continuation of membership to cooperative is explained by COMPLAIN, TRUST, IDEOLOGY, VOICE, SHELTER, RELATION, BENEFIT, FEED SUPPORT and EXTENSION SERVICE. The F Value is highly significant at 1% significant level, as computed P value is 0.000. Overall significance of the estimated regression model is high as from Durbin-Watson table we find the computed  $d$  is 1.830 that there is no serial correlation among the explanatory factors. Finally, seven variables have a significant effect on members' loyalty to cooperative. Among those, six

variables have positive effect and one variable has negative effect on members' loyalty to cooperative.

COMPLAIN is a significant determinant of members' loyalty which effect negatively on it at 5% significance level, which means that the members' are being loyal if they have less amount of complain against the cooperative. When the number of COMPLAIN increased against cooperative and they don't get any solution then the members become disloyal to this cooperative.

**Table 4-20: OLS Regression Model Results**

Variables	Coefficient	Std. Error	t-Statistic	P-Values	
COMPLAIN	-0.108	0.040**	-2.675	0.009	
TRUST	0.269	0.066***	4.094	0.000	
IDEOLOGY	0.159	0.059	2.702	0.802	
VOICE	0.084	0.035**	2.382	0.019	
SHELTER	0.152	0.061**	2.490	0.014	
RELATION	0.255	0.075***	3.425	0.001	
BENEFIT	-0.016	0.042	-0.386	0.701	
FEED SUPPORT	0.128	0.047**	2.739	0.007	
EXTENSION SERVICE	0.152	0.063**	2.399	0.018	
N=	111	Durbin-Watson Statistic	1.832	R <sup>2</sup>	0.875
F-Statistic	78.304	Adjusted R <sup>2</sup>	0.862***	P-Value.(F-Statistic)	0.000

\*\* , \*\*\* denotes significant at 5%, 1% respectively

Source: Calculated from survey data of December, 2012

TRUST is positively correlated with members' loyalty to cooperative at 1% significant level, which indicates that the more trust on cooperative's information the more the members are loyal to the cooperative.

VOICE significantly affect on members' loyalty to cooperative at the 5% significance level, which illustrates that the more the cooperative accept the member's decision, the level

of members' loyalty is higher. In this study, we found that cooperative honour the members' decision regarding the development of cooperative activities.

SHELTER is another important issue of members' loyalty to cooperative, with positive coefficients at 5% significance level, which implies that the more the member feels that cooperative is a fixed and reasonable market for milk and considers as a shelter against other trading partner then they are more loyal to the cooperative.

RELATION is positively correlated with members' loyalty to cooperative, at 1% significance level, which means that the more portion of milk supplied to the cooperative, the better relation they have with cooperative, and the members have better relation with cooperative the more they are loyal to cooperative.

We have found that FEED SUPPORT is one of the most important services provided by BMPCUL. FEED SUPPORT significantly affect on members' loyalty to cooperative at the 5% significance level, which implies that the more feed support members get from cooperative the more they are being loyal to cooperative.

EXTENSION SERVICE is another important aspect of members' loyalty to cooperative at the 5% significance level, which exemplify that the more extension service provided by the cooperative the more members are being loyal to the cooperative. It is noted that extension services provided by BMPCUL are free of charge to members.

Other two variables; IDEOLOGY and BENEFIT are not significant as per regression results, but these two variables are also important factor in members' loyalty. Socioeconomic conditions and educational levels of the respondents may be analyzed further to identify the reasons why these two factors not significant.

BMPCUL became the dominant milk producing organization, marketing more than 60% of the total marketed milk in Bangladesh. Last two decades, milk collection capacity of BMPCUL has increased drastically. The level of adoption of improved dairy breeds was

considerably superior in cooperative villages. At the same time, milk production per cooperative member also has greatly improved (General Section, Cooperative office). This significant improvement occurs because of rendering veterinary extension and feed support service by BMPCUL is remarkable. That's why farmers are continuing membership in the cooperative for a long term as the average membership age is 20.15 years. Members show repeated behavior over years which exhibit the members' loyalty to cooperative.

The findings of this study partially supported the hypothesis that a member's positive attitude would significantly influence his positive behavior toward the cooperative. TRUST, VOICE, SHELTER, RELATION, FEED SUPPORT and EXTENSION SERVICE are 7 factors positively effect on members' loyalty. COMPLAIN is the only factor that affect negatively on members' loyalty. If the members don't have more complaints against cooperative then members' are more loyal to the cooperative. There were some important lessons that we learned from this study. For instance, we found that members' satisfaction with the cooperative management led to significantly higher members' loyalty.

# Chapter 5

## Results and Discussions

### 5.1 Sustainable development structure and condition of Japanese Dairy

The Japanese livestock sector continues to be heavily protected from international competition, despite recent reforms. Economic and environmental constraints have led to a stagnation or decline in output of livestock products over recent years. Rapid structural change has also seen the emergence of large-scale intensive production units. Its reliance on imported grains has reduced Japan's overall agricultural self-sufficiency to around 40%. The 1980s saw Japan's imports of feed grains level off, but imports of meats and dairy products grew at a faster rate than previously. Hence self-sufficiency in livestock products has declined, substantially in the cases of beef and pig meat. When the Japanese economy recovers from the current depression, income growth rates may reflect those of other developed industrial economies, rather than those of the newly industrializing economies. This,

plus the facts that the urbanization phenomena in Japan is long over and that livestock protection is high, suggests that Japan's potential demand growth for livestock products is likely to be driven mainly by lower consumer prices should protection be reduced. This is already evident from trade policy reforms for beef and cheese. Using a global general equilibrium model, projections of the Japanese economy indicated that, even without policy reforms, self-sufficiency and the trade balance in livestock products will continue to fall.

## **5.2 Changes of Central dairy farming area of Saga Prefecture**

Rice is main agricultural production all over Japan. But after economic development in 1955, rice production has been decreased and others (such as: vegetable, fruits, Livestock etc) production has been increased. This scenario is same in Saga prefecture as well. Among livestock production, Dairy farming is very significant in National and Saga Prefecture as well. Until 1970s, dairy cattle was high in Saga Plain area and it has been decreased afterwards. There are many research done on compound dairy farming in Saga Plain area until early 1970s. But, after 1970s, we don't understand almost what is the condition of dairy farming in Saga Prefecture as there is a few research done on dairy farming. Therefore, we want to study on dairy flows from 1970 to 2005 and present dairy condition of Saga prefecture. In 1960, number of dairy cattle in Saga Plain number of dairy cattle was 62% and has been decreased to 33% in 2005. But, in 1960, the number of dairy cattle in Uwaba-Daichi and Karatsu area was 7% and has been increased to 40% in 2005 that showed that the central dairy farming area was in Saga plian area and it has been changed to Uwaba-Daichi and Karatsu area.

### 5.3 Scale size classification and practices of Dairy farms in Saga Prefecture

Realistic scale size of a farm will make interest to give the full effort to dairy farming. In most situations the ultimate size of the dairy will depend on the following factors: (1) land base available on site or in the area for land application of manure, (2) availability of labor, (3) people and business management skills of the owner, and (4) income goals of the owner. In this study area, farmer's are mostly concerned about their income level as other factors are not their limiting factor. In this regards, we have considered the income of households can be the factor to classify of scale size.

Figure 3-4 describes annual income of households including dairy households and worker's households. If average annual income of dairy household lies above the line of worker's households then they can give their full effort to any business. In this regards, if one household has above 30 milking cows then household income lies over the line of worker's household. But, the income of dairy household has been reduced to equal as worker's household because of concentrated feed price has increased suddenly in 2007-08, but it lies on the worker's household income line. That's why; we have divided scale size in 30-50 milking cows as medium scale dairy farms in table 3-1.

According to table 3-2, the average age of the responded farmers is 56 years. Among the respondents of survey, 64% of the farmers belonged to the group of below 60 years and rest 36% belonged to the group of above 60 years. From which, 73% of small holder belonged to the group of below 60 years and 27% of small holder belonged to the group of above 60 years. On the other hand, 75% of medium scale farmers belonged to the below 60 years group and 25% of the medium holder belonged to the group of above 60 years. But, 66% of responded farmers those are large scale farmers belong to above 60 years group.

Successor's keen interest may continue the farm in the long run. But, lack of willingness of young people to continue farming, is a major problem in agricultural sector in Japan. 13

out of 15 small scale farmers doesn't have successor to continue their farm into next generation. Among those, 4 farmer's age has crossed 60 years. On the other hand, 1 out of 4 medium and 1 out of 6 large scale farmers doesn't have successor to continue their farm in the next future.

Classification of scale size has made us clear about different management practices of different scale farms. Family labor plays vital role in small and medium scale farms whereas workers are hired in large scale farms. Young people have involved in medium and large scale farms but aged people mostly managed small scale farms. Grass has produced by small and medium scale farms but purchased by large scale farms. 13 out of 15 small scale farmers doesn't have successor, on the other hand, 3 out of 4 medium and 5 out 6 large scale farms have successor which attracts small scale farmers' successor. Government and other private organization have to take initiative i.e. motivational activities for retaining the successor in small scale dairy farms. Bucket milking system is practiced by small scale farmers yet whereas parlour milking system is practices by large scale farmers. Cow barn system and Milking system of large scale farms attract small scale farms. These differences opened the arena to carry out further study about performances of different scale dairy farms.

#### **5.4 “Sixth-Industry” of Dairy Farms**

Family labor income from raw milk has been decreasing day by day in Tofuken. In Addition, feed price has increased in 2007-08 suddenly that affected on the cost of production (i.e. cost of milk) and ultimately income from raw milk has drastically reduced (Figure 1). To re-construct the income, authority has taken decision to increase the farm-gate price of raw milk by 10 yen per kg which has directly contribute to increase the income level of dairy farmer. Although, the sales price has been increased, the income from raw milk is less than 30 yen per kg in 2010 while that was more than 50 yen in 1990. But in these circumstances,

income can be increasing through expanding the scale size of farms that means increasing the herd size or establishing processing unit i.e. direct marketing to the customers.

In Saga Prefecture, most dairies do not do direct marketing to the customers now. Only 3 farmers in Saga Prefecture are doing direct marketing to the customers. They are legally sold raw and pasteurized; homogenized and non-homogenized milk and milk products. Additionally niche products such as cheese, yogurts, milk coffee and milk pudding are emerging. Most of the dairy farmers are prisoners of market price. They could cut their costs, but stuck with the market price. They have no control over that price. Even though, very efficient farmers watch their potential profits drive off the farm with the milk truck.

Farmers concerned that their more income has gone away through tank lorry when raw milk picked from their bulk cooler. They were thinking about this situation and tried to find out the alternative way to increase the income of family labour. Direct selling to the customers can revive the income level of the farm.

"Sixth industry" concept is an honorary professor of Tokyo University, Nara, agricultural experts Imamura Robinson in the 20th century first proposed. With *economic development* and industrialization process forward, the second industry, food processing, catering services of tertiary industry are flourishing, increasing its added value, and as the primary industry accounted for the value of Agricultural production itself continuously reduced, farmers and the Agricultural industry in the breeding industry is increasingly profitable enterprise. How to do? Minister made this village of Nara, is not only engaged in agricultural crops (primary industry), but also engaged in the processing of *agricultural products* (the second industry) with sales of *agricultural products* and processed products (tertiary sector), in order to get more added value. " $1 + 2 + 3 = 6$ ", " $1 \ 2 \ 3$ " is equivalent to 6. This is the "sixth industry" origin for the Sustainable Development of agriculture and rural opened up a bright road.

Owner of farm 'A' has attracted to the constant price of milk. He has started dairy farm. In 1988, he thought that income will not be increased only to sell milk then he started to produce ice-cream and sold it through own restaurant. He also got order from other farmers to produce ice-cream for them. After 1997, he expanded his processing unit to produce other kinds of milk and milk products such as: Non-homogenous pasteurized milk, Plain Yogurt, Drinking Yogurt, Macha and Coffee Milk, Various Kinds of Cheese etc. This farm posses its own structure to supply in farmer's market, supermarket within the region.

The successor of the farm 'A' finds interest in dairying and processing of dairy products. Then, they tried to set strategic objectives to reach the direct marketing channel is closely linked to a greater satisfaction of end user, providing the maximum in spatial convenience, aligned with minimal wait time, given that product delivery is immediate. Hence, value is added to the product. With this, the action of the farm in this channel was heavily focused on a strategy of overcoming the price perception and convenience of local traditional retail, offering a value proposition (product plus service/convenience) that is more attractive to the consumer.

In 2002, owner of Farm 'B' thought to produce some products from his own produced milk. Then he contacted with Farm 'A' for producing cup ice-cream for his farm. After that, he was thinking to produce milk products by himself. When his son has returned home after his graduation, he planned to engage his son into farming activities through establishing processing unit of cheese. In May 2012, they have started to produce unique cheese in their farm.

Their strategic objectives to reach the direct marketing channel are providing the fresh and unique products to achieve greater satisfaction of end user. The farm has then a strategy to "skip over" the traditional intermediaries of the traditional distribution channels, so as to offer

its products with more added services directly to the end consumer, reducing the number of intermediaries and focusing the channel flows with reliable agent.

Owner of farm 'C' also started to sell ice-cream which was produced by Farm 'A'. But, raw milk and other raw material supplied by Farm C. In 1997, they started to produce milk (raw material) for soft ice-cream and sold through own sales shop and other soft ice-cream seller's shop. In 2011, they have established dairy academy for delivering the speech about milk production and care of the animals, also teach how to make butter from raw milk. The successor of the farm is working in Prefectural Government Office as a veterinary Doctor. After retirement of the owner, successor will continue the farm to future.

Farm B's strategic objectives to reach the direct marketing channel is providing the good quality raw material for soft ice-cream and sharing knowledge to achieve greater satisfaction of end user. The farm has then a strategy to "skip over" the traditional intermediaries of the traditional distribution channels, so as to offer its products with more added services directly to the end consumer.

Analysis regarding performance of three dairy farms and their distribution strategies, and the market opportunities to support the decision regarding the structure of direct marketing possibility for other farmers has been developed. Therefore, an attempt was made to relate the theoretical bases on the channel structure and flows to the practical development of a direct marketing channel structured by specific farm, which initiated its activities in 2012. The main strategic choices involved the definition about how to reach the chosen segments, how marketing flows should operate and which members of the channel would be responsible for these flows. Hence, decisions of how to fulfil the needs of the targeted segments were structured, along with the objectives of the channel analyzed, and how marketing channel members should be chosen and evaluated in the structuring process. As managerial implications and contributions, a sequence of analysis that was used by these three farms to

decide whether to enter in direct marketing channel. Direct marketing channel can ensure the freshness of the product, ease supply chain channel that can earn additional income for the farmers as family labour income decreased rapidly.

## **5.5 Sustainable development structure and condition of Bangladesh Dairy**

In Bangladesh dairy is the most important livestock product produced by smallholder crop-livestock farmers. Milk production in Bangladesh increased from 1.29 million metric tons in 1987-88 to 1.62 million metric tons in 1997-98, to 1.74 million metric tons in 2001. However, current national production is inadequate to meet demand. Due to increased production import of powdered milk decreased from 55,000 metric tons in 1991-92 to 17,000 metric tons in 2001. Income elasticity of demand for milk is estimated to be 1.62 compared to 1.19 for meat and eggs in 1995-96, and these are projected to be 0.65 and 0.63 respectively in 2020. Milk production in the country need to grow by 4.2- 5.6 percent per annum to meet increased demand (Hossian and Bose, 2000). Achievement of such a high growth rate in the sector has the potential to get large number of smallholder producers and others involved in milk processing and marketing out of poverty through employment and income generation. Dairy generates more regular cash income and dairy production, processing and marketing generate more employment per unit value added compared to crops (Asaduzzaman, 2000; Omore et al., 2002). However, achievement of high growth rate over the projected period and beyond will require a major transformation of the dairy sector and removal of current and potential constraints in dairy production, processing and marketing.

In general, dairying in Bangladesh is practiced as a part of mixed crop farming system where most of the rural household keep cow in order to cultivate land and also to produce milk for family consumption. Cows are reared in very primitive way. It is seen from the history that, milk may not have been sold in many parts of Bangladesh where production was

mainly aimed at subsistence consumption. In Bangladesh, most of the cow (about 80%) is owned by smallholder households (Saadullah). In terms of small farmers, dairy production is a family operation. Some poor farmers who used to sell their excess milk were considered as a low class segment of the society. The rapid growth of population, poverty, inequality and lack of employment opportunity has forced farmers to start selling milk. Recently in Bangladesh, almost rural households rear dairy cows as their supplementary income. There are many families in Bangladesh they do not have any land for cultivation, but they have nearly 2 or 3 milking cows for their livelihood (Kabir). During the last three decades the agricultural farming system of Bangladesh has changed and dairy farming is getting popularity as a new farming venture. However, there are not enough available dairy infrastructures in the village level.

Dairy animal rearing is a component of farming system in Bangladesh since ancient time. The animals are reared by farmers for milk production and the cow gives birth female calf is used as future milking animal and male calf is used as future bullock for traction, transport and to sale for cash money. Small farmers keep 1-2 milch animals of low genetic production potential. The traditional feeding system for dairy cattle is based on the use of rice straw, natural grasses supplemented with a little or no concentrates. The quantity and quality of fodder available from natural pasture shows seasonal fluctuation. There is an acute shortage of feed supply during the dry season and the available feed during this period is of very poor quality. Poor nutrition results in low production and reproductive performance slow growth rate, loss of body condition and increased susceptibility to diseases and parasites.

But, cooperation and competition are two basic social processes and fundamental theme of sociological literature. However, for an agrarian developing country cooperation can act as an effective and efficient instrument to bring positive socio-economic changes for the masses. Cooperation in its modern perspective started in British India (Bangladesh was a part) with

the enactment of the Cooperative Societies Act. of 1904. The main aim was to provide cheap credit to the farmers. Thus cooperative in Bangladesh is not a new concept. After independence in 1971, the cooperatives gained popularity to some extent. But it could not significantly fulfil their basic aims such as agriculture development and the income generation for the rural poor people (Ahmed, 1989).

Bangladesh Milk Producers' Cooperative Union Ltd. (BMPCUL), a newly emerging unique type of dairy cooperative, is not providing any significant amount of credits to the individual dairy farmers, but is functioning as an agent of income generation for the dairy farmers. The Government took initiatives to organize poor dairy farmers under a cooperative umbrella (BMPCUL), in which the Government gave credit to establish the dairy infrastructures such as, milk processing centers, factory and veterinary services, transportation and a stable market. BMPCUL started its function with the aims of establishing a dairy base in Bangladesh as well as rural development by providing inputs to the farmers at low cost and ensuring fair price to the small rural milk producers. Presently the BMPCUL has been running seven dairy plants for processing and/or pasteurizing at Dhaka, Baghabarighat, Tangail, Manikganj, Tekerhat, Sreenagar and Rangpur region.

## **5.6 Contribution of dairying**

It has been reported that 36% of cows between 3 and 10 years old and 60% of cows >10 years are used for milk production and draft power (BBS 1986). Saadullah (1995) found that the work involved in moving draft loads significantly decreased cows' milk yields; however, the situation could be improved in terms of milk yield by supplementing improved diet during work.

As an input to cropping systems, manure continues to be an important link between crop and animal production in Bangladesh. The yearly total cattle manure/dung production in Bangladesh is estimated to be 80 million tonnes of which 68 and 52% is used as manure in

rural and urban areas, respectively. The use of dung as a household fuel is mostly on small farms and represents 25% of total production (DLS 2000).

The livestock sector generates 20% of full-time employment in Bangladesh (DLS 2000). Generation of self-employment and the total income shares of dairy cows and goat raising tend to increase with a decrease in farmer's resources, especially land area, suggesting that animals are of particular importance for landless and small-scale farmers (Alam 1994). The pattern of utilisation of labour on dairy farms (Alam 1994) is shown in Table 3. Alam (1994) also reported that, on average, each mini dairy farm created the opportunity for employment of 1.78 man-days/day. The number of employed labourers was highest with large farms (2.50 man-days/day) followed by medium (1.65 man-days/day) and small farms (1.50 man-days/day). On average, each farm employed 1.07 male labourers and 0.71 female labourers each day. The use of female family labourers was highest (1 labourer/day) in the case of small farms. Alam (1994) did not interpret his findings in terms of labour used per livestock unit.

Rearing of dairy cattle has been increasingly viewed as a means of alleviating poverty in Bangladesh and is believed to improve the livelihoods of landless and small households. Many non-governmental organisations (NGOs), such as Proshika Manobik Unnayan Kendra (PROSHIKA), BRAC (Bangladesh Rural Advancement Committee), Grameen Bank and Aftab Dairy, are involved in the promotion of micro-credit for small livestock enterprises including dairy cattle, poultry and goat production. Many smallholders, particularly in mixed farming systems, prefer the flow products (milk, draft power and manure) rather than the end products (meat, hides and skins) since selling their animals for slaughter entails the permanent loss of flow products. Individuals can expand their labour force by raising cows and processing primary products into marketable secondary products, such as butter, cheese and yoghurt and by selling manure as fuel and fertiliser. Income from the sale of these

primary and secondary products and by-products can be used to meet/provide farm household expenses, savings, investments and insurance, and its value tends to increase over time.

Biomass fuel accounts for significant share of the total energy consumption in Bangladesh. It provides basic energy requirements for cooking and heating in rural households and processing in a variety of traditional cottage industries in urban and semi-urban areas. Due to rapid increase in commercial energy consumption in most of the developed and rapidly developing countries, the share of traditional fuels in the total national energy use has been falling in recent years. However, actual biomass energy consumption in Bangladesh is still increasing like in other South Asian countries (Haq et. al, 2003). Infrastructure Development Company Ltd. (IDCOL), a Govt. owned Investment Company, which has proven success of dissemination of energy project across Bangladesh to implement National Domestic Biogas and Manure Programme (NDBMP). The overall objective of NDBMP is to further develop and disseminate domestic biogas in rural areas with the ultimate goal to establish a sustainable and commercial biogas sector in the country.

## **5.7 Resource Circulation System and its impact**

Income from the dairy activities used to meet/provide household expenses, savings, investment and insurance. Finding of the study reveals that Local Resource Circulation System (LRCSs) by means of farm management to decrease the cost, and increase the income and labor utilization in dairy-crop farming in the farm level. It has contributed to provide year-round working opportunities for the local people, utilize family labor effectively and provide a place for milk market low shipping and no storage cost. Integrated agriculture as the primary activity among most of the people has good chance to develop dairying as reducing stress and shock of farming household.

LRCS has good linkages with local raw materials, labor, milk marketing etc. It is mainly both way circulation systems. First, it circulates the resources by means of farm management to decrease the cost of milk production and increase the income and labor utilization in integrated dairy farming in the farm-level. Second, it circulates the resources such as local raw milk as local nutritional intake, local labor, and local capital by means of related industries in local economy-level. This system is to promote the local economic development through proper utilization of local resources (animal feed, cow-dung, and other farm residues, family or local labor, local land and capital, local nutritional intake). It provides employment opportunities of local people in farm households as well as self processing shop such as sweets shop and self selling outlet directed by farmers. Figure 4-2 illustrates the mechanism of LRCS of dairy in the study area. In this system, farmers get the animal feed from the crop lands that they simultaneously operate with cattle farming. During post harvesting time, farmers collect and store crop residuals (rice straw and other crop residuals) for timely and year round feed supply. The cow-dung and other droppings of dairy cattle used to produce compost fertilizer for crop cultivation instead of chemical fertilizer. Compost fertilizer leads to high yield crop production (Bangladesh Agricultural Research Institute, 2011). The survey results revealed that per capita milk consumption is 188 ml which is higher than that of Bangladesh (44.3 ml in 2007, FAO). All the functions related to the farm economy handled by family labor particularly female member of households.

Dairy farming involves a very stable composition of cows at the household level and offers good prospects for improving farming families' living conditions. Integrated dairy farming and agriculture in this district ((Map d)) increase the short-term benefits and long-term sustainability of agriculture, especially dairy farming. Dairy farming in this district is labor-intensive especially family labor. The survey results revealed the rationality of developing the domestic dairy sector through circulation of LRCSs. Milk consumption by

members of dairy farming households is considerably higher than the country's average per capita milk consumption. However, the income from dairy farming contributes to meeting various types of household expenses, such as children's educational expenses, purchase of household appliances and assets, etc. Engaging in integrated farming with dairy farming increases the sustainability of rural livelihoods by reducing malnutrition of children, increasing interaction with the government and banks, increasing participation in village activities, empowering women, etc. In these and other ways, dairy farming contributes to the betterment of poor farmers' livelihoods.

### **5.8 Sustainable development conditions under dairy cooperative (BMPCUL)**

Being the largest dairy organization, BMPCUL has the responsibility of developing the country's dairies to attain the self-sufficiency in milk production. In this way, activities are extended in the selected milk producing areas of Bangladesh for the development of the economic conditions of the rural milk producers, and to encourage dairy cows keeping by giving members remunerative milk prices. Keeping this as the main objective, the BMPCUL has been dedicated, since the early 70's to dairy development in Bangladesh.

Dairy development activities include the genetic improvement of dairy cows coupled with vaccination, better food and fodder, and improved dairy farm management, which in turn increase milk production. Higher milk production per cow means higher income for dairy cow keepers.

BMPCUL's activities are extended in milk producing areas of Bangladesh for the development of the economic conditions of the rural milk producers by giving members remunerative milk prices. Dairy development activities include the genetic improvement of dairy cows coupled with vaccination, better food and fodder, and improved dairy farm management, which in turn increase milk production. Fig. 4-5 shows that the veterinary

services of the BMPCUL. In 1977-1978, the BMPCUL started their services in cattle treatment. Gradually they adopted cattle vaccinations, and artificial insemination, which led to increase the numbers of AI calves. It is found that cattle treatment incidents are increasing rapidly as number of cows treated raised from 64,138 in 2001-02 to 120,456 in 2011-12. The same trend was observed for cattle vaccinations. In 1980/1981, the provision of cattle vaccinations was introduced to 1,000 cattle, which increased to 134,423 cattle vaccinations in 2012. AI services were also introduced in 1990 also increased drastically during the decade of 1991-2012. More incidences of artificial insemination has resulted more AI calves, which are growing with the incidences of AI services since 1990-91 to 2012. Data show that, within a short period of time, BMPCUL extended their activities in dairy development in the country. This also indicates that the demand for veterinary service is increasing. In other words, people are adopting AI services and becoming more aware of treatment and vaccinations that became a positive factor for their dairy development.

BMPCUL provide some quality feed support to members for better production of milk. Feed distribution has risen to 823.24 ton in 2003-04 to 1100.40 ton in 2011-12. In 2007-08, the world feed price especially corn price has increased suddenly which affects the feed distribution during 2008-10. They also lend land to members for cultivating green grass which is called BATHAN with Tk 300 per acre. They also supplied grass seeds to members for cultivation. Amount of lent land has increased 900 acre in 2003-04 to 2000 acre in 2011-12. In BATHAN, farmers can rear their cows for six to seven months.

To clarify the role of cooperative services in dairy development, done field study on cooperative and non-cooperative farmers' production and marketing aspects. Farmers interviewed derived living expenses from different activities depart from dairy production. Most of the farmers depend on agricultural activities as a source of income, indicating that farmers are doing integrated or compound dairy farming. The results confirmed that

approximately 89% of cooperative farmers depend on only dairy farming as a major source of income whereas approximately 77% of non-cooperative members depend on dairy farming only as a major source of household income. However, non-cooperative members depend more on other activities compared to cooperative members.

Education level of farmers' household head is importance, given that it play a vital role on adopting new technologies that will have a positive influence in dairy farm management. Results indicate that among the interviewed farmers, more non-cooperative members (46.5%) are illiterate compared to cooperative members (38.5%). It also indicate that majority of interviewd farmers' level pof education lies on primary to secondary education wether some (approximately 12%) cooperative farmers have higher education. It implies that relatively educated farmers joined in cooperative dairy society.

Age of household head is very important for decision making. Younger farmers have courage to take risk than older farmers; on the otherhand, older farmers have experienced than younger to take proper decision. According to table 4-9, modal age class of cooperative farmers lie on 31-40 years group and that of non-cooperative members lie on 41-50 years group. It implies that cooperative farmers are relatively younger than non-cooperative farmers.

Table 4-10 illustrates the monetary values of variable inputs were used for both cooperative and non-cooperative dairy fams. Calculating of variable inputs, amount of different inputs and prices were obtained from farmers, and then multiplied by units used and then cost of inputs was divided by the herd size/farm to get average cost and then divied by 365 to get average cost per day per cow.

According to below table, highly employed inputs for cooperative farmers were feed, labor and drugs. These accounts for 93.4%, 2.3% and 3.4% respectively. Whereas, highly employed inputs for non-cooperative farmers were feed, Drugs and Veterinary and AI

servicecost, laborand transport. These inputs account for 87.5%, 4.7,3.6 and 3.2 respectively. Feed is the most important inputs for dairy cattle to be more productive. Coopertive society supplied part of feed quantity at a break-even price among members. Rearing the cross breed cows is the reason for high feed cost for cooperative farmers. The feed cost is 30% less when the y took their cows in the BATHAN for rearing. BATHAN is a place borrowed from cooperative union (BMPCUL) where farmers took cows for feeding green grass for 6-7 months. This system helps farmers to reduce the feeding cost by 30% in those 6-7 months. As aresult, it reduces the total annual feeding cost.

Cooperative farmers are enjoying free veterinary services from their cooperative society, but they have to buy drugs required for better treatment of cows. Cooperative members got transport facility for carrying milk to plant from society office. But, non-cooperative farmers have to pay 3.2% of total inputs ccost as transportation cost. This is one of the competitive benefits for coooperative farmers.

Cooperative farmers have slightly bigger herd size as table 4-11 indicates that cooperative nad non-cooperative farmers had 10.5 and 6.5 dairy cattle repectively. Cooperative famers' herd size can be attributed to an improvement in assess to dairy breeds through cooperatives. Cooperative farmers are rearing only cross breed cows ( such as  $\frac{1}{2}$  Sahiwal  $\times$   $\frac{1}{2}$  Pabna Milking = G<sub>1</sub>,  $\frac{3}{4}$  Sahiwal  $\times$   $\frac{1}{4}$  Pabna Milking = G<sub>2</sub>,  $\frac{1}{2}$  Friesian  $\times$   $\frac{1}{2}$  Pabna Milking = G<sub>3</sub>,  $\frac{3}{4}$  Friesian  $\times$   $\frac{1}{4}$  Pabna Milking = G<sub>4</sub>,  $\frac{1}{2}$  Sahiwal  $\times$   $\frac{1}{4}$  Friesian  $\times$   $\frac{1}{4}$  Pabna Milking = G<sub>5</sub>,  $\frac{1}{2}$  Jersey  $\times$   $\frac{1}{4}$  Sahiwal  $\times$   $\frac{1}{4}$  Pabna Milking = G<sub>6</sub>, Pabna Milk Cow (100 %) = G<sub>7</sub> and Non Descriptive = G<sub>8</sub>), whereas non-cooperative farmers rearing crossbreed as well as indigenous cows.

Cooperative and non-cooperative farmers were milking 4.8 and 3.7 cows respectively during study period as per table 4-11. Results reveal that the average lactation period for cooperative farmers were higher than that of non cooperative farmers. Average lactation period is lower than 290-300 days which affect negetively in milk production.

Average milk yield was 46.7 and 27.9 litres per day for cooperative and non-cooperative farmers respectively. Productivity of milk per cow was 9.7 and 7.5 litres for cooperative and non-cooperative farmers respectively. It suggests that, cooperative farmers enjoy 29.33% higher productivity compared to non-cooperative farmers.

Milk marketed and consumption pattern of the responded farmers described in table 4-12. There is a significant difference between cooperative (45.4 litres/day) and non-cooperative farmers (26.9 litres/day) in milk marketed but not in milk consumed. Cooperative farmers sold higher quantity of milk than that of non-cooperative farmers. This scenario tells us about free veterinary services, training programmes, advised about improved husbandary practices and fixed and reliable market ensured by cooperative society in the study area. Cooperative farmers bear less risk in spoilage of milk compared to non-cooperative farmers as they travelled long distance to sell their milk.

Milk price for cooperative and non-cooperative farmers were 36.3 Tk./litre and 34.9 Tk./litre respectively. It implies that cooperative farmers enjoyed high milk price compared to non-cooperative farmers. Non-cooperative farmers sold milk in fluctuated market and it varied day to day. Cooperative farmers eliminated price fluctuation risk factors through guaranteed market ensured by cooperative society.

Milk marketing channel under cooperative production system is integrated and structured channel in Bangladesh. Fig. 4-3 shows that individual farmers are bringing their milk at collection centre of primary cooperative society in the village. Then, collected milk is sent to Baghabarighat Milk processing centre of BMPCUL for chilling and pasteurizing. BMPCUL provides transport for carrying the milk to Processing centre. About 97% of milk supplied to the processing centre. 3% of milk consumed by primary milk producers or farmers households. After chilling and pasteurizing, milk carried to the factory of BMPCUL, Dhaka where it is processed into cheese, ice cream, butter and homogenized fresh milk into small

plastic bags. These milk and milk products are sold to the consumers in urban market through the distributors, shopkeeper/ retailer from on the milk sales depot at a fixed price. There are no other intermediaries involved in the marketing channel and the milk price is also fixed for the primary producers according to their fat content.

The processors have developed these strategies to attract dairy farmers with services, raw milk prices and collection systems. As shown in Table 4-13, some strategy differences between cooperative society (Milk Vita) and non-cooperative (Milk Traders) were observed. First, Milk Vita freely provided expensive services such as treatment, vaccination, artificial insemination and a supply of no-profit no-loss based feed while Milk Traders did not offer these essential services to dairy farmers to keep cows and calves healthy. Milk Vita also provided a cow loan with 5% interest to its members without mortgage while Milk Traders provide micro credit that required a mortgage without interest. Milk Vita collected raw milk through its primary milk producers' society in each hamlet. Members carried milk to the society's collection point by themselves to sell while Milk Traders collected directly from the selected farmers, traders and markets. On the above discussion, it can be conclude that the private processors adopted the above mentioned strategies to maximize their profit. They did not offer expensive services to dairy farmers and rarely if ever checked water levels in raw milk.

However, Milk Vita took risks of the farming by giving free services to members. Non-members dairy farmers relied on government veterinary services, which were insufficient. Private veterinary doctors were limited and lived in urban areas rather than rural areas. If farmers called, the doctor could not respond quickly due to distances, the limited number of doctors and limited transportations. Often doctors arrived after the cows have died. Farmers also had to pay fees. The costs of other services provided by private doctors were also very

high. Therefore, the strategies of private processors were miss- guiding the members of Milk Vita.

Respondents that are member of dairy cooperative were asked to state the benefits of being a cooperative member compared to the period when they were operating individually. It is revealed from the results (Table 4-13) that farmers are getting free veterinary services from the cooperative society which affects their dairy production and income (Ghosh and Maharjan also found same findings in 2001). And then, the second most important benefit is the secured market for produced milk at fixed price. They are getting bonus according to milk quantity sold to cooperative from which they can use as a capital to the farm. Payment of milk price has been paid once in a week that they can pay their input expenses on a weekly basis. They also get cow loan from the society at low interest in a convenient installment system from weekly payment. More than 60% (64%) of the responded farmers believed that BATHAN (land lent for grass production) is very helpful for rearing cows. They are also benefited from quality feed getting from cooperative society at break-even price that affects production positively.

Table 4-14 describes the constraints faced by cooperative and non-cooperative farmers regarding farm management and production. Both cooperative and non-cooperative farmers believed that feeding cost is very high that reduces their farm's income. But, cooperative farmers are getting part of quality feed at break-even price from the society that helps to fulfill inadequate supply of feed. Whereas, non-cooperative farmers are facing the problems of inadequate supply and quality of feed in the market. Non-cooperative farmers experienced poor veterinary services more compared to cooperative farmers. Cooperative farmers faced less in breed procurement than non-cooperative farmers. Non-cooperative farmers also faced lack of grazing land compared to cooperative farmers. Non-cooperative farmers faced water

crisis during farming activities. Prevalence of diseases experienced by both cooperative and non-cooperative farmers as a hindrance of dairy development in the study area.

Marketing of milk is a major hindrance of dairy development in the country. Although, cooperative society has established secured market for their members, they also faced some problems related to market. That's why, farmers were asked to state their own view about obstacles related to marketing of milk.

Table 4-15 presents the constraints faced by cooperative and non-cooperative members regarding marketing of milk. It is evident from results that major problems faced by both cooperative and non-cooperative members were infrastructure of market, information regarding market price and others, access to adequate market. In addition, non-cooperative farmers have to travel long distance to collection centre that can spoilage milk during transportation. They also could not sell their milk during political strike in the country but cooperative members can sell their milk to the society.

Many agricultural cooperatives are facing challenges with respect to globalization, industrialization of agriculture, and competition from large multinational corporations in the agro-food and forest industries. The cooperative organizations respond by mergers – increasingly often across borders – sometimes by de-mutualisation or by seeking new organizational forms. BMPCUL has also some external pressure as well. After knowing the development structure and condition of cooperative members, it is evident that cooperative farmers are developing more than that of independent farmers. A regression analysis has done for analysing the factors affecting farmers' perception about continuation being a member.

Loyalty of farmers (or to be continued as member) to cooperative is defined in this study as the willingness of farmers to maintain their present support to cooperatives even if prices and services are better elsewhere. Various authors use more or less different concepts, though related. Loyalty can be regarded as a behavioral or an attitudinal concept. The former means

that a loyal person exhibits repeat behavior, implying that he or she tends to patronize the same trading partner over and over again. The attitudinal dimension means that the person has a predestination to patronize the same partner repeatedly. This study focuses on the behavioural interpretation of loyalty. In a cooperative context the concept loyalty may express a member's behavior as an investor in the cooperative as well as his or her behavior in the governance role, i.e. the member's acts in order to monitor the cooperative. Likewise all members have the right and the possibility to exert influence in the cooperative organization, even though many members do not take this opportunity. As loyalty is interpreted as members' actual behaviour in the patron, investor and governance roles, it is in principle possible to make objective measurements

Table 4-19 presents the descriptive statistics of respondents' demographic characteristics. It is observed that average age of the households heads lies on the 51-60 years group. 87% of respondents have a secondary education or below. Average land holds per households are 8.49 bighas. Average experiences as a member of a cooperative are 20.15 years.

An OLS linear regression model was applied to find out the factors that affect members' perception about continuation of membership to cooperative (members' loyalty). Members' loyalty represented dependent variable (Y). Dependent variable (Y) is the set of hypothesized to be affected by 9 explanatory variables described in Table 4-19.

The OLS regression results are shown in Table 4-20. Results show that  $R^2 = 0.875$  that means that about 88% of members' perception about continuation of membership to cooperative is explained by COMPLAIN, TRUST, IDEOLOGY, VOICE, SHELTER, RELATION, BENEFIT, FEED SUPPORT and EXTENSION SERVICE. The F Value is highly significant at 1% significant level, as computed P value is 0.000. Overall significance of the estimated regression model is high as from Durbin-Watson table we find the computed d is 1.830 that there is no serial correlation among the explanatory factors. Finally, seven

variables have a significant effect on members' loyalty to cooperative. Among those, six variables have positive effect and one variable has negative effect on members' loyalty to cooperative.

COMPLAIN is a significant determinant of members' loyalty which effect negatively on it at 5% significance level, which means that the members' are being loyal if they have less amount of complain against the cooperative. When the number of COMPLAIN increased against cooperative and they don't get any solution then the members become disloyal to this cooperative.

TRUST is positively correlated with members' loyalty to cooperative at 1% significant level, which indicates that the more trust on cooperative's information the more the members are loyal to the cooperative.

VOICE significantly affect on members' loyalty to cooperative at the 5% significance level, which illustrates that the more the cooperative accept the member's decision, the level of members' loyalty is higher. In this study, we found that cooperative honour the members' decision regarding the development of cooperative activities.

SHELTER is another important issue of members' loyalty to cooperative, with positive coefficients at 5% significance level, which implies that the more the member feels that cooperative is a fixed and reasonable market for milk and considers as a shelter against other trading partner then they are more loyal to the cooperative.

RELATION is positively correlated with members' loyalty to cooperative, at 1% significance level, which means that the more portion of milk supplied to the cooperative, the better relation they have with cooperative, and the members have better relation with cooperative the more they are loyal to cooperative.

We have found that FEED SUPPORT is one of the most important services provided by BMPCUL. FEED SUPPORT significantly affect on members' loyalty to cooperative at the

5% significance level, which implies that the more feed support members get from cooperative the more they are being loyal to cooperative.

EXTENSION SERVICE is another important aspect of members' loyalty to cooperative at the 5% significance level, which exemplify that the more extension service provided by the cooperative the more members are being loyal to the cooperative. It is noted that extension services provided by BMPCUL are free of charge to members.

Other two variables; IDEOLOGY and BENEFIT are not significant as per regression results, but these two variables are also important factor in members' loyalty. Socioeconomic conditions and educational levels of the respondents may be analyzed further to identify the reasons why these two factors not significant.

BMPCUL became the dominant milk producing organization, marketing more than 60% of the total marketed milk in Bangladesh. Last two decades, milk collection capacity of BMPCUL has increased drastically. The level of adoption of improved dairy breeds was considerably superior in cooperative villages. At the same time, milk production per cooperative member also has greatly improved (General Section, Cooperative office). This significant improvement occurs because of rendering veterinary extension and feed support service by BMPCUL is remarkable. That's why farmers are continuing membership in the cooperative for a long term as the average membership age is 20.15 years. Members show repeated behavior over years which exhibit the members' loyalty to cooperative.

The findings of this study partially supported the hypothesis that a member's positive attitude would significantly influence his positive behavior toward the cooperative. TRUST, VOICE, SHELTER, RELATION, FEED SUPPORT and EXTENSION SERVICE are 7 factors positively effect on members' loyalty. COMPLAIN is the only factor that affect negatively on members' loyalty. If the members don't have more complaints against cooperative then members' are more loyal to the cooperative. There were some important

lessons that we learned from this study. For instance, we found that members' satisfaction with the cooperative management led to significantly higher members' loyalty.

# Chapter 6

## Conclusion

### 6.1 Concluding Summary

The Japanese livestock sector continues to be heavily protected from international competition, despite recent reforms. Economic and environmental constraints have led to a stagnation or decline in output of livestock products over recent years. Rapid structural change has also seen the emergence of large-scale intensive production units. Its reliance on imported grains has reduced Japan's overall agricultural self-sufficiency to around 40%. The 1980s saw Japan's imports of feed grains level off, but imports of meats and dairy products grew at a faster rate than previously. Hence self-sufficiency in livestock products has declined, substantially in the cases of beef and pig meat. When the Japanese economy recovers from the current depression, income growth rates may reflect those of other developed industrial economies, rather than those of the newly industrializing economies. This, plus the facts that the urbanization phenomena in Japan is long over and that livestock

protection is high, suggests that Japan's potential demand growth for livestock products is likely to be driven mainly by lower consumer prices should protection be reduced. This is already evident from trade policy reforms for beef and cheese. Using a global general equilibrium model, projections of the Japanese economy indicated that, even without policy reforms, self-sufficiency and the trade balance in livestock products will continue to fall. Should Uruguay Round reforms have been factored in, self-sufficiency would likely have declined further and import volumes would have grown even faster. Despite some recent reductions in guaranteed prices and tariffs (noticeable for beef and cheeses) Japan's livestock sector remains one of the most highly protected in the world. Moreover, support is delivered primarily through price support, with its consequent distortions of output, consumption and trade volumes. Demand growth has been hampered by substantial policy induced gaps between consumer prices in Japan and those in less-protected economies. Domestic fiscal constraints and international pressures will likely combine to force further reductions in support to the livestock sector. The beef example suggests that these reforms can bring benefits to consumers and at the same time continue to provide less-distorting support to rural population. In addition, the emergence of environmental problems associated with livestock production in Japan, and the political shift towards 'multi-functionality' and support of the rural environment provide possibilities for the future directions of Japan's agricultural policies.

Rice is main agricultural production all over Japan. But after economic development in 1955, rice production has been decreased and others (such as: vegetable, fruits, Livestock etc) production has been increased. This scenario is same in Saga prefecture as well. Among livestock production, Dairy farming is very significant in National and Saga Prefecture as well. Until 1970s, dairy cattle was high in Saga Plain area and it has been decreased afterwards. In 1960, number of dairy cattle in Saga Plain number of dairy cattle was 62% and

has been decreased to 33% in 2005. But, in 1960, the number of dairy cattle in Uwaba-Daichi and Karatsu area was 7% and has been increased to 40% in 2005 that showed that the central dairy farming area was in Saga plain area and it has been changed to Uwaba-Daichi and Karatsu area.

Classification of scale size has made us clear about different management practices of different scale farms. Family labor plays vital role in small and medium scale farms whereas workers are hired in large scale farms. Young people have involved in medium and large scale farms but aged people mostly managed small scale farms. Grass has produced by small and medium scale farms but purchased by large scale farms. 13 out of 15 small scale farmers doesn't have successor, on the other hand, 3 out of 4 medium and 5 out of 6 large scale farms have successor which attracts small scale farmers' successor. Government and other private organization have to take initiative i.e. motivational activities for retaining the successor in small scale dairy farms. Bucket milking system is practiced by small scale farmers yet whereas parlour milking system is practiced by large scale farmers. Cow barn system and Milking system of large scale farms attract small scale farms. These differences opened the arena to carry out further study about performances of different scale dairy farms.

Analysis regarding performance of three dairy farms and their distribution strategies, and the market opportunities to support the decision regarding the structure of direct marketing possibility for other farmers has been developed. Therefore, an attempt was made to relate the theoretical bases on the channel structure and flows to the practical development of a direct marketing channel structured by specific farm, which initiated its activities in 2012. The main strategic choices involved the definition about how to reach the chosen segments, how marketing flows should operate and which members of the channel would be responsible for these flows. Hence, decisions of how to fulfil the needs of the targeted segments were structured, along with the objectives of the channel analyzed, and how marketing channel

members should be chosen and evaluated in the structuring process. As managerial implications and contributions, a sequence of analysis that was used by these three farms to decide whether to enter in direct marketing channel. Direct marketing channel can ensure the freshness of the product, ease supply chain channel that can earn additional income for the farmers as family labour income decreased rapidly.

In Bangladesh dairy animal rearing is a component of farming system since ancient time. The animal are reared by farmers for milk production and the cow gives birth female calf is used as future milking animal and male calf is used as future bullock for traction, transport and to sale for cash money. Small farmers keep 1-2 milch animals of low genetic production potential. The traditional feeding system for dairy cattle is based on the use of rice straw, natural grasses supplemented with a little or no concentrates. The quantity and quality of fodder available from natural pasture shows seasonal fluctuation. There is an acute shortage of feed supply during the dry season and the available feed during this period is of very poor quality. Poor nutrition results in low production and reproductive performance slow growth rate, loss of body condition and increased susceptibility to diseases and parasites.

Rearing of dairy cattle has been increasingly viewed as a means of alleviating poverty in Bangladesh and is believed to improve the livelihoods of landless and small households. Many non-governmental organisations (NGOs), such as Proshika Manobik Unnayan Kendra (PROSHIKA), BRAC (Bangladesh Rural Advancement Committee), Grameen Bank and Aftab Dairy, are involved in the promotion of micro-credit for small livestock enterprises including dairy cattle, poultry and goat production. Many smallholders, particularly in mixed farming systems, prefer the flow products (milk, draft power and manure) rather than the end products (meat hides and skins) since selling their animals for slaughter entails the permanent loss of flow products. Individuals can expand their labour force by raising cows and processing primary products into marketable secondary products, such as butter, cheese and

yoghurt and by selling manure as fuel and fertiliser. Income from the sale of these primary and secondary products and by-products can be used to meet/provide farm household expenses, savings, investments and insurance, and its value tends to increase over time.

Biomass fuel accounts for significant share of the total energy consumption in Bangladesh. It provides basic energy requirements for cooking and heating in rural households and processing in a variety of traditional cottage industries in urban and semi-urban areas. Due to rapid increase in commercial energy consumption in most of the developed and rapidly developing countries, the share of traditional fuels in the total national energy use has been falling in recent years. However, actual biomass energy consumption in Bangladesh is still increasing like in other South Asian countries (Haq et. al, 2003). Infrastructure Development Company Ltd. (IDCOL), a Govt. owned Investment Company, which has proven success of dissemination of energy project across Bangladesh to implement National Domestic Biogas and Manure Programme (NDBMP). The overall objective of NDBMP is to further develop and disseminate domestic biogas in rural areas with the ultimate goal to establish a sustainable and commercial biogas sector in the country.

Dairy farming involves a very stable composition of cows at the household level and offers good prospects for improving farming families' living conditions. Integrated dairy farming and agriculture in Maulvibazar district (Map 4-d) increase the short-term benefits and long-term sustainability of agriculture, especially dairy farming. Dairy farming in this district is labor-intensive especially family labor. The survey results revealed the rationality of developing the domestic dairy sector through circulation of LRCSs. Milk consumption by members of dairy farming households is considerably higher than the country's average per capita milk consumption. However, the income from dairy farming contributes to meeting various types of household expenses, such as children's educational expenses, purchase of household appliances and assets, etc. Engaging in integrated farming with dairy farming

increases the sustainability of rural livelihoods by reducing malnutrition of children, increasing interaction with the government and banks, increasing participation in village activities, empowering women, etc. In these and other ways, dairy farming contributes to the betterment of poor farmers' livelihoods.

Farmers interviewed in Sirajganj district (Map 4-a) derived living expenses from different activities apart from dairy production. Most of the farmers depend on agricultural activities as a source of income, indicating that farmers are doing integrated or compound dairy farming. The results confirmed that approximately 89% of cooperative farmers depend on only dairy farming as a major source of income whereas approximately 77% of non-cooperative members depend on dairy farming only as a major source of household income. However, non-cooperative members depend more on other activities compared to cooperative members. Cooperative farmers are enjoying free veterinary services from their cooperative society, but they have to buy drugs required for better treatment of cows. Cooperative members got transport facility for carrying milk to plant from society office. But, non-cooperative farmers have to pay 3.2% of total inputs cost as transportation cost. This is one of the competitive benefits for cooperative farmers.

Cooperative farmers sold higher quantity of milk than that of non-cooperative farmers. This scenario tells us about free veterinary services, training programmes, advised about improved husbandry practices and fixed and reliable market ensured by cooperative society in the study area. Cooperative farmers bear less risk in spoilage of milk compared to non-cooperative farmers as they travelled long distance to sell their milk. Milk marketing channel under cooperative production system is integrated and structured channel in Bangladesh. Individual farmers are bringing their milk at collection centre of primary cooperative society in the village. Then, collected milk is sent to Baghabarighat Milk processing centre of BMPCUL for chilling and pasteurizing. BMPCUL provides transport for carrying the milk to

Processing centre. About 97% of milk supplied to the processing centre. 3% of milk consumed by primary milk producers or farmers households. After chilling and pasteurizing, milk carried to the factory of BMPCUL, Dhaka where it is processed into cheese, ice cream, butter and homogenized fresh milk into small plastic bags. These milk and milk products are sold to the consumers in urban market through the distributors, shopkeeper/ retailer from on the milk sales depot at a fixed price. There are no other intermediaries involved in the marketing channel and the milk price is also fixed for the primary producers according to their fat content.

However, Milk Vita took risks of the farming by giving free services to members. Non-members dairy farmers relied on government veterinary services, which were insufficient. Private veterinary doctors were limited and lived in urban areas rather than rural areas. If farmers called, the doctor could not respond quickly due to distances, the limited number of doctors and limited transportations. Often doctors arrived after the cows have died. Farmers also had to pay fees. The costs of other services provided by private doctors were also very high. Therefore, the strategies of private processors were miss- guiding the members of Milk Vita.

Many agricultural cooperatives are facing challenges with respect to globalization, industrialization of agriculture, and competition from large multinational corporations in the agro-food and forest industries. The cooperative organizations respond by mergers – increasingly often across borders – sometimes by de-mutualisation or by seeking new organizational forms. BMPCUL became the dominant milk producing organization, marketing more than 60% of the total marketed milk in Bangladesh. Last two decades, milk collection capacity of BMPCUL has increased drastically. The level of adoption of improved dairy breeds was considerably superior in cooperative villages. At the same time, milk production per cooperative member also has greatly improved (General Section, Cooperative

office). This significant improvement occurs because of rendering veterinary extension and feed support service by BMPCUL is remarkable. That's why farmers are continuing membership in the cooperative for a long term as the average membership age is 20.15 years. Members show repeated behavior over years which exhibit the members' loyalty to cooperative. The findings of this study partially supported the hypothesis that a member's positive attitude would significantly influence his positive behavior toward the cooperative. TRUST, VOICE, SHELTER, RELATION, FEED SUPPORT and EXTENSION SERVICE are 7 factors positively effect on members' loyalty. COMPLAIN is the only factor that affect negatively on members' loyalty. If the members don't have more complaints against cooperative then members' are more loyal to the cooperative. There were some important lessons that we learned from this study. For instance, we found that members' satisfaction with the cooperative management led to significantly higher members' loyalty.

## **6.2 Managerial implications**

The study gives way to the researchers and policy makers about extent of sustainable development of dairy farming in Japan and Bangladesh. It has found successors' condition in different scale of dairy farms and sixth industrialization to retain the successor in Japan and cooperative production system to sustain farms in Bangladesh.

In case of successors' condition, this study empirically analyzed different scale of dairy farms through classification as there was no proper classification of dairy farms in Japan. Most of small scale farmers don't have successor to carry on the farms onto next generation. But, small scale farms are more in Japan (except Hokkaido). This study found three different scale farms in sixth industrialization. These farms' successor could be the next kin of the farms.

Rearing of dairy cattle has been increasingly viewed as a means of alleviating poverty in Bangladesh and is believed to improve the livelihoods of households. Productive and reproductive performance of cows is not up to the mark. Cooperative society provides service that effect on production and income of households (Ghosh and Maharjan, 2001). This study found that cooperative members being benefited from secure milk market, fixed price of milk and free veterinary services whereas most of the dairy farms are facing these problems as an individual producers.

Many agricultural cooperatives are facing challenges with respect to globalization, industrialization of agriculture, and competition from large multinational corporations in the agro-food and forest industries. This study analyzed factors that affect on farmers' loyalty i.e. continuing membership tenure to cooperative society which assures farm continuation.

Members' positive attitude would significantly influence his positive behavior toward the cooperative. TRUST, VOICE, SHELTER, RELATION, FEED SUPPORT and EXTENSION SERVICE are 7 factors positively effect on members' loyalty. COMPLAIN is the only factor that affect negatively on members' loyalty. If the members don't have more complaints against cooperative then members' are more loyal to the cooperative.

### **6.3 Future Research**

In case of dairying in Japan, there are many pathways to proceed. First of all, this study classified scale size based on income level of working household. But, there are many other bases for classifying the scale size such as: land base available on site or in the area for land application of manure, availability of labor, people and business management skills of the owner, and income goals of the owner. Rather than one prefecture data, father study can be carried in more prefectures in Japan.

For sixth industrialization, this study found only three industrialized farm in this prefecture, this sample size cannot exhibit the proper scenario of sixth industrialization of dairy farming in Japan.

In case of dairying in Bangladesh, there are also many pathways to precede the research on extent of sustainable development. This study found the contribution the dairy to farmers' livelihood in the context of income and biogas. But, further study can be carried on other context such as: employment generation, capital formation, source of nutrition etc.

For LRCSs, this study found the circulation system in traditional dairy farming. Future study can be carried on different dairy production system with economic viability and effectiveness.

## Bibliography

- Agriculture & Livestock Industries Corporation (ALIC), Japan, Monthly Statistics, Various issues.
- Alexandru Nedelea, Veronica Grosu & Mohammad Shamsuddoha (2009). "Dairy Farming- an Alternative Income Generating Activity", *Bulletin UASVM Horticulture*, 66(2).
- Aminul Haque ABM (2013), "Bio slurry Ultimate Choice of Biofertilizer", 2: 738 doi: 10.4172/scientific reports. Volume 2 • Issue 4.
- Araki, Kazuaki (1994), "A Study on the Development of Land Use System of Dairy Farming in Hokkaido", *Jurnal of Rakuno Gakuen University* 19(1), pp 65-205.
- Asaduzzaman, M., (2000), "Livestock sector, economic development and poverty alleviation in Bangladesh", *Changing rural economy of Bangladesh*, (Bangladesh Economic Association, Dhaka), 42–53
- Ashrafuzzaman, A.K.M. (1995), "Economics of Milk Production: A Study of Two Villages in Shirajganj District", *Bangladesh Academy for Rural Development*, Kotbari, Comilla.
- Bangladesh Bureau of Statistics (BBS), *Statistical Year Book of Bangladesh*, Ministry of Planning, 2008 and various issues.
- BARI (2011), "Annual report, Bangladesh Agricultural Research Institute", Gazipur, Bangladesh.
- Bhuyan, S. (2007), "The 'people' factor in cooperatives: An analysis of members' attitudes and behavior", *Canadian Journal of Agricultural Economics*, 55 (3), pp. 275–298.
- Borgen, S.O. (2001), "Identification as a trust-generating mechanism in cooperatives", *Annals of Public and Cooperative Economics*, 72 (2): 208–228.
- Bravo-Ureta, B.E., and Lee, T.C. (1988), "Socioeconomic and technical characteristics of New England dairy cooperative members and non-members", *Journal of Agricultural Cooperation*, 3, pp. 12–27.

- Burt, L., and Wirth, M.E. (1990), “Assessing the effectiveness of a farm supply cooperative: A comparison of farmer and manager viewpoints”, *Journal of Agricultural Cooperatives*, 5, pp. 17– 26.
- Cain, J.L., Toensmeyer, U.C., and Ramsey, S. (1989), “Cooperative and proprietary firm performance as viewed by their customers”, *Journal of Agricultural Cooperation*, 4, pp. 81–88.
- Carney,D., ed. (1998), “Sustainable rural livelihoods: what contribution can we make?” London:DFID.
- Consoli, M.A & Neves, M.F. (2008), “A Method for Building New Marketing Channels: The Case of “Door-to-Door” in Dairy Products”, *Direct Marketing, an International Journal*, v. 2, n. 3, p. 174-185,.
- DLS (2008), “Annual report on livestock, Division of Livestock Statistics”, Ministry of Fisheries and Livestock, Farmgate, Dhaka, Bangladesh.
- Fahlbeck, E. (2007), “The horizon problem in agricultural cooperatives – only in theory?” In K. Karantininis and J. Nilsson (Eds.) *Vertical markets and cooperative hierarchies* Dordrecht: Springer. pp. 255– 274.
- Ghosh, Ashoke Kumar and Keshav Lall Maharjan (2001), “Development of Dairy Cooperative and Its Impacts on Milk Production and Household Income: A Study on Bangladesh Milk Producers’ Cooperative Union Limited”, *Journal of International Development and Cooperation*. Vol.10. No. 2, 2001, pp. 193-208.
- Gordon E. Groover, “Management Practices on Virginia Dairy Farms”. Department of Agricultural & Applied Economics College of Agriculture and Life Sciences, Blacksburg, Virginia 24061.
- Hemme, T. & Otte, J. (2010), “Status and Prospects for Smallholder Milk Production: A Global Perspective”, Rome: FAO, .6; Trinity College Dublin. 2010. ‘EU dairy policy reform and developing countries’.
- History of Saga Prefectural Land Improvement; Published by *Saga Prefectural Government* in 1994.

- Houque, MM (2013), “The Sustainable Conditions and Support System for Bangladesh Dairy Sector under the Global Competition Structure: Case studies on the main dairy farming areas in Bangladesh”, PhD Thesis. URL: <http://hdl.handle.net/10232/19962>.
- IAASTD, (2007), “Global report: International Assessment of Agricultura Science and Technology for Development” (IAASTD, Washington, DC).
- IDCOL (2011), Infrastructure Development Company Limited, Annual Biogas Users Survey Report.
- J. Nishitani, (1980) “Expansion of Farm Size in dairy Farming on Paddy Field” 29 no. Research Bulletin of Nippon Veterinary and Zoo technical University. Department of Farm Management pp 123-127.
- Japan Dairy Council. <http://jdc.lin.go.jp/> accessed December 15, 2012.
- K. R. Fawz-ul-Haq, Islam Faisal and M. A. Hoque (2003), “Agricultural Biomass Energy for Developing Countries in Asia”, Proceedings International Energy Congress and Exhibition.
- Karim Z (1997), “Agriculture for 21st century in Bangladesh. In: A final draft policy report on National Livestock Development Policy”, Ministry of Fisheries and Livestock, Dhaka, Bangladesh.
- Kotler, P. & Armstrong, G. (1991), *Principles of Marketing*, 5th ed., Tokyo, Prentice Hall.
- Li Feng, Jerker Nilsson. (2011), “The human values behind farmers’ loyalty to their cooperatives”, Paper presented at the 5th international conference on Economics and Management of Networks, December 1 – 3, 2011, in Limassol, Cyprus.
- M.A.Samad AND M.H. Rashid, (2002), “Promotion of Smallholder Dairy Production in Bangladesh”, Proceedings of the Workshop on Alleviating Micronutrient Malnutrition through Agriculture In Bangladesh.
- M.M. Uddin, M.N. Sultana, O.A. Ndambi, T Hemme, K.J. Peters (2010), “A farm economic analysis in different dairy production systems in Bangladesh”, Livestock Research for Rural Development. Volume 22, Article #122.

- McDermott, J.J., et al., (2010), “Sustaining intensification of smallholder livestock systems in the tropics”, *Livestock Science* doi:10.1016/j.livsci.2010.02.014.
- McGahan, A.M. & Porter, M.E. Porter. (1997), “How Much Does Industry Matter, Really?” *Strategic Management Journal*, 18 (Summer Special Issue), pp. 15–30.
- Md. Habib Ullah (2012), “Current Status of Renewable Energy Sector in Bangladesh and a Proposed Grid Connected Hybrid Renewable Energy System”, *International Journal of Advanced Renewable energy Research*, Vol. 1, Issue 11, pp. 618-627.
- Miah M S (2012), “The productive and reproductive performances of dairy cows in Sunamgonj district”. MS. Thesis. Department of Physiology & Pharmacology, Sylhet Agricultural University, Sylhet, Bangladesh.
- Ministry of Agriculture and Fisheries, Statistics Bureau. Annual Report on Agricultural Management survey. Various Issues (1999-2009).
- Ministry of Agriculture and Fisheries, Statistics Department. Agricultural census, Various Issues (1980-2010).
- Ministry of Public Management, Home Affairs, Statistics Bureau. Annual Report on the family income and expenditure survey. Various Issues (1999-2009).
- Misra, S.K., Carley D.H. and Fletcher, S.M. (1993). Dairy farmers’ evaluation of dairy cooperatives. *Agribusiness. An International Journal*, 9 (4), pp. 351–361.
- Miyan HA (1996). Towards sustainable development: The national conservation strategy of Bangladesh. Consultancy report on the livestock sector. Ministry of Environment and Forestry, Dhaka, Bangladesh
- Mohan Munasinghe,( 2009) “Sustainable Development in Practice”, (Page 31-45)
- Munasinghe, M. (2013), Sustainable development triangle. Retrieved from <http://www.eoearth.org/view/article/156365>
- Österberg, P., J. Nilsson and K. Hakelius (in press). “Members’ Perception of their Participation in the Governance of Cooperatives: The Key to Trust and Commitment in Agricultural Cooperatives”.

- Rahaman, M. M and Mian, M.R.U. (1996), “A Socio-economic Study on the Dairy Cooperatives in Bangladesh”. Department of Agriculture Finance, Bangladesh Agriculture University, Mymensingh.
- Roy, Alok (2000), “Milk Marketing under Cooperative Management: A Case Study of the Performance of Some Selected Primary Milk Producers’ Cooperative Societies in Bangladesh.” Proceedings of Annual Conference of the Agriculture Economics Society of Japan. Tokyo, Japan, pp. 286-291.
- Saadullah M. (2001), “Smallholder dairy production and marketing in Bangladesh”, In: Rangnekar D. and Thorpe W. (eds), Smallholder dairy production and marketing—Opportunities and constraints. Proceedings of a South–South workshop held at NDDDB, Anand, India, 13–16 March 2001. NDDDB (National Dairy Development Board), Anand, India, and ILRI (International Livestock Research Institute), Nairobi, Kenya.
- Samdup, Tashi; Udo, H.M.J.; Ibrahim, M.N.M.; ZIIPP, A.J. van der (2010), “A Conceptual Framework to Assess Development of Smallholder Crop-cattle Farming Systems in Bhutan: Sustainable Development or Gross National Happiness?” Journal of the Faculty of Agriculture Shinshu University Vol.46 No.1 • 2 (Page 123-137).
- SAMDUP, Tashi; UDO, H.M.J.; IBRAHIM, M.N.M.; ZIIPP, A.J. van der (2010), “A Conceptual Framework to Assess Development of Smallholder Crop-cattle Farming Systems in Bhutan: Sustainable Development or Gross National Happiness?” Journal of the Faculty of Agriculture SHINSHU UNIVERSITY Vol.46 No.1 • 2 (Page 123-137).
- Scoones, I. (1998), “Sustainable rural livelihoods: a framework for analysis”, IDS working paper, 72. Brighton: IDS.
- Shamsuddin M, Alam MM, Hossein MS, Goodger WJ, Bari FY, Ahmed TU, Hossain MM, Khan AHMSI (2007), “Participatory rural appraisal to identify needs and prospects of market-oriented dairy industries in Bangladesh”, Tropical Animal Health and Production 39:567-581.
- Shitinohe, Chosei (1983),”The Trend and Future of Large Herd Dairy Farms in Hokkaido”, , Agricultural Synthetic Institute, pp 16-50.

- Shuzo Teruoka, (2008), “Agriculture in the modernization of Japan (1850-2000)” translated by Sarah Ham Akamine, published.
- Siddiquee, N.A. & Southwood, R. (2011), “Strengthening the dairy Value Chain in Bangladesh”, Slideshow presented at the Gender and Market Oriented Agriculture (AgriGender 2011) Workshop, Addis Ababa, Ethiopia, 31 January–2 February.
- Simalane, N. (2011), “An assessment of the role of cooperatives in smallholder dairy production and marketing in Swaziland” Msc thesis, Department of Agricultural Economics, Extension and Development, University of Pretoria, Pretoria.
- Sinichi, K. (2011), “Crisis of Dairy farming and Milk Industry: An aspects Japanes Dairy Production”, Tsukuba Shobo.
- Suber, K. (2005), “An introduction to fair trade and cooperatives: A methodology” Overseas Cooperative Development council, United States of America.
- Tatsuo Yamada and Ryoichiro Ohta (1967), “Agricultural History of Saga Prefecture” published by Kinkado.
- Umeda, K. (2007), “Regional System of Japanese Dairy Farming”, KOKON Shoin.
- UNDP (2005) Human Development Reports
- USDA, (2000), Alternative Farm Enterprises –Agritourism Success Stories, “Direct marketing of Dairy products”, USDA National Resource Conservation Service, October.

## Appendix A

### (Questionnaire for Saga Prefecture, Japan)

秘 **酪農家調査票** 世帯主氏名 ( ) 所在地 ( 鎮西町八床 )  
からつ農協・酪農部会 ( ) 支部 役員 ( ) ( ) 年から  
調査日時 年 月 日

#### 農業従事者 家族

続柄	満年齢	最終学校 (研修 なども)	年間 農業従事 日数	主な 仕事内容	農業者年金 加入・受給
世帯主					

あとつぎ予定者が非農業従事もしている場合 (上とダブル場合もある)

あとつぎ 予定者	満年齢	最終学校	勤務先 (会社名)	勤務地	年間 勤務日数	年間 農業従事日数

#### 雇用者 年間雇用者

性別	年齢	出身地	年間 従事日数	給与形態は 月給か 時給月払いか	勤続 年数	主な 仕事内容

パート雇用者

#### ヘルパー利用状況

作業内容 利用日数・時間数 利用の理由 利用ヘルパー数・性別

## 農地の所有と利用

	所有地面積(a)	借地面積(a)	借地の所在 集落内・外	借地の相手の所在 集落内・外	借地の理由
水田					
畑 (うち 上場開発 地面積)					
採草放牧地 (うち上場 開発地)					
果樹園					

## 作付作物

	平成23年産		平成22年産	
	作物名	作付面積(a)	作物名	作付面積(a)
水田	米(食用米)			
	転作・飼料用牧草名 ( )			
	( )			
	転作・飼料用稲			
畑 (うち上場 開発地を 確認)	転作・飼料米			
採草放牧地 (うち上場 開発地を 確認)				
果樹園				

**機械装備状況**（畜舎等の施設は除く）*時間があつたら聞く*

**畜産関係**

スタンチオン	モア
ロープ・つなぎ方式	ロールベアラー
フリーバーン	ラッピングマシーン
バーククリーナー	マニユアスプレッター
ミルクカー	トラクター
パイプライン	
パーラー	ミキサー
バルククーラー	

**稲作関係**

- 耕耘機
- 田植機
- バインダー
- 脱穀機  
(ハーベスター)
- コンバイン
- 乾燥・調製はどうしているか
- 米の利用・販売方法



## 粗飼料調達方法

牧草生産 自家（上述）

他農家の転作分 所在地区 面積 耕作者数

購入粗飼料

### 稲わらの調達先・調達量・調達方法

どこから (市町村・地区名)	どれほど 面積 トン	形態 バラ・稲わらロール ラッピングロール	調達方法 自分で製造・運搬 自分は運搬のみ 運搬も依頼	金額 (万円)
計				

### 稲わらの用途

えさ	敷き料	その他（ ）
トン	トン	トン
稲わら全体量の 約（ ）%	稲わら全体量の 約（ ）%	稲わら全体量の 約（ ）%

### 稲わら収集組織（組合）に参加しているか

参加している その場合、参加している組織（組合）名（ ）

参加していない 組織（組合）代表者名（ ）

**堆肥の生産と流通**

**糞尿の供給先別供給量**（過去1年間）

自家の堆肥舎へ 投入生換算で（ ）トン、それは全体量の約（ ）%に相当  
 副素材の種類と投入量  
 （ ）（ ）トン（ ）（ ）トン  
 （ ）（ ）トン（ ）（ ）トン  
 （ ）堆肥センターへ（ ）トン、それは全体量の約（ ）%に相当  
 堆肥センター名  
 自家の**堆肥舎**は何カ所ありますか（ ）カ所 建物総面積（ ）a・坪・m<sup>2</sup>  
 堆肥舎の構造（ ） 設置年（ ）年  
 設備（自動攪拌機などを設置しているか）

自家の堆肥舎で出来た堆肥の生産量と供給先別供給量

年間生産量 完熟で（ ）トン

供給先別供給量

自家利用 それは全体量の約（ ）%に相当  
 水田（ ）aに（ ）トン あるいは10a当たり（ ）トン  
 畑（作物： ）（ ）aの栽培に（ ）トン あるいは10a当たり（ ）トン  
 畑（作物： ）（ ）aの栽培に（ ）トン あるいは10a当たり（ ）トン  
 畑（作物： ）（ ）aの栽培に（ ）トン あるいは10a当たり（ ）トン  
 その他（地目： ）  
 （作物： ）（ ）aの栽培に（ ）トン あるいは10a当たり（ ）トン

販売・贈与・交換 それは全体量の約（ ）%に相当 交換の場合、何をどれほど

どこへ （供給地区名）	農家か 団体か（団体名）	利用作物名	供給量 （トン）	それは販売か 贈与か交換か （稲藁何トンと）	販売額(万円)
計					

堆肥散布組合に参加しているか（当てはまるほうを○で囲む）

参加している その場合、参加している組織（組合）名（ ）  
 組織（組合）代表者名（ ）  
 参加していない

お宅の農業経営の推移のあらまし (時間があれば聞く)

別紙 (A3)

主な  
出来事 ( 学卒 ) 年  
↓

耕地面積  
田面積  
畑面積  
樹園地面積

主要作物  
米  
麦  
いも  
豆  
ミカン  
葉タバコ

畜産  
飼料用作物

肥育牛  
和牛  
ホル  
F1  
繁殖 (母) 牛  
その他

酪農  
搾乳牛  
育成牛

## 意向調査

### 堆肥について

自家製造堆肥における問題点はあります、あるとしたら何でしょうか

スムーズにいており、問題はない

良質堆肥製造技術の困難性あり  
その内容は何か：

生産コスト問題あり  
その内容は何か：

供給先がなかなか見つからない

運搬費用負担問題  
その内容は：

畜産経営上、堆肥問題は大きい問題ですか、それとももっと大きい問題がありますか

現場から見て、どのような条件が揃えば堆肥の利用促進がはかれると考えますか

### 肉用牛飼養頭数についての今後の意向

堆肥問題とは別に今以上の頭数拡大を考えていますか

考えている 目標頭数 和牛（ ）頭、F1（ ）頭、その他（ ）（ ）頭  
目標年次は（ ）年後ころ

その理由：

頭数拡大よりも肉質向上をめざす

その理由：

頭数拡大も肉質向上も両方をめざす

その理由：

ありがとうございました

## Appendix B

### (Questionnaire for Maulvibazar, Brahmanbaria and Jessore District, Bangladesh)

Name:.....Address:.....

<b>1. Family Members</b>	<b>Working Hours</b>	<b>Age</b>	<b>Educational Level</b>	<b>Remarks</b>

#### **2. General Information:**

(a) Occupation:.....

(b) Dairy Farming Involvement: (i) Main (ii) Side

(c) Have You Received Training: (i) Yes (ii) No

If yes then what types of training have you received? Where have you received?

.....

(d) Land size:.....

(e) Monthly Income:.....

(f) Sources of Fund:.....

#### **3. Description of Farm Households:**

(a) Farm size:.....

(b) Farm Type:.....

(c) Housing system:.....

(d) Feeding System (i)..... (ii) Calf Feeding:.....

#### **4. Description of cows:**

##### **(i) Number of Cows:**

(a) Total Cows:..... (i) Indigenous:..... (ii) crossbred:.....

- (b) Milch Cows:..... (c) Dry cows:..... (d) Pregnant Cows:.....  
 (e) Heifer:..... (f) Yearling Bull:..... (g) Bull Calf:.....  
 (h) Heifer Calf:.....

**(ii) Breeding Methods:** .....

**(iii) Milk Production:**.....

**(iv) Cost:**.....

**5. Grass Cultivation:**

- (a) Land area:.....  
 (b) Types of Roughage:.....  
 (c) Problems of grass cultivation:.....  
 (d) How do you feed?.....

**6. Overall Management practices:**

- (i) Milking cows:** a) Hygienically b) Unhygienically  
**(ii) Milking system:** a) Bucket b) Pipeline c) Parlour d) Others  
**(iii) Water:** a) Supply b) Tube-well c) Pond d) Others  
**(iv) Cleaning System:**  
**(v) Preventive Register:** a) Yes b) No

If yes.....

- (vi) Disposal of Manure:** a) giving to others b) Sold out c) As fertilizer c) Fuel

**(vii) Treatment of Sick cows:**.....

**(viii) Vaccination:** .....

**(ix) Storage of Milk:**.....

**(x) Place of Selling Milk:**.....

**7. Impact of dairy farming on community Development**

**(a) Perception on vulnerability reduction in small farmer's economy:**

- |   |     |    |
|---|-----|----|
| (i) Live stock rearing reduces vulnerability                        | Yes | No |
| (ii) Dairy provides sustainable livelihoods                         | Yes | No |
| (iii) Dairy based families faces stresses and shocks                | Yes | No |
| (iv) Integrated farming only provides sustainable rural livelihoods | Yes | No |

**(b) Response on impact of dairy farming on social development**

- |                                 |           |           |
|---------------------------------|-----------|-----------|
| i) School dropouts/ child labor | Decreased | Increased |
| ii) Infant Mortality            | Decreased | Increased |
| iii) Malnutrition               | Decreased | Increased |

iv)	Indebtedness	Decreased	Increased
v)	Alcoholism	Decreased	Increased
vi)	Domestic Violence	Decreased	Increased
vii)	Interaction with Government and Bank Officials	Decreased	Increased
viii)	Family Planning	Decreased	Increased
ix)	Sanitation	Decreased	Increased
x)	Adult Education	Decreased	Increased
xi)	Housing	Decreased	Increased
xii)	Assets Purchased	Decreased	Increased
xiii)	Participation in Village Activities	Decreased	Increased
xiv)	Recreation	Decreased	Increased
xv)	Rest time	Decreased	Increased

**Comments:**

.....  
.....  
.....  
.....  
.....

**Problems:**

.....  
.....  
.....  
.....  
.....

**Prospects:**

.....  
.....  
.....  
.....  
.....

## Appendix C

(Questionnaire for Dairy Cooperative, Sirajganj District, Bangladesh )

### Sustainability of Dairy farms focusing on Production and Marketing as or not as a member of Dairy Co-operative in Bangladesh

#### A. General Information

Name of the Farmer.....  
 Date of Interview:.....  
 Location of the Farm: 1. Rural  2. Urban  3. Pri-Urban   
 Area name:.....  
 Member of dairy co-operative: Yes  No   
 If Yes, name of co-operative.....

#### B. Household Characteristics

1. Gender of Farmer: Male  Female   
 2. Age (Years): 20-30  31-40  41-50  51-60  >60   
 3. Education Level (Years) No Formal Education  Primary Education   
     Secondary Education  HSC   
     Above HSC   
 4. Household Size (No of family Members):.....  
 5. Number of Adults (>18 Years): Working on the Farm ..... Off the Farm .....  
     Total .....  
 6. Number of Children (<18 years) Working on the Farm ..... Total .....  
 7. Dairy Herd Size: 1. Indigenous  2. Crossbreed   
 8. Dairy Farming Experience (Years): < 5  5-10  > 10   
 9. Main Source of Income:  
     1. Dairy  2. Other agricultural activities  3. Off-Farm employment   
     4. Remittances  5. Pension  6. Others   
 10. Type of Assets in the Farm:

Sl. No	Type of Asset	Initial Cost	Estimated Useful Life	Current Value
1	Dairy Cows 1. Indigenous <input type="checkbox"/> 2. Crossbreed <input type="checkbox"/>			
2	House for cows			
3	Others			

**A. Farm Inputs**

**1. Non Labor Inputs:**

Type of Input	Quantities Used	Unit Cost	Total Cost / Month
Feed: Green Grass Rice Straw Concentrates Other Feeds			
Breeding: AI Bulls			
Veterinary cost			
Electricity Cost(Farm)			
Water			
Other			

**2. Labor Input**

Sl.N.	Activity	Hours of work		Unit Cost		Total Cost
		Family	Hired	Family	Hired	
1	Milking					
2	Feeding					
3	Cleaning of the farm					
4	Marketing of Milk					
5	Transporting of Milk					
6	Animals Care					
7	Calves Care					
8	Cleaning of Dairy Cattle					
9	Manure Processing					

**B. Production**

Cows	Total Cows	Lactating cows	Avg. Milk Yield		Avg. Milk Sold		Avg. Consumed (L)
			Day(L)	Month (L)	Day(L)	Month (L)	
Indigenous							
Crossbreed							
1.....							
2.....							
3.....							
4.....							
Total							

**C. Dairy Marketing Activities**

a. Where do you sell your Milk?

i. Co-operative  ii. Farm gate  iii. Traders  iv. Local Markets

v. Do not sell  vi. Direct Customer  vii. Other

b. Reasons for selling to this channel

i. Close to Farm  ii. Better price  iii. Can get immediate cash

v. Collection centre is close  vi. Other (specify).....

c. Distance Travelled to Market (km): < 5  5-10  10-15   
> 15

d. Are you satisfied with the marketing channel? Yes  No

e. If not satisfied, why?

.....  
.....

f. quantity of Milk sold per day

Selling Channel	Sold / Day (L)	Price/ Litre	Money Received/ Week or Day	Money Received/ Month
Co-operative				
Traders				
Farm gate				
Local Markets				
Direct Customer				
Other				

### A. Transport

a. How do you transport your Milk to the market?

- i. Public Transport  ii. Own Transport  iii. On foot  iv. Ox Cart   
v. Hired car  vi. Bi-cycle  vii. Other

b. How much does it cost to use the mode of transportation you have mentioned?

.....

c. Major constraints in relation to transport of your produced milk to the market?

- i. Expensive  ii. Poor roads  iii. Long Distances   
iv. Other (specify).....

### B. GOOD MANAGEMENT AND FARM PRACTICE

#### 1. Milking System

- i. Manual by own  ii. Manual by employee  iii. Manual by others

#### 2. Feeding System

- i. Stall feeding  ii. Grazing  iii. Both

Types of Grazing

- i. Communal  ii. Private  iii. Zero

Please indicate the type of feed given to the dairy cattle:

Sl. No.	Type of Dairy cattle	Types of feed	Season
1	Lactating		
2	Pregnant		
3	On dry period		
4	Calves		

### 1. Pasture establishment and management

- a. Do you have planted pasture? Yes  No
- b. Area of pasture?.....
- c. Do you sell fodder and how much and Price?.....
- d. Rice production area?.....
- e. Vegetable production area?.....

### 2. Milk handling and hygiene

- a. Are there any quality control measure taken to ensure milk quality?  
.....
- b. How much and what cost incur in applying to quality control measures?  
.....
- c. What are the problems encountered in ensuring milk quality?  
i. Expensive  ii. Poor milking utensils  iii. Lack of traini   
iv. Other (specify).....
- d. Is record keeping practised on the farm? Yes  No
- e. If yes, which type of records are kept and why?  
i. Milk Production  ii. Inputs used and costs  Marketed Milk   
iv. Income  vi. Other (specify).....
- f. Is there a health management practised on the farm? Yes  No
- g. Please state the type of disease, control and cost for each disease:

Sl. No.	Type of Disease	Season	Control	Cost/Cattle
1				
2				
3				
4				
5				

### 3. Water sources

- a. Which source of water do you use?  
i. Rivers and Streams  ii. Piped Water  iii. Borehole   
iv. Other.....

### 4. Milk Losses

- a. Do you incur any milk losses? i. Yes  ii. No

- a. If yes, how much do you lose per week (L)? 1. < 5  2. 5-10  3. > 10
- b. Why the milk losses incur?
1. Long Distance to Market  2. Poor Milk Handling
3. Lack of chilling Facilities  4. Minimum Market opportunities
5. Other.....
- c. How do you deal with spoiled milk?
1. Used for home consumption  2. Fed to Calves
3. Make sour milk  4. Given to neighbour
5. Other.....

**A. Household Income**

Sources of Income	Amount per Month	Total Amount
Milk Sales		
Cattle Sales		
Off Farm employment		
Remittances		
Other Agricultural Activities		

**B. Provision of services**

**A. Training**

- a. Have you ever participated in dairy production for the past three years?
1. Yes  2. No

- b. If the answer is no, what are the reasons?

- 1.....
- 2.....
- 3.....

- c. If yes, specify the type of training and organization of the training:

Types of Training	Duration	Organization
Proper Milking and hygienic milk Handling		
Record Keeping		
Milk Marketing		
Dairy Death		
General farm Management		
Pasture establishment and management		
Dairy Cattle Feeding		
Heat Detection		
other		

- d. Has the training been helpful in gaining knowledge and skills to solve your practical problems Related to Dairy Production and Marketing? 1. Yes  2. No

If no, why.....

.....  
 .....  
 a. What is your source of market price information?

1. Extension officer  2. NGO   
 3. Radio/TV  4. Newspaper   
 5. Co-operative  6. Other.....

**A. Extension Service**

- a. Do you have an extension officer in this area? 1. Yes  2. No   
 b. How many times does he visit in a month? 1. < 3  2. 3-5  3. 5-10   
 4. > 10  5. Not at all   
 c. Have the visits helpful? 1. Yes  2. No   
 d. If Yes, how?.....  
 .....  
 .....

**B. Support Provided**

Support Provided	Types of support									
	1	2	3	4	5	6	7	8	9	10
1. Government Veterinary Officer										
2. NGOs										
3. Co-operative										
4. MOA										
5. Microfinance Institutions _____										
6. Others										

1. Training, 2. Advisory Services, 3. Credit Provision, 4. Provision of AI services, 5. Provision of bull services, 6. Veterinary Services, 7. Concentrated Feed, 8. Fodder seed, 9. Breeding, 10. Other (specify).....

**Constraints in dairy Production and Marketing**

Production Constraints	√	Marketing constraints	√
Lack of grazing land		Distance of Milk collection centre	
Inadequate water supply		Lack of access to adequate Market	
Inadequate feed		Inadequacy of labor to transport Milk	
Prevalence of disease		Spoilage of Milk during Transportation	
Dairy cattle procurement		Inadequate Market Information	
Poor veterinary services		Inadequate infrastructure development	
Other			

**Suggestions on improving dairy production and marketing**

Sl.N	Improving production	Improving marketing
1		
2		
3		
4		
5		
6		
7		

Why you are not being a co-operative member:

Specify some reasons:

.....  
 .....  
 .....  
 .....

**Co-operative Members**

Membership of the dairy marketing co-operatives and benefits obtained

a. What were the main reasons motivating you to be a member of the dairy co-operatives?

- 1. To get secured market for the milk
- 2. To get dairy inputs timely and with fair price
- 3. To get dividends from the co-operative
- 4. To get education, training and advisory services from the co-operatives
- 5. To gain access to credit
- 6. Others specify.....

b. How long have you sold milk to the co-operative?

- 1. Less than a year  2. 1-2 years
- 3. 2-3 years  4. Greater than 3 years

**Benefits of being a co-operative Member**

a. Ways in which co-operative being helpful to you?

- i. Marketing of milk  ii. Provision of inputs  iii. Procurement of cows
- iv. Veterinary services  v. extension services  vi. AI services
- vii. Access to credit  viii. Improvement in Milk Quality  ix. Training
- x. Other specify.....

b. Are there any change since you have been marketing of your milk through a co-operative?

- i. Production Level  ii. Income

Please explain.....

c. Do you think being a member of a co-operative is more advantageous than being on your own? 1. Yes  2. No

- a. Please Explain why?.....  
 .....  
 .....
- b. As a member of the dairy co-operative have you gained any new information?  
 1. Technology .....  
 2. Price and Marketing.....  
 3. Production, milk Handling and Good Farm Management Practices.....  
 .....
- c. Do you believe that the dairy co-operative is doing good job in solving problems that facing by farmers? 1. Yes  2. No
- d. If no, What are the major problems that are not being solved by dairy co-operative in your area?  
 1. Lack of adequate milk collection centres near to farm   
 2. Lack of adequate dairy inputs for members   
 3. Lack of access to necessary services   
 4. Lack of chilling facilities to preserve milk   
 5. Lack of support services   
 6. High Transportation Cost   
 7. Others specify.....

**Governance of co-operatives**

- a. Are you satisfied with co-operative leadership? 1. Yes 2. No  
 Please explain.....  
 .....
- b. Are leaders selected through voting of members? 1. Yes 2. No
- c. Are you satisfied with the way of elections held? 1. Yes 2. No  
 Please explain.....
- d. Are the leaders accountable? 1. Yes 2. No
- e. Are you satisfied with member participation in decision making?  
 1. Yes 2. No
- f. What are the main problems the co-operative facing now?

<b>Problem</b>	<b>Very Important</b>	<b>Important</b>	<b>Less Important</b>

- g. Do you wish to continue be a member of dairy co-operative? 1. Yes  2. No
- h. Why/ why not?.....  
 .....  
 .....

**Thank You very much for your co-operation**

\_\_\_\_\_

\_\_\_\_\_