

MASTER'S THESIS

to achieve the degree of
"Master in Agriculture Production Chain Management"
Specialization Livestock Chains

**"Enhancing Milk Procurement of Warana Co operative Milk
Union Ltd (WCOMUL) in Warana valley in Maharashtra state
(India)"**

Presented by
Jitendra Lembhe
September, 2010

A Research project submitted to,



Van Hall Larenstein University of Applied Sciences
Wageningen, The Netherlands

© copyright Jitendra Lembhe, 2010. All rights reserved

PERMISSION TO USE

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

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

Director of Research
Larenstein University of Applied Sciences
P.O. Box 411
6700 AK, Wageningen
The Netherlands
Fax: 0031 26 3615287

Acknowledgement

I am very much thankful to the Government of Netherlands (NUFFIC) and Larenstein University of Applied Sciences for providing me financial assistance to pursue Master's Degree in this renowned institute. I would like to acknowledge with warm gratitude to my respected supervisor and course coordinator Mr.Marco Verschuur for his guidance and constructive suggestions, inspiration and insights throughout the course work in writing this thesis report. Your kind-full guidance and suggestions have contributed immensely to making piece what it is. I would like to extend my heartfelt thank to all the lecturers of the Van Hall Larenstein University specially Mr.Johan meinderts, Dr.Marcel Put, Dr. Adnan Koucher for their intellectual support from the very beginning on the behalf of this study.

I am also thankful to Dr.J. B. Patil for his support and encouragement for doing this study. I would like to sincere thank to all the staffs of WCOMUL specially my friend Mr.Satishkumar Shinde and members of Village Cooperative as well as informal talk with other people in the district for contributing their valuable time and support to collect data. I also like to give special thanks to my friend Vijay Nashte for giving me support in data collection and sharing his experiences with me.

It is also hearty indebted to my innocent mother Surekha Lembhe, and younger brother Jogendra for their tremendous support and multi encouragement since a long period of time. My warmest regards is to my uncle Narayanrao Nikam who always encouraged me to have further education.

I am indebted to my wife Rupali Lembhe together with my lovely son Atharv for their love, concern and understanding and particularly for taking charge of responsibility in my absence.

And at the last to my father Vinayakrao Lembhe and uncle Vasantrao Lembhe for providing me encouragement.

There are many more people who have supported in diverse ways, but for space have not been mentioned. I am grateful to you all.

September, 2010.
Wageningen
The Netherlands.

Table of Contents

Chapter 1: Introduction.....	1
1.1 Introduction.....	1
1.2 Background	2
1.3 Research Problem	3
1.4 Research Hypothesis.....	3
1.5 Objective.....	3
1.6 Research questions	3
1.7 Research Methodology	3
1.7.1 Data Collection	4
1.7.2 Selection of Villages	4
1.7.3 Survey of VCs to Collect Milk Procurement Data.....	5
1.7.4 Survey of MPs to Collect Milk Production Data:.....	5
1.7.5 Interviews with checklist for Collecting Qualitative Data:.....	5
1.7.6 Analysis of Data:	6
Chapter 2: Review of literature.....	7
2.1 Concept of Value Chain in Warana Valley	7
2.2 Milk Production	7
2.3 Milk Procurement and Quality:	9
Chapter 3: Result	12
3.1 Dairy Subsector in Warana Valley:.....	12
3.2 WCOMUL Dairy Chain.....	13
3.2.1 Input Supplier	13
3.2.2 Milk Producers	13
3.2.3 Village Cooperatives	13
3.2.4 WCOMUL.....	13
3.2.5 Wholesaler	14
3.2.6 Retailer.....	15

3.2.7 Consumers.....	15
3.2.8 Supporters and Influencers	15
3.3 Milk Procurement at VC level in Warana Valley	15
3.3.1 Trend in Milk Procurement	15
3.3.2 Alternative Milk Marketing Channels for VC and MP	16
3.3.3 Causes of Decreased Milk Procurement	16
3.3.4 Factors Responsible for Switching of VCs and MPs	18
3.3.5 Milk Production in Warana Valley	21
3.3.6 Causes of Decreased milk production	22
3.3.7 Milk Procurement Strategy	25
Chapter 4: Discussion	27
4.1 Dairy Sub sector in Warana Valley.....	27
4.2 Milk Procurement at VC level in Warana Valley	27
4.2.1 Trend in Milk Procurement	27
4.2.2 Reasons of Decreased Milk Procurement of WCOMUL.....	28
4.2.3 Factors Responsible for Switching of VCs towards other Competitors.....	28
4.3 Milk Production in Warana Valley at MP level	30
4.3.1 Trend in Milk Production.....	30
4.3.2 Causes of Decreasing Milk Production	30
4.4 Procurement Strategy	31
Chapter 5: Conclusion and Recommendations	33
5.1 Conclusion.....	33
5.1.1 Dairy Sub Sector in Valley	33
5.1.2 Milk Procurement at VC level in the Valley	33
5.1.3 Milk Production at Milk Producer Level.....	33
5.1.4 Procurement Strategy.....	33
5.2 Recommendations.....	34
5.2.1 For Milk Union	34

5.2.2 For Village Cooperatives	34
5.2.3 For Milk Producers	34
References.....	35
Annex 1 Map of India	37
Annex 2 Map of Maharashtra.....	38
Annex 3 Questionnaires	39
3.1 Questionnaire for Village Co-operative	39
3.2 Questionnaire for Milk Producer.....	42
3.3 Checklist for Interview with Milk Procurement manager/supervisor of competitors	46

List of Tables

Table 1: Survey of VC through structured questionnaire.....	5
Table 2: Survey of Milk Producers through structured questionnaire.....	5
Table 3: Interviews with checklist.....	6
Table 4: Summary of information/data and its source.....	6
Table 5: Basic Milk and Bonus Milk Prices of Different MUs in Warana Valley.....	18
Table 6: Costs of Veterinary and A. I. Services.....	19
Table 7: Inputs and their price provided by different Milk Unions.....	20
Table 8: Subsidies for Animal Purchase and Rate of Interest from Different MUs	21
Table 9: Breed Composition with Average No. of Animals per Household.....	23
Table 10: Cost Price Analysis of Milk in 2005 and 2009.....	25

List of Figures

Figure 1 Location of Warana Milk Union.....	4
Figure: 2 Research Area	7
Figure 3: Milk Procurement Factors.....	11
Figure 4: Milk Production Factors	11
Figure: 5 Cooperative and Private Dairy Chains in Warana Valley	12
Figure: 6 WCOMUL Dairy Chain	14
Figure: 7 Trend of Milk Procurement at VC level in Sample Villages (Source Survey)	15
Figure: 8 Trend in Total Milk Procurement in Sample Villages in the Valley (Source Survey Data)	16
Figure: 9 Switching of Old and Newly Formed Village Cooperatives towards Other Competitors.....	17
Figure: 10 Switching of number of MPs towards New Competitors.....	17
Figure: 11 Number of Times Milk Rejection per VC per Year	19
Figure: 12 Farming System in Warana Valley.....	21
Figure: 13 Trend in Milk Production at Milk Producer level	22
Figure 14: Rise in Average Milk Prices (Source Field Survey)	23
Figure 15: Rise in Prices of Fodder and Concentrate (Source Field Survey)	24
Figure 16: Comparison between Average Milk and Cost Price of Production	25

Abbreviations

CMU	: Cooperative Milk Union
ECMU No. 1	: Existing Competitor Milk Union No.1 (Gokul Milk Union, Kolhapur)
ECMU No. 2	: Existing Competitor Milk Union No. 2 (Rajaram Bapu Milk Union, Islampur)
ECMU	: Existing Competitor Milk Union
FAO	: Food and Agriculture Organization
Gol	: Government of India
MF	: Milk Fat
MoA	: Ministry of Agriculture
MoC	: Ministry of Commerce
MP	: Milk Producer
MSCMMF	: Maharashtra State Cooperative Milk Marketing Federation
MU	: Milk Union
Murrha	: Buffalo Breed
NCMU No.1	: New Competitor Milk Union No.1 (Prachiti Milk Union, Shirala)
NCMU	: New Competitor Milk Union
NCMU No.2	: New Competitor Milk Union No.2 (Siddhart Private Milk Union)
ND	: Non Descript
NDDB	: National Dairy Development Board
SMP	: Skim Milk Powder
SNF	: Solid Not Fat
VC	: Village Cooperative
WCOMUL	: Warana Cooperative Milk Union Limited
WFP	: World Food Programme
WMP	: Whole Milk Powder

Abstract

The study was conducted to review the situation of milk procurement and production in Warana Valley with objective to study causes and factors of decreased milk procurement of Warana Cooperative Milk Union Limited (WCOMUL) during last five years and to make recommendations for formulating milk procurement strategy of WCOMUL. The survey was carried out for the 60 Village Cooperatives (VCs) and 50 Milk Producers (MPs) to investigate the causes and factors that affect the milk procurement and production in the Warana Valley. Out of total 60 VCs, 30 VCs belonging to WCOMUL, 30 VCs belonging to Competitor Milk Unions and 25 MPs belonging to WCOMUL, 25 MPs belonging to Competitor Milk Unions were selected for the survey. The semi structured interviews of Assistant Milk Procurement Managers of four Competitor Milk Unions were carried out to collect the qualitative information about procurement strategies. The result of the study show that there is trend of declining milk procurement in the Valley but procurement of WCOMUL has dropped tremendously by 34% because of decreased milk production per animal and switching of VCs of WCOMUL towards other competitors mostly new competitors (80%) and existing competitors (20%). The switching of VCs is due to various factors like high frequency of rejection of milk of VCs by WCOMUL, force to buy low quality concentrate for VCs by WCOMUL, unsuitable time of milk collection especially in village at long distance, facility of interest free loan and subsidy for purchase of dairy animals by other Competitor Milk Unions in the Valley. The milk production per animal is also decreased by 25% and factors of decreased milk production are high rise in prices of concentrate and fodder during last five years leading to high rise of cost price of per liter of milk. Another factor is low quality of crop residues like sugarcane top and leaves, wheat, rice, soybean and groundnut straws which are fed to the animals as a fodder due to less land under fodder cultivation because of low land holding (1.48 ha per household with average no. of 5 animals per household). The procurement strategy of WCOMUL is to supplement its requirement by purchasing milk from other MUs in Maharashtra and neighboring Karnataka state. The strategy of one existing Milk Union is to increase procurement by enhancing milk production of existing dairy animals while other existing MUs strategy is to expand area of procurement in other parts of district. Both New competitors strategy is to expand area of procurement in Warana Valley and to attract VCs and MPs of other MUs. So the recommendations for WCOMUL are offering extra incentive for quality milk to the MPs, improve quality of concentrate with no force of buying and at reasonable rate, prepare and implement special plan of milk quality for members of VCs and MPs, establish BMC at village level for easy procurement and improving quality, provide fodder at low rate and low interest or interest free loan for animal purchase and take initiative to start cooperative dairy farms at village cooperative level.

Chapter 1: Introduction

1.1 Introduction

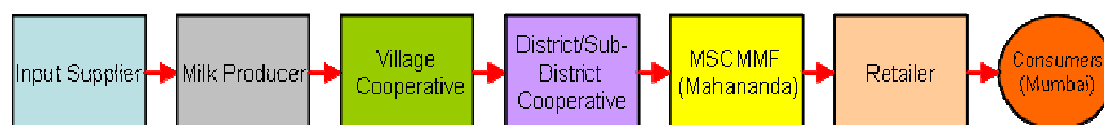
India has become the world's No. one milk producing country with output of 104.8 million tons in 2007-08 with the annual rate of growth of 4% against world's at 1 % (MoA, 2009) The rapid growth and modernization of Indian dairy sector is largely due to contribution of dairy co operatives under operation flood program assisted by many multi lateral agencies like EU, World Bank, FAO, WFP (World Food Program). In Indian contest of poverty and malnutrition milk has a special role to play for its many nutritional advantages as well as providing supplementary income to 70 million farmers in over 500 000 villages (Dairy India,1997).

Maharashtra state ranks sixth in milk production in India with 7.4 million tons in 2008-09. The per capita availability of milk in Maharashtra is 188 gm in 2008-09 as against 258 gm at national level (NDDB, 2009).

In India dairy co operative have three level structures as primary village co operative, district cooperative and state cooperative milk marketing federation. The role of village co operative is to collect milk from small scale milk producers and role of district co operative is to procure that milk, process it and make products. The state marketing federation is responsible for marketing of that processed milk and milk products by it one brand name.

The dairy cooperative account the major share of processed liquid milk marketed in the country. The milk is processed and marketed by 170 Milk Producers' District Co operative Unions, which federate into 15 State Cooperative Milk Marketing Federations.

In Maharashtra state, there are 43 district and regional Cooperative Milk Unions. The milk procured by those Milk Unions is sold by Maharashtra State Cooperative Milk Marketing Federation (MSCMMF) on its one brand name "Mahananda" in Mumbai market (NDDB 2009) but there are many District and Sub-district Milk Unions sell their milk on their own brand name only in Maharashtra not in other states of India. In general the cooperative dairy chain in Maharashtra state is as follow.



The Warana Cooperative Milk Union Ltd (WCOMUL) is one of large District Dairy Cooperative in Maharashtra state established in 1968 in Warana Valley which is basically known for sugarcane production. Initially WCOMUL started procuring milk from 52 villages in the Valley, area later on expanded to 110 villages in the Valley which covers three sub districts of Sangli district and four sub districts of Kolhapur district. There are four more Milk Unions (MUs), two old and two new are also functioning in the same area. This Valley covers 110 villages along the bank of river Warana around 100 km from the origin to the end of river Warana where it unites with another big river Krishna which is the study area of this research. Initially milk was sent to the Government dairy for further processing but in 1984 WCOMUL decided to process the milk and sell in market on own brand name as "Warana"

1.2 Background

The main goal of formation of WCOMUL was socio economic development of milk producers in Warana valley by facilitating milk production and procurement from this particular valley on priority basis. The WCOMUL is marketing more milk products than fluid milk and because of good quality; there is high demand for Warana milk products in Mumbai, Maharashtra and Goa market. Warana Shrikhand is the largest selling brand of Shrikhand in India. The export of SMP, Tetra packs milk, Butter, Ghee and Cheese is increasing every year. There are new orders received for tetra pack milk from Uganda and Singapore. The WCOMUL is also supplying tetra pack milk and milk products to Indian Army, Indian Railway, Multinational Company Cadbury India Limited and some pharmaceutical companies. In 2008-09 WCOMUL has supplied 2.2 million liters of milk, 1000 tone WMP and 266 tones butter to Indian Army. (WCOMUL Annual Report 2009) This increasing demand from high profile customers states that quality of milk and milk products of WCOMUL is high.

The WCOMUL still want to keep this valley high on its agenda as part of its strategic policy because of high milk quality and low procurement cost and as a social responsibility as this MU is owned by the MPs in this Valley. The milk from this valley is of high quality in terms of butter fat and SNF (Solid Not Fat) and bacteriological quality. This is because various awareness programs about quality milk production are being implemented by WCOMUL in last three decades. The WCOMUL have been implementing programs like training of farmers on Productivity Enhancement, Clean Milk Production, and Mastitis Control leading to improvement in quality of milk (bacterial) in the valley. Traditionally the quality of milk in Warana valley is also of high value because of geography and climate. The cost of procurement of milk from this valley is also low due to short distance from WCOMUL. But the milk procurement of WCOMUL from Warana valley has decreased for last five years.

The milk producers in the valley are of small scale subsistence farmers with very low land holding (<2ha) and raising their livestock 3-5 animals either cattle or buffalo mainly on low quality crop residues like sugarcane tops, rice straw and wheat straw. The sugarcane tops are mainly feed to the animals during the period of six months of running the sugar factory and during rest of the period sugarcane leaves are feed to the animals.

WCOMUL is buying milk directly from other small Milk Unions in Maharashtra and neighboring Karnataka state to fulfill the market demand but the quality is not up to standard in terms of fat, SNF and bacterial quality. The milk required for making products needs high quality milk but there is no direct control of WCOMUL on quality of that milk received from other Milk Unions. The WCOMUL cannot rely on such milk purchased from outside sources as it may spoil the product quality and brand name of Warana in the market.

Because of high quality of milk in the Valley, there is high competition for procurement in the Valley. There are already two Existing Competitor Milk Unions (ECMUs) Gokul and Rajarambapu in the Valley and two New Competitor Milk Unions (NCMUs) Prachiti and Siddhart have entered in 2007.

1.3 Research Problem

The customer's increase of demand for quality milk products and increasing export market of WCOMUL has increased the requirement of quality milk for WCOMUL from Warana Valley but the milk procurement from Valley has decreased for last five years.

1.4 Research Hypothesis

1. The milk production at milk producer level is decreased.
2. The village cooperatives might have been switched towards other dairy competitors entered in the valley.

1.5 Objective

To give recommendations for formulating suitable milk procurement strategy of WCOMUL for increasing milk procurement from Warana Valley in future by studying factors responsible for decreased milk production and procurement.

1.6 Research questions

Ques.1. What is the structure of milk subsector in the Warana Valley?

- a. What are the different dairy chains in the Warana Valley?
- b. What is the role of different stakeholders in WCOMUL dairy chain?

Ques.2. What is the status of milk production and procurement of WCOMUL & other competitors in the Warana Valley area?

- a. What is the trend in milk procurement in the Valley at village cooperative level for the last five years?
- b. What is the trend in milk production in the Valley at milk producer level for last five years?
- c. Which are the alternative marketing channels for milk producers and village cooperatives to supply their milk?
- d. What are the critical factors responsible for decrease/increase in milk procurement and production in the Warana Valley?

Ques.3. What are the milk procurement strategies of different Milk Unions in Warana Valley area?

- a. What is the milk procurement strategy of WCOMUL for last five years?
- b. What is the milk procurement strategy of other competitors in the Warana Valley area?

1.7 Research Methodology

The type of research was of desk study and field study. The research has followed both qualitative and quantitative approach. The desk study was done from secondary data and field study was done from primary data. The field study was done at three levels that is survey of MPs for collecting quantitative data of milk production, survey of VCs for collecting quantitative data of milk procurement and semi structured interview of members of competitor MUs for collecting qualitative data. The survey of MPs and VCs was done through structured questionnaire and case study by interviewing of members of MUs using checklist.

1.7.1 Data Collection

The quantitative data was collected through survey by designing structured questionnaire for MPs and VCs.

The qualitative research was done through case study in which interviews with checklist was conducted with four Assistant Milk Procurement Managers of all competitor Milk Unions.

The secondary data was collected from different sources like Journals, Annual reports of WCOMUL, other MUs and VCs, District Dairy Development Department and National Dairy Development Board (NDDB).

1.7.2 Selection of Villages

The totals of 12 villages were selected out of 110 villages in the Warana Valley (See Figure1) which is around 10% of all villages in the Valley. Of which 6 from each side of river, four from hilly area and eight from plane area as milk is more from plane area. Six villages of small size having less than 400 MPs and six villages having more than 400 MPs were included in the sample to make it more representative. The data was collected from all the village co-operatives and 50 MPs in those 12 villages.



Figure 1 Location of Warana Milk Union

1.7.3 Survey of VCs to Collect Milk Procurement Data

The total 60 VCs (16% of total number of VCs) in those 12 villages were selected to collect the milk procurement data as there are 370 VCs from 110 villages supplying milk to WCOMUL.

The village cooperatives were categorized into two categories those supplying milk to WCOMUL and those not supplying milk to WCOMUL. The village co operatives were also categorized on the basis of size as large size (>500liters milk/d) and small size (<500 liters milk/d) so as to involve all types of sample (See Table 1).

Table 1: Survey of VC through structured questionnaire

Group	Small size cooperatives	Large size cooperatives
Supplying milk to WCOMUL	24	06
Not supplying to WCOMUL	24	06
Total	48	12

30 samples were collected from first group of VCs supplying milk to WCOMUL and 30 samples were collected from second group of VCs those supplying milk to other competitors. From total 60 VCs the 48 were small size and 12 were of large size (See Table1) as small size VCs are more in number than large size.

1.7.4 Survey of MPs to Collect Milk Production Data:

The data of 50 samples of milk producers from those 12 villages was collected to study milk production level in those villages. Initially 60 MPs one from each VC was selected but because of time limits it was decreased to 50. The milk producers were categorized in two main groups. Each group of 25 milk producers supplying milk to WCOMUL and not supplying milk to WCOMUL were selected. The MP were further categorized in to three categorizes A. Small Size MPs (1-4 dairy animals) B. Medium Size MPs (5-8 dairy animals) C. Large Size MPs (>8 dairy animals) See Table 2.

Table 2: Survey of Milk Producers through structured questionnaire

Group	Small Size	Medium Size	Large Size	Total
Supplying Milk To WCOMUL	15	8	2	25
Not Supplying Milk To WCOMUL	15	7	3	25

1.7.5 Interviews with checklist for Collecting Qualitative Data:

In case study, the Assistant Milk Procurement Managers of two existing competitors Gokul and Rajarambapu and two new competitors Prachiti and Siddhart were interviewed (See Table 3). To get reliable information from members of village cooperative of other competitors, proper coordination with competitors was made.

Table 3: Interviews with checklist

Group	No
Assistant Milk Procurement Managers of two new competitors (one each)	2
Assistant Milk Procurement Managers of two existing competitors (one each)	2
Total	4

To carry out survey of VCs and MPs the help of my colleague working in other Milk Unions was taken to convince the members of VC and MPs to get proper information.

1.7.6 Analysis of Data:

The collected data was presented in tabular form for analysis in excel by using mean, bar chart, percentage and tables.

The information and or data collected from different sources were used to get the answer of all research questions. The following table shows the type of information and its source.

Table 4: Summary of information/data and its source:

Res.sub question	Information/Data	Source of Data/Information
1 a	Dairy Sub Sector in Warana Valley	Semi structured interview & Secondary data
1 b	Role of stake holders of WCOMUL	Semi structured interview & Secondary data
2 a	Trend in Milk Procurement at VC level	Survey of VCs
2 b	Trend in Milk Production at MP level	Survey of MPs
2 c	Alternative Channels of Marketing	Survey of MP and VC
2 d	Factors of Milk Procurement and Production	Survey of VCs and MPs
3 a	Procurement Strategy of WCOMUL	First hand info. & Secondary data
3 b	Procurement strategy of other Competitors	Semi structured Interview & Secondary data

Chapter 2: Review of literature

2.1 Concept of Value Chain in Warana Valley

The small holder milk producers were unable to sell their surplus milk in urban market. Milk from peri urban area was sold in urban market by middleman who was making profit from it but fair share was not given to the milk producer. The milk producers at long distance and remote areas like Warana Valley were unable to sell their milk in that market. But with development of dairy cooperative chains those milk producers got guaranteed market and fair prices for their milk. These cooperative dairy chains have established well organized structure in which each actor has its own role and all the actors get their fair value share. In this way the concept of value chain came into practice in Warana Valley. The WCOMUL along with four other competitors is functioning in Warana Valley. Being a good brand name in domestic and export market demand of quality milk from this Valley by WCOMUL increased but milk procurement of WCOMUL has been decreased during last five years. To study the causes of this decreasing procurement research was done at three levels in the chain by survey and interviews with checklist. The research area was at MP, VC and MU level (See Figure 2).

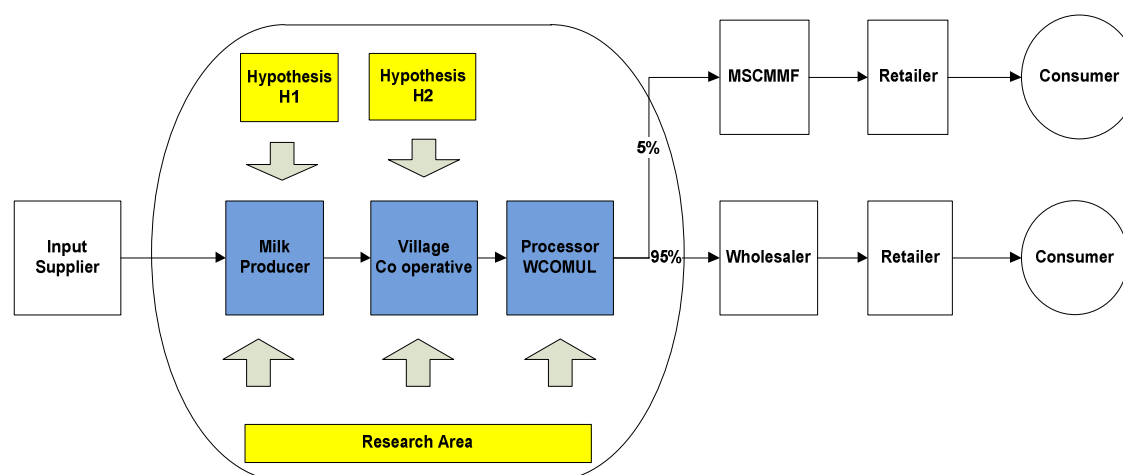


Figure: 2 Research Area

To study those reasons of decreasing milk production, procurement and different strategies of milk procurement review of literature was done.

2.2 Milk Production

Karmakar and Banerjee (2006), stated that there is a huge demand for milk and milk products in India with more than one billion consumers of which majority are vegetarians drinking milk as habit leading to 100% consumption of total production in domestic market. The newly emerging fast food chains and food and non food industries is a new consumer for dairy industry. There is a increasing demand for SMP in export market and indigenous dairy products by the ethnic population spread all over the world.

Ghosh and Maharjan (2004), have shown that the milk production of the members of primary village co-operative has been increased by providing various dairy inputs and

services to the milk producers. The inputs like cattle feed, fodder and fodder seed and services like Extension, Artificial Insemination, vaccination and animal treatment by veterinary department of Milk Shed Area. The milk production has increased through breed development by cross breeding program through Artificial Insemination. The milk procurement of BMPCUL has increased from 0.86 million liters in 1974 to 53.81 million liters in 2000. The BMPCUL also makes urban market available for milk procured by Milk Shed Area and increased their share of liquid milk market in Bangladesh.

Sarwar et al (2002), maintained that dairy industries in developing Asian countries have characters like small herds, poor genetic potential of animals, low quality of feeds, high risks of diseases, improper marketing channels, lack of technical staff dairy sectors, high environment stresses, reproductive problems and high udder abnormalities, low farm management, poor extension services and lack of commercial rations.

Ghosh and Maharjan (2004) , have also shown that members of dairy cooperative are receiving dairy inputs and fair prices for milk and guaranteed market due to cooperative system. New members are attracting towards dairy farming due to cooperative but non cooperative milk producers are not receiving those dairy inputs and getting low milk prices. Milk production of cooperative members is high due to developed dairy breeds than those of non cooperative producers who have indigenous breed.

Bandyopadhyay (1996), did comparative study of dairy cooperative and rural development between Amul and Himul milk Unions in Gujarat and West Bengal states of India. He found less progress in Himul due to poor organization of techno-economic programme like Breed Improvement Programme, Veterinary Aid, and Fodder Development. The author also proved that milk yield capacity of dairy animals in Amul is higher than that of Himul due to advantage of getting extension services to the milk producers from Milk Union. The milk price as well as facilities or services is an important factor in delivering milk to the dairy as milk producers of Amul deliver their milk to Amul because they receive fair price for their milk from Amul and milk producers of Himul deliver their milk to Himul because they get facilities/ services from Himul though they receive a lower price for their milk from Himul dairy than other marketing channels.

Patil et al (2009), studied constrains faced by the dairy farmer in Nagpur district of Maharashtra state in India and they studied different parameters leading to decreased production of milk viz. situational, financial and technological constrains. Regarding situational constrains low production is due to low yielding local breed that is ND cattle and shortage of green fodder coupled with low nutritive value and low fertility. High cost of cattle feed leading to feeding of small quantity of cattle feed and high cost of high yielding breeds of animal leading to keeping of low productive ND cattle which ultimately leading to low milk production.

Patil (2004), studied the cost of milk production in Dhule district of Maharashtra of India and he found that the major cost is variable costs of which 70% cost is of feed stuff cost and 15% cost is of hired labor or opportunity cost for labor which are the major costs of milk production need more attention for reducing those costs.

Rao and Hall (2003), studied importance of crop residue in crop-livestock systems in India and they showed for the majority of small scale farmers crop residue constitute 40-60% of total dry matter intake. The rest comes from homegrown feeds and

grasses. They also stated that there is shortage of feed during dry months, particularly 2-3 months prior to onset of monsoon.

Udo et al (2007), stated that availability of good roughage and concentrate is the important factor for milk production throughout the year, especially when there are improved breed of cattle introduced in that area.

Sharma et al (2002), observed and showed dairy inputs particularly oil cakes, fodder and feed (Mixed Concentrate) have increased relatively faster than milk prices which signifies importance of productivity enhancement. They also showed dependency of Indian dairy farming on low quality crop residues, natural resources and open grazing but for additional increase in milk production those resources are not enough to fulfill demand so additional output has to come from modern systems of stall feeding by use of more concentrates.

Anwar et al (1991), shows that the preservation of surplus fodder is a possible solution when there is a scarcity of fodder due to seasonal variation by which it is possible to maintain continuous supply of fodder throughout year thereby reducing production losses and ultimately economic losses.

Millogo et al (2008), studied milk production and milk quality problems in Burkina Faso and they observed that dairy farmers have cross bred cows but because of low plain of nutrition they are not giving sufficient amount of milk. Improved cross breeds needs to supplement concentrate diet to improve milk production.

Javed et al (2004), mentioned that the production of cows calving in autumn is maximum because of low environmental temperature and availability of good quality feed and forages. While the cows calving in hot dry and humid hot seasons were poorest producers.

2.3 Milk Procurement and Quality:

Ashrafuzman (1995), shows in his study in Sirajganj district, Bangladeshi that economic efficiency of milk production is more under cooperative system and farmers are enjoying the selling of their milk to an ensured market under cooperative marketing channels.

Ministry of Commerce (2007), In the study conducted in North Eastern state of India and it is observed that there are three main modes of selling milk, the first is direct selling to consumer, second is to the cooperative society and last one is sale to middleman. The maximum amount of milk is sold to the middleman because he pays more milk price per liter of milk. Here the milk price plays major role in milk procurement.

Ghanekar (2008), said that in Maharashtra there is more number of CMUs functioning in the same area and making competition among them leading to increasing to increased procurement cost of milk but in Gujarat only one MU is functioning in one district. The most of the MUs in Maharashtra are marketing their milk on their own brand names while in Gujarat whole milk is marketed under one brand name of Amul.

Dhaka and Rangawamy (2007), showed the milk procurement efficiency mostly depends on operational efficiency of milk collection, transportation, chilling and reception of milk which means how efficient is your milk collection method either

manually or automatic milk collection method, mode of transportation by milk can or by tanker, chilling at village level or at processing plant.

Ghosh et al (2009), have shown that importance of strengthening infrastructure in dispersed and unconnected areas by establishing Bulk Milk Coolers (BMCs) which has built organized milk procurement system in inaccessible areas due to distance and risk of spoilage. She also showed auto milk collection stations can create a transparent and fair procurement system.

Nubern and Kilmer (1995), have studied different milk procurement systems in Florida as 1. Supplemental milk obtained through pooling arrangements with regional dairy cooperatives 2. Increased supply as a result of an expanded procurement area 3. Supplemental milk obtained from import sources 4. Supplemental milk obtained from a supply plant. In this scenario author observed the fourth procurement strategy is more feasible in Florida as it maximizes the aggregate net revenue of its members in Florida.

Bohra et al (2003), studied different informal and formal marketing channels in peri-urban dairy farms in the mountains and he found that direct producer consumer marketing channel is common and most of milk is sold through this channel followed by producer middleman consumer marketing channel but consumer do not trust on middleman as they think middleman would have mix water in milk to increase volume. The cooperative channel of milk marketing was not so active in peri-urban dairy farms. They also found that producers prefer to choose cooperative channel only when market is not easily accessible to them.

Chaddad (2007), did the evaluation of Brazilian dairy cooperative and he found that market share of total milk procurement of dairy cooperative fell from 60% in 1990 to 40% in 2002. This is because of competition from increased imports and entry of multinational companies and many cooperative processing plants and their brand names were acquired by multinationals. The competitiveness of cooperatives is affected due to lack of economics of scale, lack of financial resources and high transaction costs and most important thing multinationals have high risk capital. But some cooperatives got success because of popular regional brand names and commanding price premiums in regional markets even though they lack economics of scale. The experience of dairy cooperatives in Brazil suggests that it is important for cooperative leaders to recognize and quickly adapt their organizations to the changing business environment

De et al (2010), studied that the quality of buffalo milk changes with its change in physiological stage and change in management practices. Though buffaloes have strong defense mechanism against mastitis, with change in management system like increased feeding and introduction of machine milking, there is increase in somatic cell count (SCC) which may increase the chances of udder infection especially in buffaloes of high parity producing more milk.

The study of above literature revealed different factors that can influence the milk production and procurement. Those factors formed the basis for making questionnaire for the Milk Producers to study production factors and questionnaire for Village Cooperative to study procurement factors (See Figure 3 and 4).

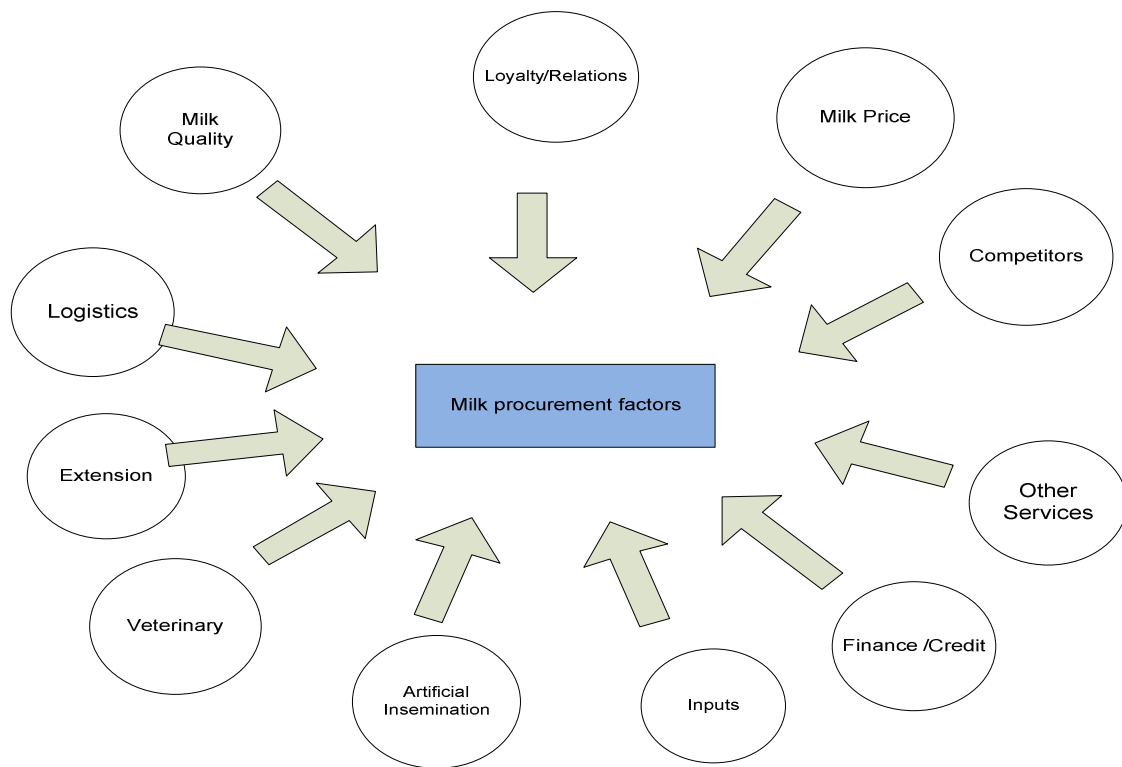


Figure 3: Milk Procurement Factors

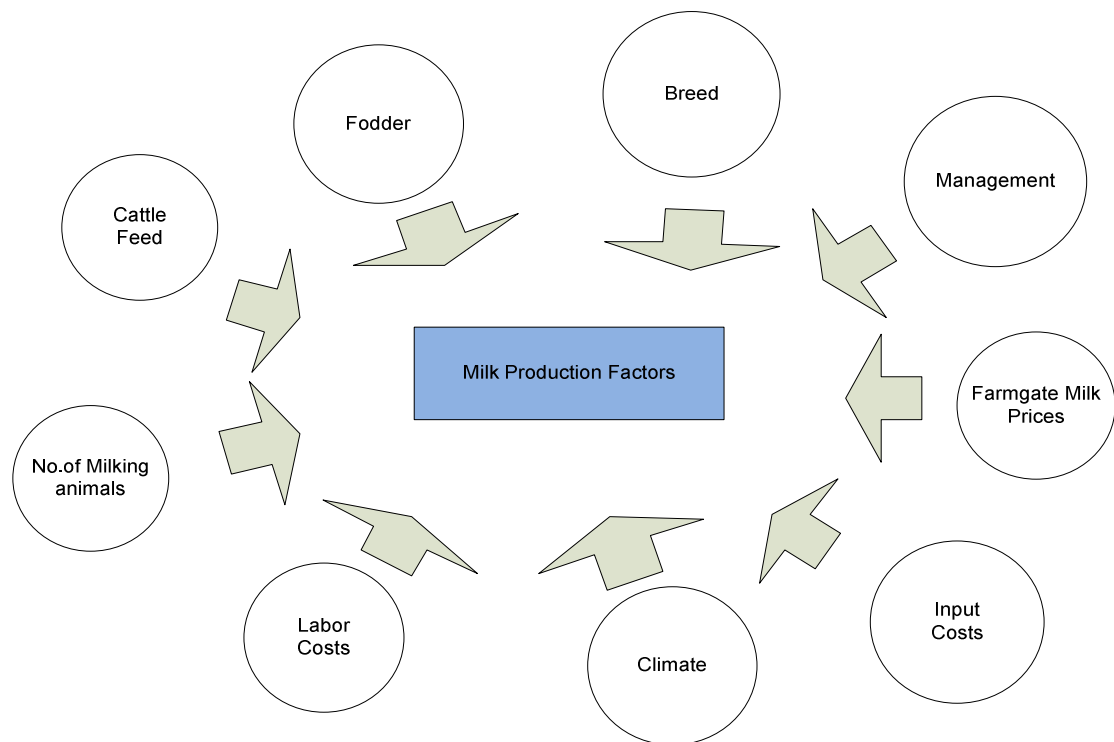


Figure 4: Milk Production Factors

Chapter 3: Result

3.1 Dairy Subsector in Warana Valley:

In Warana valley there are two types of dairy chains one is Cooperative Dairy Chain and another is Private Dairy Chain (See Figure 5). WCOMUL, two existing and one new MU are the Cooperative Dairy chains and only one New MU is the example of Private Dairy Chain. The ECMU No.1 (Gokul) has established their good brand name in the Mumbai, Pune, Maharashtra and Goa. They are also exporting SMP and WMP to some Asian countries. ECMU No.2 (Rajaramnapu) is selling their milk and milk products also in Mumbai, Pune and other cities in Maharashtra by its own brand name. Both the New MUs are selling their milk and milk products in local markets in

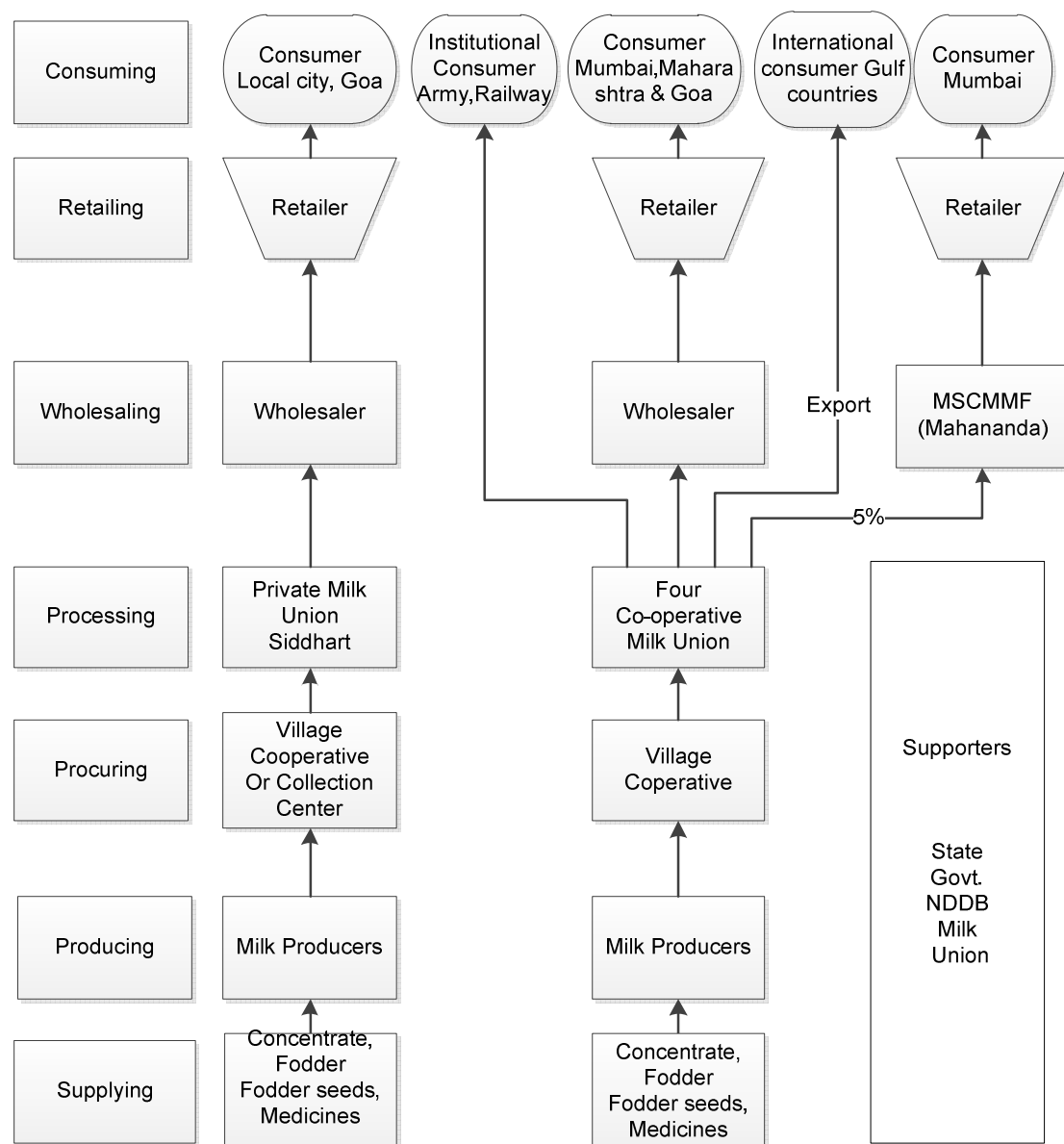


Figure: 5 Cooperative and Private Dairy Chains in Warana Valley

Maharashtra and Goa by their own brand name. The VC is formed by the group of MPs and VCs are the members of District Cooperative Milk Unions and District Cooperative Milk Unions are the members of Maharashtra State Cooperative Milk Marketing Federation (MSCMMF). The Board of Director of District Milk Union is elected democratically from the members of VC who are the MPs. Milk Unions are allowed to sell their milk either directly in the market by their own brand name or to the State Marketing Federation. All the Cooperative Milk Unions in the Warana Valley are selling their milk by their own brand name and only 5% of the procured milk is sold to the MSCMMF to preserve their membership. The CMU only accepts milk from VC but not from the private collection centers or individual farmers.

In the private dairy chain they can collect milk from any milk collector either VC or Private Collection Centers and it is their own responsibility to sell their milk. They cannot supply their milk to MSCMMF for sell.

The milk procurement share of WCOMUL and Competitor Milk Unions in Warana Valley was 77 % and 23% in 2005 which became 58% and 42% in 2009 respectively (Source Survey data).

3.2 WCOMUL Dairy Chain

The different actors in the WCOMUL dairy chain are small scale milk producers, village cooperatives, WCOMUL as dairy processor, wholesalers, retailers and consumers (See Figure 6)

The Influencers are the Govt. of India and Govt. of Maharashtra while Supporters are NDDB, Various Banks and MU itself plays a great role of supporter.

3.2.1 Input Supplier

Most of the dairy inputs like concentrate, fodder, fodder seeds, mineral mixture and chaff cutters are supplied by WCOMUL through VC on credit which is deducted from next milk payment.

3.2.2 Milk Producers

There are around 43000 MPs supplying milk to VC belonging to WCOMUL. The MPs are mixed small scale dairy and arable farmers with main cash crop of sugarcane.

3.2.3 Village Cooperatives

The group of MPs come together to form VC and these VCs are the members of WCOMUL. The members of the BoD of VC are the MPs. VCs collect milk from MPs which is then procured by WCOMUL. There are total numbers of 370 VCs in the Valley supplying milk to WCOMUL.

3.2.4 WCOMUL

It is a District Cooperative Milk Union functioning in Kolhapur and Sangli districts in the Valley of river Warana. It is the members of Maharashtra State Cooperative Milk Marketing Federation (MSCMMF). All the 370 VCs are members of WCOMUL and BoD of WCOMUL is democratically elected by those members of VCs. The members

of BoD are the MPs but the Managing Director is paid employee of WCOMUL. The total of 44% of milk is procured from VCs in the Valley and remaining 56% is coming from other MUs in Maharashtra and Karnataka. WCOMUL is processing the milk and making wide range of products like shrikhand, lassi, SMP, WMP, ghee, butter, flavored milks, paneer, cheese, curd and ice cream. The fluid milk is send to the dairy plant of WCOMUL in Mumbai by milk tanker, where it is packed in half and one liter plastic pouch.

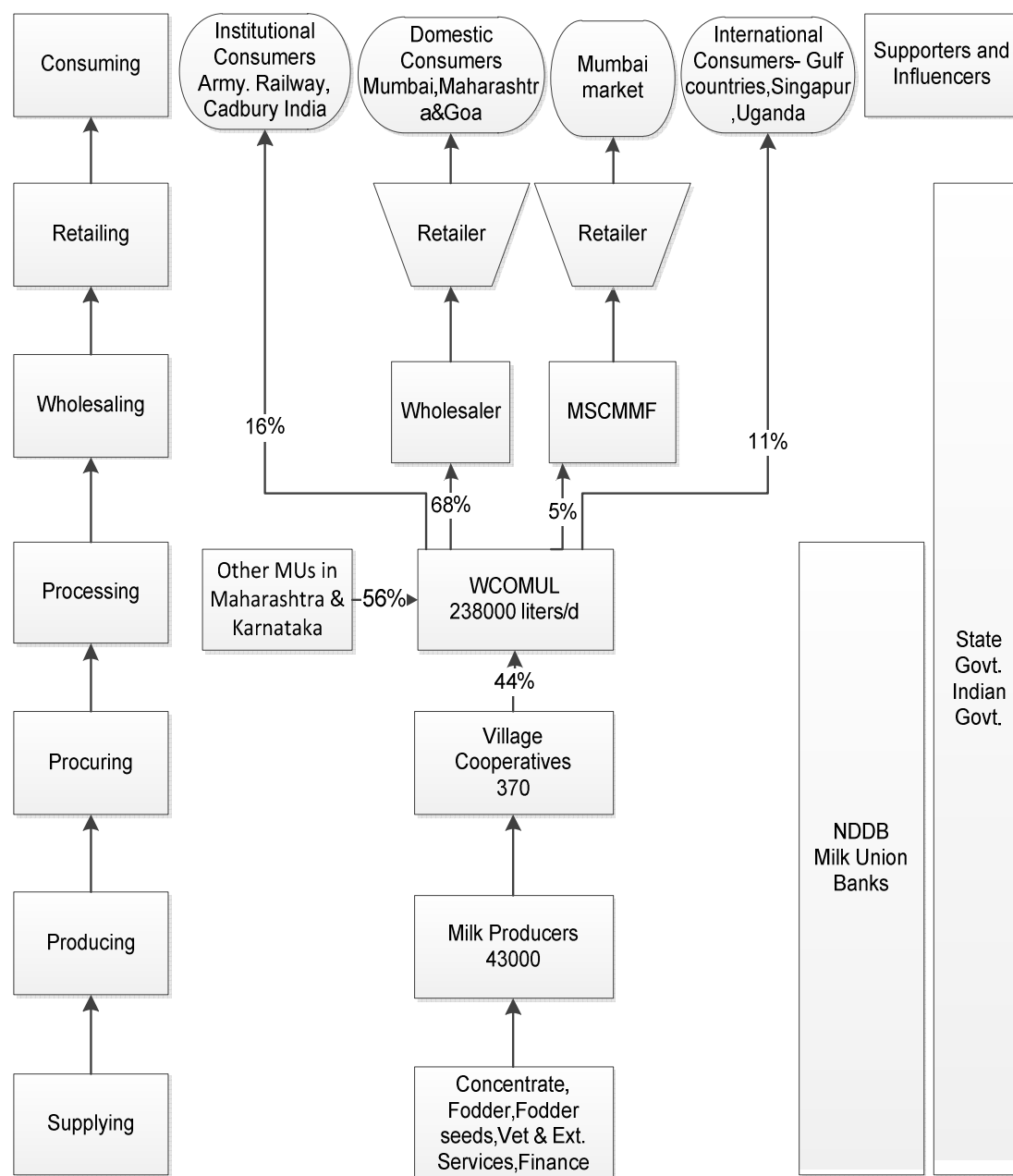


Figure: 6 WCOMUL Dairy Chain

3.2.5 Wholesaler

The milk products are distributed to the wholesalers in Mumbai, Pune and other cities of Maharashtra, Karnataka and Goa through insulated van. There is one wholesaler in one district of Maharashtra. The fluid milk from Mumbai dairy plant is distributed to the wholesalers in Mumbai.

3.2.6 Retailer

The milk from wholesaler goes to the retailer in the respective district.

3.2.7 Consumers

The WCOMUL have established good brand in Mumbai, Maharashtra, Karnataka and Goa market. The total of 68% milk and milk products goes in domestic market, 16% goes to large institutional consumers like Indian Army, Railway and Cadbury India limited and pharmaceutical company 11% goes to export market and 5% goes to MSCMMF. Warana shrikhand is the largest selling brand of shrikhand in India. The export of SMP, Tetra packs milk, Butter, Ghee and Cheese to Gulf countries is increasing every year. The tetra pack milk is also exported to Uganda and Singapore.

Shrikhand: It is a milk product prepared from fermented milk with addition of sugar, different flavors like mango pulp, strawberry pulp and dry fruits. This product is very famous in Western part of India especially in Gujarat, Mumbai, Maharashtra, Goa, and north Karnataka states with huge demand during festival time.

3.2.8 Supporters and Influencers

NDDB is providing technical and financial support to WCOMUL by arranging different trainings for workers, officers for improving skills, knowledge and attitude. The national, district cooperative and private banks are providing financial support to WCOMUL. WCOMUL itself is playing a great role of supporter for MPs and VCs by providing all the dairy inputs and services to them. The Government's role is to provide regulatory framework and policy making. The changing policy of Indian Govt. about export of SMP and WMP affects adversely on marketing of those products.

3.3 Milk Procurement at VC level in Warana Valley

3.3.1 Trend in Milk Procurement

The milk procurement of Warana was decreasing during the period of 2005 to 2009; the procurement of Existing Milk Unions also decreased by small amount during the same period while procurement by New Competitors increased. (See Figure 7)

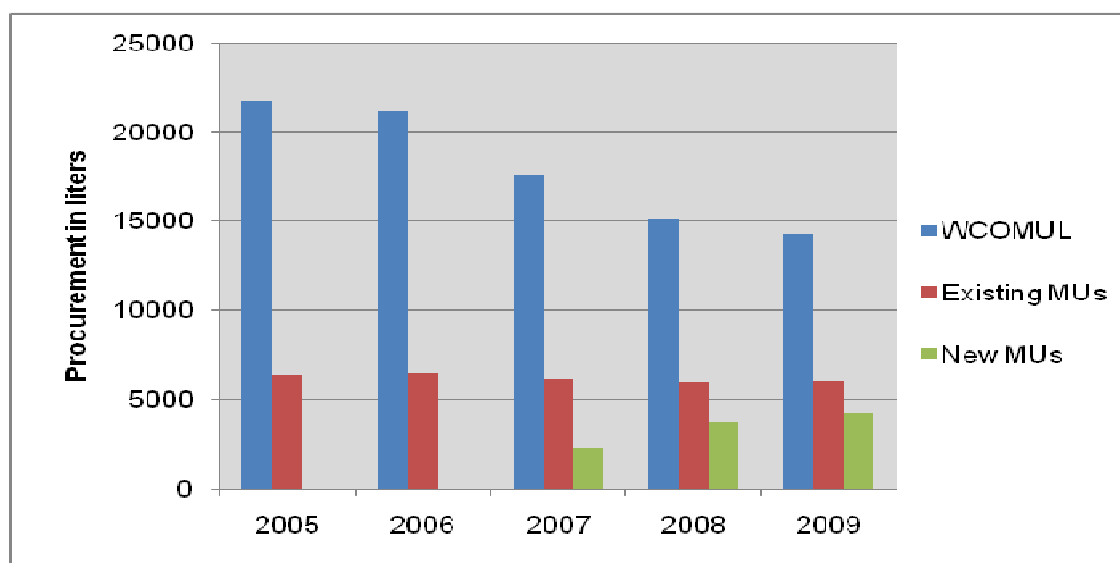


Figure: 7 Trend of Milk Procurement at VC level in Sample Villages (Source Survey)

The average daily milk procurement of Village Cooperatives supplying milk to WCOMUL in sample villages was 21763 liters in 2005 and 14295 liters in 2009 that means decrease of 34%. The average daily milk procurement of Village Cooperatives supplying milk to Existing Competitors has decreased from 6430 liters in 2005 to 5998 liters in 2009 means decrease of 7%. The average daily procurement of Village Cooperatives supplying milk to new competitors has been increased to 4254 Liters means increase of 82% from 2007 to 2009 during three years.

The total average daily procurement of milk in sample villages in the Valley during last five years has been decreased by 13 %.(See Figure8).

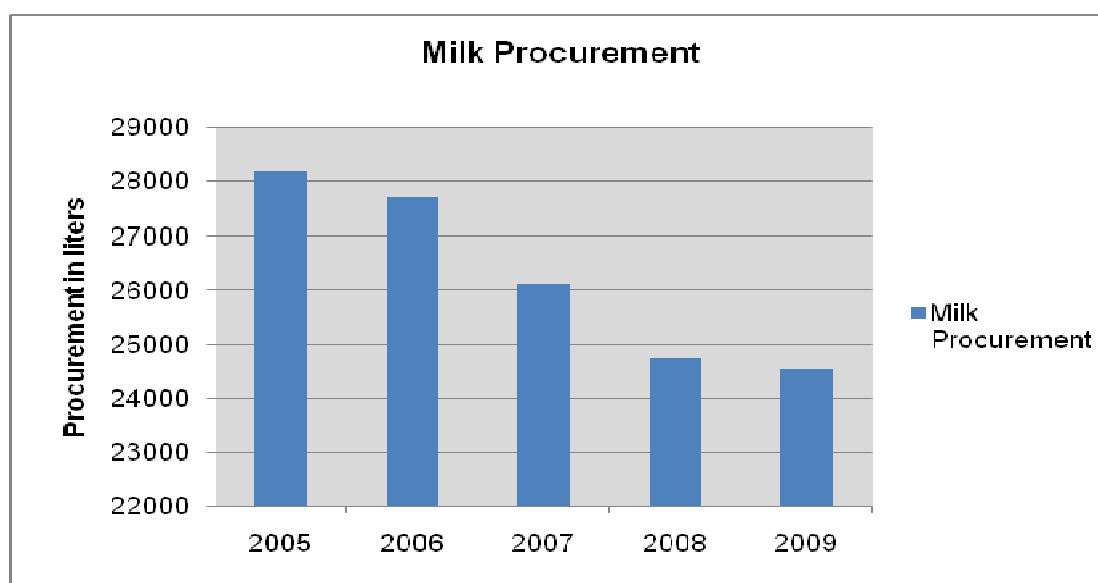


Figure: 8 Trend in Total Milk Procurement in Sample Villages in the Valley (Source Survey Data)

3.3.2 Alternative Milk Marketing Channels for VC and MP

All the VCs are supplying milk either to CMU or Private Milk Unions (PMU- Siddhart). Total of 5 VC out of 60 samples are supplying milk to newly formed Private Milk Union and rest are supplying milk to Cooperative Milk Unions. There is no VC selling milk to other markets than Milk Unions. All the milk producers are keeping milk for home consumption and remaining surplus milk is going to VC. The average daily milk for home consumption per household was 1.85 liters in 2005 and 2.17 liters in 2009.

3.3.3 Causes of Decreased Milk Procurement

3.3.3.1 Decreased Milk Production

The procurement of Warana and Existing Union has decreased due to decreased milk production in the Valley. The decrease in procurement of Warana is 34% and Existing Union is 7%. (See Chapter 3.3.6)

3.3.3.2 Switching of Old and Newly Formed VCs towards Other Competitors

The number of Village Cooperatives supplying milk to Warana has decreased by number two only from 33 in 2005 to 31 in 2009. Both of them have switched towards New Competitors.

There is increasing no. of VCs supplying milk to Existing and New Competitors (See Figure 9) There are 14 new Village Cooperatives formed of which three are supplying milk to Existing Competitors and 11 supplying milk to New Competitors.

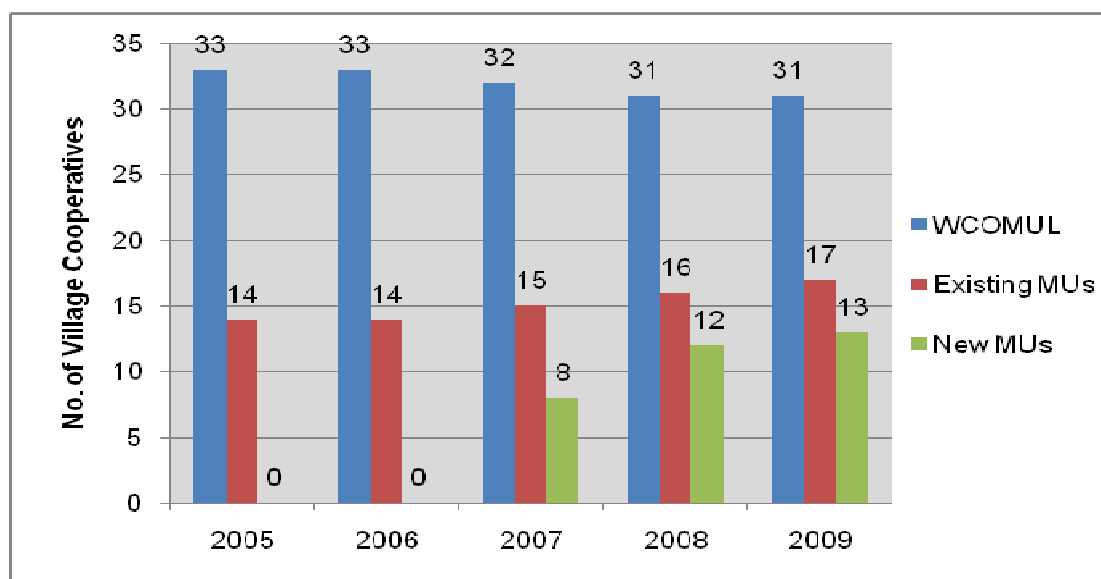


Figure: 9 Switching of Old and Newly Formed Village Cooperatives towards Other Competitors

These new VCs are formed by separation of group of MPs belonging to VCs of WCOMUL that is why the number of milk producers of WCOMUL have decreased from 6649 in 2005 to 4784 in 2009 which is 28% (see figure 10) on the contrary number of producers of new competitor has been increased up to 1450 in 2009 from 2007 within three years. The number of milk producers of Existing Competitor remained same during the five years.

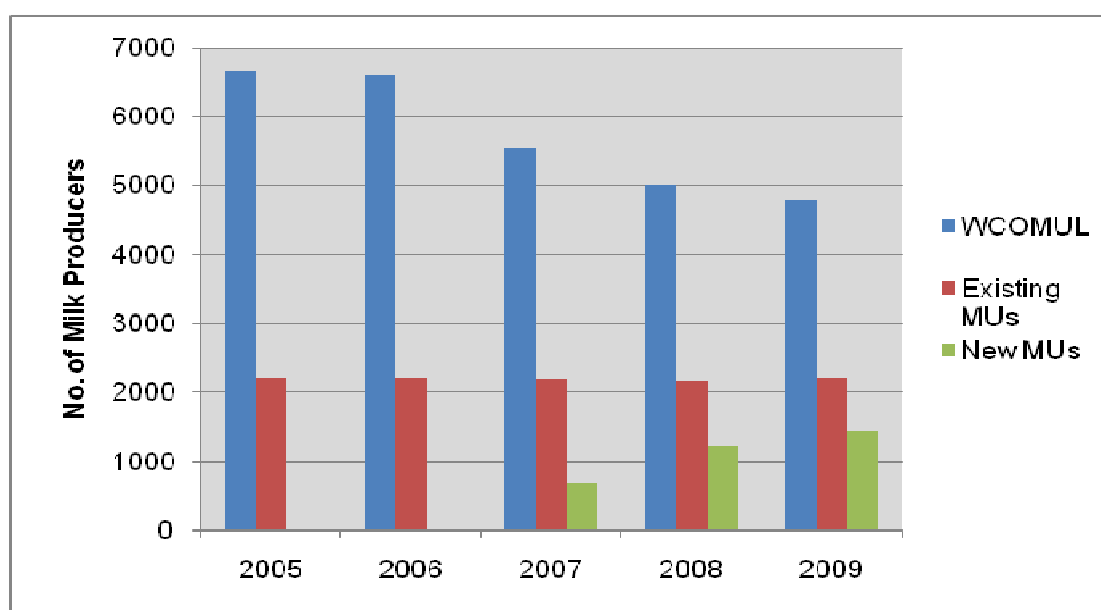


Figure: 10 Switching of number of MPs towards New Competitors

The bonus milk price paid by WCOMUL and one existing Milk Union is same while another existing Milk Union is paying less. The new competitors are not paying any bonus milk price. The Milk Producers supplying milk to Warana and Existing Competitor No.1 (Gokul) are 100% satisfied while that of MPs of all other MUs are not fully satisfied about milk bonus price.

3.3.4 Factors Responsible for Switching of VCs and MPs

3.3.4.1 Milk Prices

The milk prices paid by all the Milk Unions are same as regulated by Govt. of Maharashtra.

3.3.4.2 Bonus Milk Price

These are the extra money per liter of milk paid by the Milk Union from its profit as the owner of MU is the MPs so profit made in previous financial year is distributed to MPs for per liter of milk in next financial year not on the basis of quality but on the basis of quantity of milk delivered during that year. The bonus milk price paid by WCOMUL and one existing Milk Union is same while another existing Milk Union is paying less. The new competitors are not paying any bonus milk price. The Milk Producers supplying milk to WCOMUL and Existing Competitor No.1 (Gokul) are 100% satisfied while that of MPs of all other MUs are not fully satisfied about milk bonus price. The table (Table 5) below shows the bonus milk prices paid by different Milk Unions.

Table 5: Basic Milk Prices and Bonus Milk Prices of Different MUs in Warana Valley

	Cow Milk		Buffalo Milk	
	Basic Milk Price/lit in Rs.	Bonus Price/lit in Rs.	Basic Milk Price/lit in Rs.	Bonus Milk Price/lit in Rs.
Warana Union	14.00	0.35	23.50	1.20
Existing Competitor No.1	14.00	0.35	23.50	1.20
Existing Competitor No. 2	14.00	0.40	23.50	0.60
New Competitors	14.00	-	23.50	-

Source: Annual Reports of Milk Unions, 2009

3.3.4.3 Milk Rejection by Milk Union on the basis of Quality

In WCOMUL frequency of milk rejection on quality basis is higher than competitor MUs. The average times of milk rejection per VC per year is about 8.4 times in WCOMUL, 3.5 times in Existing Competitors and 0.5 times in New Competitors (See Figure 11). The frequency of milk rejection is high in Warana because they have good brand name for quality milk products in the market and to keep that quality of product at high level Warana do not accept low quality milk.

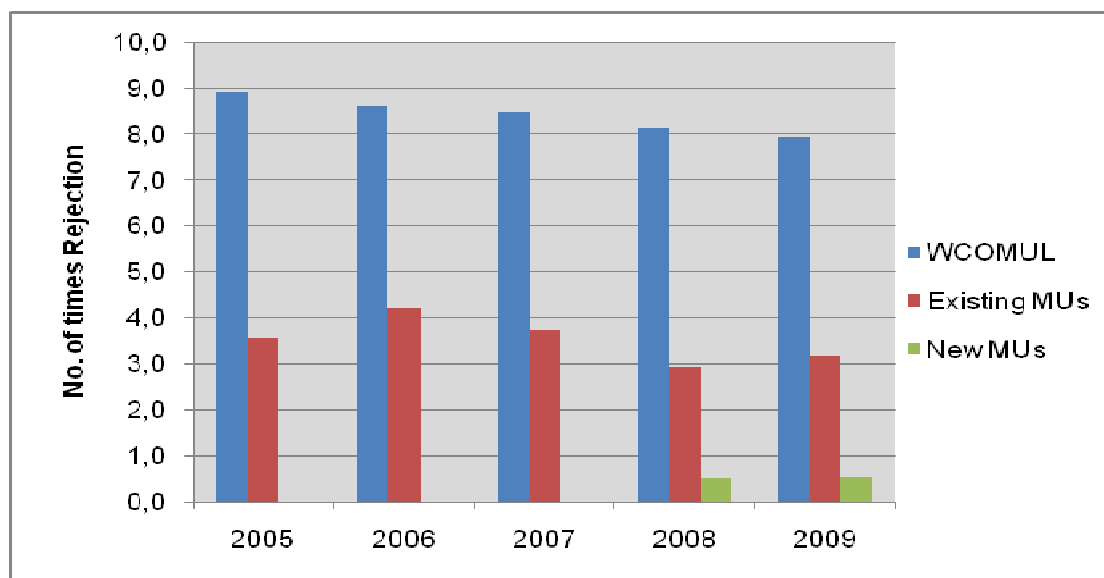


Figure: 11 Number of Times Milk Rejection per VC per Year

3.3.4.4 Milk Collection Time

The total of 58% VCs of WCOMUL and 33% VCs of ECMU No.1 (Gokul) said milk collection vehicle time is not suitable while 100% VCs supplying milk to other MUs are said Procurement vehicle time is suitable. The distance of villages in the periphery area of procurement of WCOMUL and ECMU No.1 (Gokul) is comparatively more (30-50km) than New Competitors.

3.3.4.5 Veterinary, A. I. and extension services

All these services are provided by all the Milk Unions but cost and quality of veterinary and A. I. service are different (See Table 6).

Table 6: Costs of Veterinary and A. I. Services

	WCOMUL	ECMUs	NCMUs
Veterinary cost/visit in Rs.	50	60	60
Cost per A.I.in Rs.	45	50	50

Source: Field Survey

The cost per special visit of veterinarian in WCOMUL is Rs.50; in both existing and new Milk Unions is Rs. 60. The average cost of per A.I. in Warana Union is Rs.45; in both existing and new MUs is Rs.50.

All the VCs of WCOMUL (100%) said quality of veterinary and A.I. services are excellent while those of ECMUs 50% said excellent and 50% said good service. 90% of VCs of NCMUs said quality of services is good and 10% said quality is fair.

3.3.4.6 Dairy Inputs

The dairy inputs like concentrate (Cattle Feed), mineral mixture, fodder seeds, Chaff Cutter are provided by Milk Union to the Milk Producers through VC (See Table 7). All these inputs are provided by WCOMUL and both Existing Competitor Milk Unions. The New Competitor Milk Unions are providing only concentrate and chaff cutter and they are not providing fodder, fodder seeds and mineral mixture.

Table 7: Inputs and their price provided by different Milk Unions

Dairy Inputs	Warana Union	Existing Competitors Unions	New Competitors Unions
Concentrate	Rs.4.33/kg	Rs.4.33/kg	Rs.4.4/kg
Fodder seeds	50% Subsidy	50% Subsidy	NA
Fodder (Dry)	Rs.5/kg	Rs.5/kg	NA
Mineral Mixture	Rs.40/kg	Rs.40/kg	NA
Chaff Cutter	25% Subsidy	25% Subsidy	25% Subsidy

Source: Annual Report of Milk Unions 2009

All the dairy inputs are provided on credit to the MPs free of interest and the amount of credit is deducted from the next milk payment. The following table shows various dairy inputs and their prices provided to milk producers by different Milk Unions.

3.3.4.7 Quality of Concentrate

The 77% VCs of WCOMUL said quality of concentrate in terms of palatability, taste, odor and result of milk production is poor and 23% said fair while 100% VCs of both the ECMUs said quality of concentrate is excellent. The 88% VCs of NCMU No. 1 said quality is excellent while 100% VCs of NCMU No. 2 said quality is good. There is compulsion for VCs of WCOMUL to buy concentrate from WCOMUL only. The quality of concentrate of WCOMUL that I observed was not of good quality but according to the officers of WCOMUL cattle feed factory is according to the nutrition standards. They didn't give the answer for why they make force to VCs for buying their concentrate.

3.3.4.8 Financial Assistance

There is no any subsidy for purchasing dairy animals from WCOMUL and ECMU No.1 (Gokul) but they are providing loan to MPs, WCOMUL at 11% while Gokul at 0%. The ECMU No.2 and NCMU No.1 are providing subsidy of Rs. 4000 and Rs. 6000 per animal for cow and buffalo respectively. The NCMU No.2 is providing subsidy for animal purchase of Rs. 2000 and Rs. 4000 per animal for cow and buffalo respectively (See Table 8).

Table 8: Subsidies for Animal Purchase and Rate of Interest from Different MUs

		WCOMUL	ECMU No.1	ECMU No. 2	NCMU No.1	NCMU No.2
Amount of Subsidy Rs.	Cow	NA	NA	4000	4000	2000
	Buffalo	NA	NA	6000	6000	4000
Rate of Interest		11.5%	0%	0%	0%	0%

Source: Field Survey

3.3.5 Milk Production in Warana Valley

3.3.5.1 Farming System in Warana Valley

There is an arable farming system in the Valley (See Figure 12) with average 6.34 persons per household. The climate in the Valley is best for arable farming with plenty of water from river Warana with average rainfall of 800-1000mm per year. The average temperature is 25-27 degree Celsius; soil is of black and red lateritic type which is more productive. Average land holding of 1.48 ha of which 1.27 ha is for

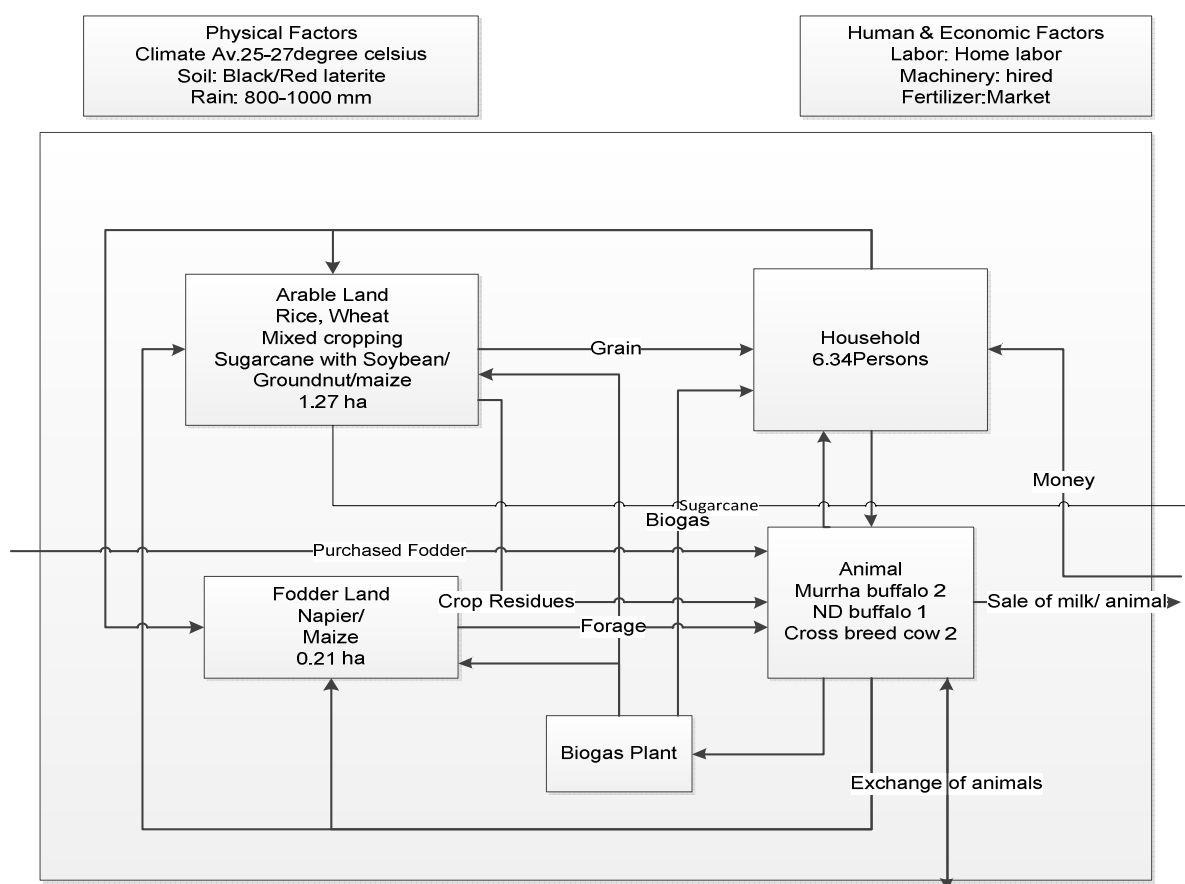


Figure: 12 Farming System in Warana Valley

arable crops of mainly sugarcane mixed cropping with soybean or groundnut or maize. The rice and wheat is grown for home consumption. The crop residues like sugarcane leaves, wheat, rice, soybean and groundnut straw are used as fodder for animals.

The remaining land of 0.21 ha is reserved for fodder like maize and Napier grass. The total no. of animals are 5 of which 2 murrha buffaloes, 1 ND buffalo and 2 cross bred cows are reared and 2.2 liters of milk is kept for home consumption and remaining surplus milk is given to the VC. The slurry of animals is used for biogas plant and further used as manure for land while biogas is used for cooking. The dairy inputs are purchased from VC while fertilizers from Cooperative consumers society. The family labor is used for farm activities and machinery like tractor is hired from outside.

3.3.5.2 Trend in Milk Production

The average milk production of cow as well as buffalo has been decreased from 2005 to 2009 (see figure 13). The average production of a cow was 4.8 liters per day in 2005 which has been decreased to 3.84 liters per day (20% decrease) and that of buffalo it has been decreased from 4.62 to 3.20 liters per day (31% decrease).

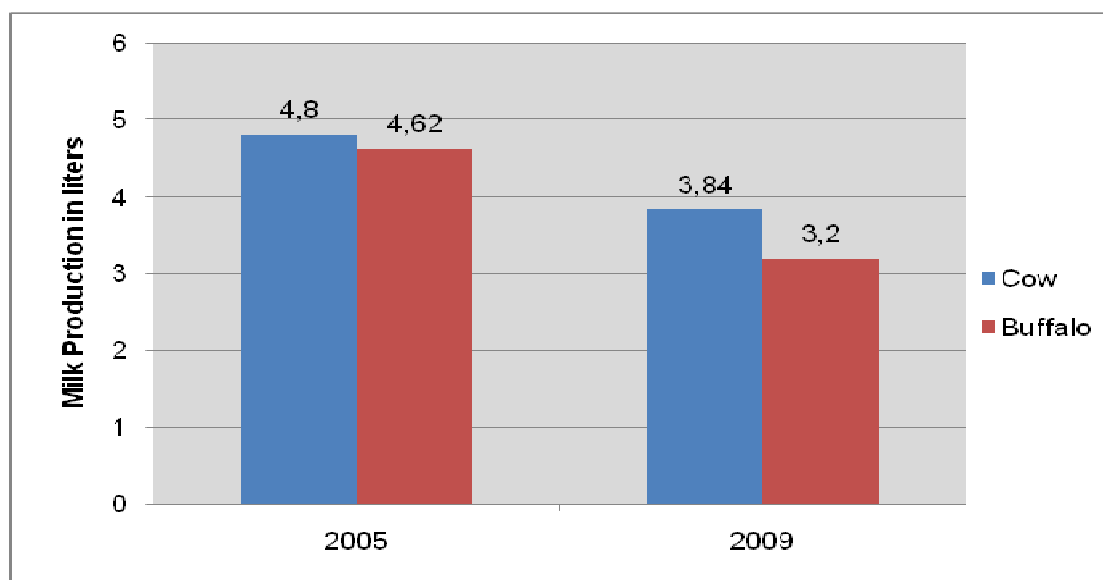


Figure: 13 Trend in Milk Production at Milk Producer level

The average milk production of dairy animals (cow and buffalo) in the Warana Valley has been decreased by 25% during last five years.

3.3.6 Causes of Decreased milk production

3.3.6.1 Change in breed composition and number of dairy animals

The average number of cross bred cow, murrha buffalo and ND buffalo per household was 1.46, 2.74 and 0.66 in 2005 and 1.70, 2.18 and 1.14 in 2009 respectively. The average number of animals per producer was 4.86 in 2005 and 5.0 in 2009. The total number of animals has been increased by 3% but that growth in number is in cross bred cow 16% and ND buffalo 73% and on other side number of murrha buffalo has been decreased by 21% (See Table 9)

Table 9: Breed Composition with Average No. of Animals per Household

Year	No. of Animal Per Household			Average No. of Animals/ Household
	Cross Bred Cows	Murrha Buffalo	ND Buffalo	
2005	1.46	2.74	0.66	4.86
2009	1.70	2.18	1.14	5.0

Source: Field Survey

3.3.6.2 Low Rise in Prices of Milk

The average per liter price of cow and buffalo milk was Rs. 9 and 14 in 2005 which rise to Rs. 14 and Rs. 23.50 in 2009 means increase of 55% and 68% respectively during five years. (See Figure 14)

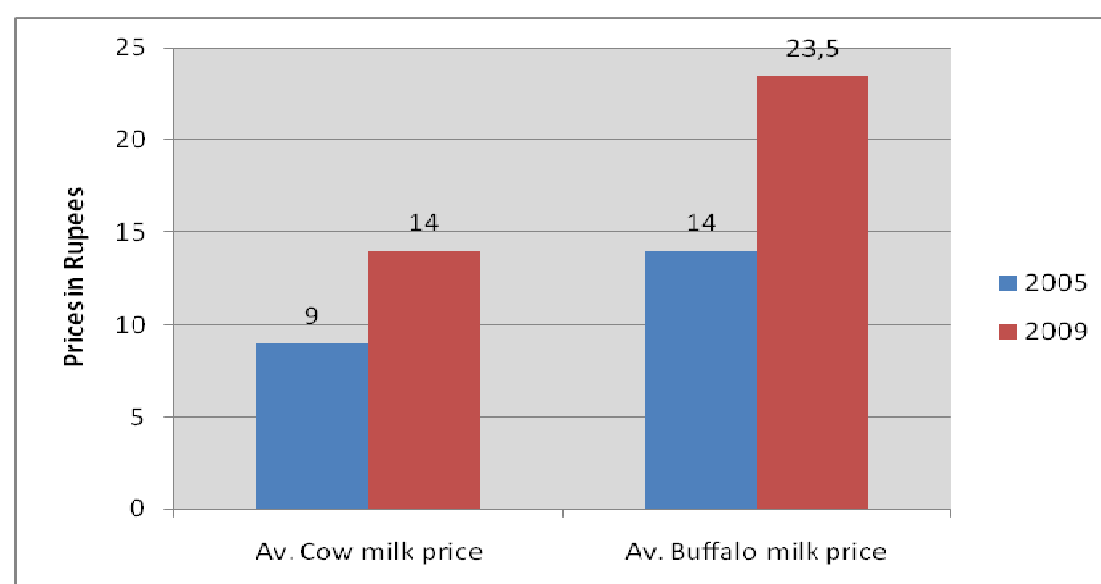


Figure 14: Rise in Average Milk Prices (Source Field Survey)

3.3.6.3 High Rise in Prices of Fodder and Concentrate

The average rise in price of per kg of fodder and concentrate is from Rs.2.25 and Rs. 4.49 in 2005 to Rs. 4.4 and 10.84 in 2009 means average increase of 100% and 146% from 2005 to 2009 (See Figure 15).

In general to produce one kilogram of milk needs one half kilogram of concentrate so in 2005 for production of 1 kg of cow milk, cost of concentrate (0.5kg) was Rs.2.20 while in 2009 it is Rs.5.42. The price of milk was Rs.9.0 per liter in 2005 which has increased to Rs.14 per liter in 2009. It means concentrate cost: milk price ratio of cow milk was 1:4 in 2005 which become 1:2.6 in 2009 while for buffalo milk it was 1:6.4 in 2005 which become 1:4.3 in 2009. This means buffalo milk production is little more profitable than cow milk production.

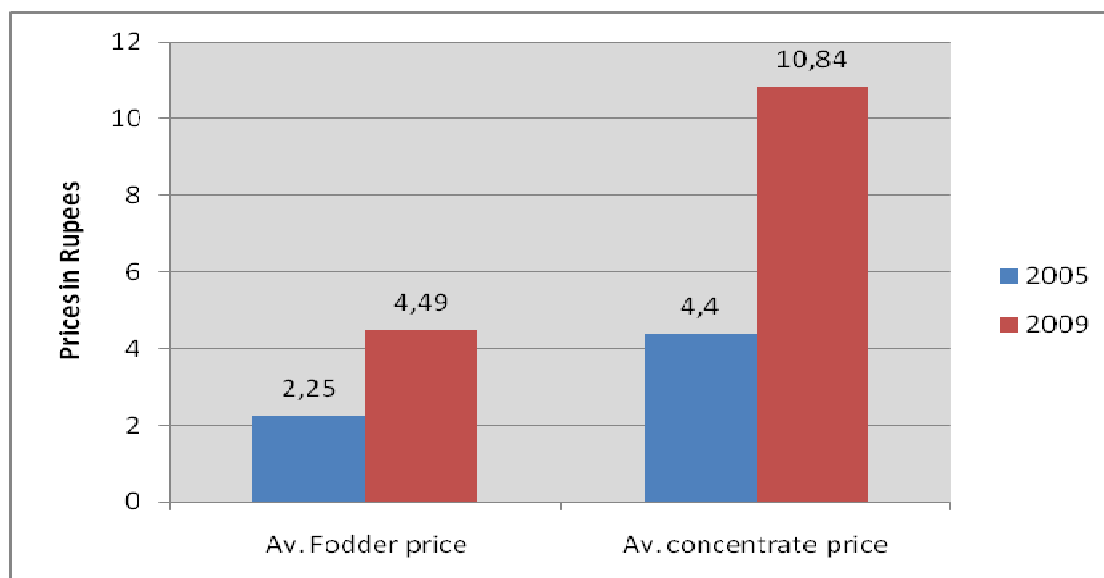


Figure 15: Rise in Prices of Fodder and Concentrate (Source Field Survey)

3.3.6.4 Average Land Holding and Land under fodder cultivation

The average land size per household was 1.53 ha and 1.48 ha in 2005 and 2009 respectively. The average land under fodder cultivation per milk producer was 0.217 ha and 0.213 ha in 2005 and 2009 respectively.

3.3.6.5 Increased Labor cost

The average hired labor cost per day was Rs. 61 in 2005 which has been increased to Rs.106 in 2009 which is 73% increase during five years.

3.3.6.6 Inputs and services costs

The average cost of mineral mixture per kg has been increased from Rs. 30 in 2005 to Rs. 42 in 2009 which is 40% increase. The average cost of per A.I. and average treatment cost per animal per year has been increased from Rs. 31.40 and Rs. 338 in 2005 to Rs. 49 and Rs. 537 in 2009 respectively which is 57% and 59% increase respectively.

3.3.6.7 Cost Price Analysis of Milk

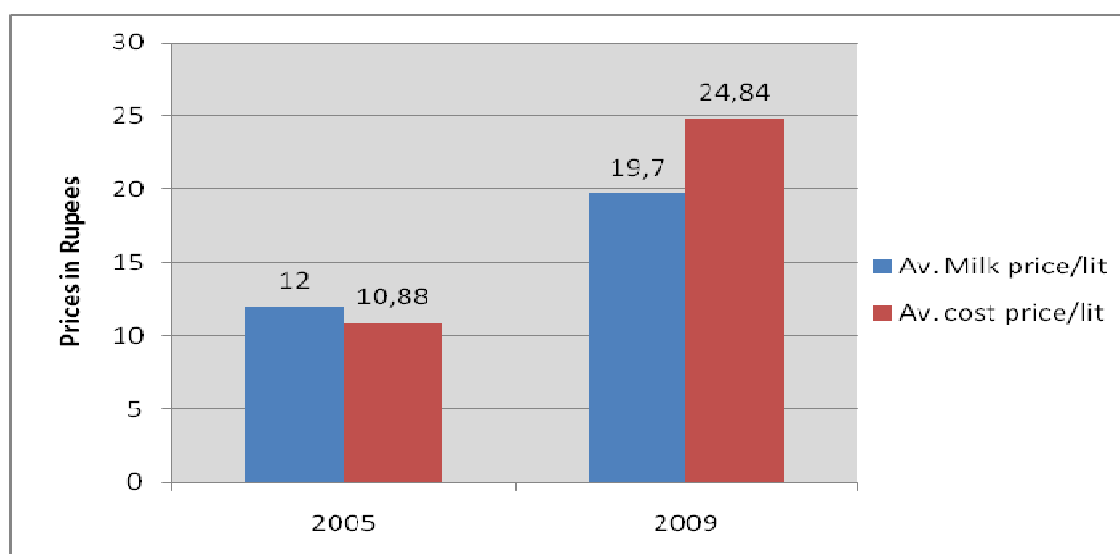
The average number of animals per MP is 5 and average milk production per animal per day is considered 4.7 liters in 2005 and 3.5 liters in 2009 as this is the average number of animals per MP and average milk production per animal per day during respective years in survey villages. The dairy input costs and service costs of year 2005 and 2009 are taken from survey data for calculation. The cost price of per liter of milk is calculated as follows (See Table10).

Table 10: Cost Price Analysis of Milk in 2005 and 2009

Fixed Costs	2005	2009
Land	1.10	1.10
Equipment	0.26	0.46
Opportunity Cost of Labor	6.0	10.60
Total Fixed Costs	7.36	12.16
Variable Costs		
Fodder	24.25	41.40
Concentrate for Maintenance	6.6	10.84
Concentrate for Production	10.36	19.07
Mineral Mixture	1.5	2.1
Vet. And A. I.	1.2	1.9
Total VC	44.55	75.31
Total Costs	51.27	87.47
Average Cost price/ liter of Milk	10.88	24.84
Average Price of Milk/lit	12	19.70

Source: Field Survey

The cost price of one liter of milk was Rs.10.88 in 2005 and Rs.24.84 in 2009 while average milk price of milk was Rs.12 in 2005 and Rs.19.70 in 2009. (See Figure16) The rise in price of milk is 64% while rise in cost price milk production is128%.

**Figure 16: Comparison between Average Milk and Cost Price of Production**

3.3.7 Milk Procurement Strategy

3.3.7.1 Strategy of WCOMUL

The present strategy is supplementation of milk from other Milk Unions in Maharashtra and neighboring state of Karnataka. The 44% of the milk procured is coming from Warana Valley and remaining 56% is purchased from other MUs (Source: WCOMUL Annual Report). The milk in the Valley is procured in 40 liters milk cans within the radius of 50 kilometers by milk procurement vehicles (Tempo).

The average time of milk collection from VC to MU is 1.5 hours. The milk above quality standards set by MU is accepted by Milk Union. The milk below standard of Fat and SNF (Cow milk- 3.0% fat and 7.5% SNF, Buffalo milk 5.0% fat and 8% SNF) is not accepted by Union. The milk above quality standards set by MU receives price according to fat percentage in milk. The milk positive for alcohol test is also not accepted by Union.

The animal purchase subsidy has been stopped in 2004 and rate of interest on loan given to the milk producers has been increased from 2% in 2004 to 11.5% in 2005. There was subsidy for animal purchase for long period of time but MU has realized that there is no significant improvement in milk procurement compared to costs done on subsidy so it has been stopped in 2004.

The bonus milk price per liter of milk (Cow milk Rs.0.35, buffalo milk Rs.1.20) is given to the milk producers once a year during main festival of Diwali.

The veterinary, A.I., Extension services and various dairy inputs are provided to enhance the production and procurement of milk.

3.3.7.2 Strategy of Existing Competitor Milk Unions (ECMUs)

The procurement strategy of ECMU No.1 is not to expand their procurement area and capacity but to increase procurement by increasing productivity of existing animals and their sale in international market so as to boost their profit and there by provide more income returns to the producers.

The milk procurement strategy of ECMU No.2 is to increase procurement by expanding area of procurement and increasing production in the jurisdiction area by providing financial assistance and subsidy for dairy animal purchase to their milk producers. They have also established 5 BMC in villages for experimental trial.

3.3.7.3 Procurement Strategy of New Competitor Milk Unions (NCMUs)

The strategy is to increase procurement by expanding area of procurement and enhancing milk production by providing subsidy and finance at zero interest to the milk producers for new dairy animal purchase. Although they are not providing all inputs and bonus milk price to the MPs but according to Assistant Managers of Procurement they have plan to provide all the inputs like ECMUs. And also they have planned to give some bonus milk price to the MPs from next year. The hidden strategy seems to divert VCs and MPs of other Milk Unions towards them.

Chapter 4: Discussion

4.1 Dairy Sub sector in Warana Valley

There are only organized Cooperative and Private Dairy Chains in the Valley. It seems that there is no existence of informal channel of marketing through middleman in the Valley. Bohra et al (2003) noted an important observation that cooperative channel of marketing is preferred only when market is not easily accessible, the similar situation is there in Warana Valley which is a remote rural area where from major milk markets like Mumbai, Pune and Goa are 250 to 350 km away so cooperative channel of marketing is accepted by the MPs in the Valley. Though marketing facility through MSCMMF is available for CMUs only 5% milk is sold through MSCMMF and remaining is sold by own brand name in the market.

WCOMUL and Gokul MU are exporting their milk products especially SMP in Gulf, other Asian countries and Africa. Only WCOMUL is supplying milk and milk products to the large institutional consumers like Indian Army, Indian railway, Multinational Company Cadbury India Limited and pharmaceutical company. All these institutional consumers buy only high quality products. The milk requirement of WCOMUL is very high to fulfill the market demand. The ECMU No.1 (GOKUL) has also increasing graph of exporting their milk products especially SMP and WMP which mean that quality of WCOMUL and Gokul products is of high standard. Karmakar and Banerjee (2006) stated same thing that there is a huge demand for milk in India and an increasing demand for SMP in export market.

The ECMU No.2 (Rajarambapu) is also successful to establish their brand name in Mumbai and Pune market. The newly entered MUs are also able to sell their milk and milk products in local and Goa market.

All these facts show that quality of milk from this area is of high so more demand for milk and milk products from this area. This improved quality might be a result of extension activities carried out by all the MUs since long period of time in the Valley. There is a high competition for milk procurement among different MUs in the Valley. Ghanekar (2008) stated the similar observation that in Maharashtra there are more number of CMUs functioning in the same area and making competition among them leading to increased procurement cost of milk as against in Gujarat state only one MU is functioning in one district. The milk procurement vehicles of all those MUs are running in the same area for procurement and more number of VCs in one village leading to increase in cost of procurement.

4.2 Milk Procurement at VC level in Warana Valley

4.2.1 Trend in Milk Procurement

There is a trend of declining milk procurement in the valley (See Fig.7&8) and total milk procurement in the Valley has been decreased by 13% during 2005 to 2009. The decrease in milk procurement of WCOMUL is very high by 34%, ECMUs by 7% but the procurement of New Competitors rise to 4254 liters from 2007 to 2009 in sample villages.

4.2.2 Reasons of Decreased Milk Procurement of WCOMUL

4.2.2.1 Decreased Milk Production and Increased Home Consumption

One of the reasons of decreasing procurement is decrease in milk production per animal at MP level as discussed in chapter 3.3.6 and increased home consumption per household due to increase in average family size from 5.28 per household to 6.34 per household which is increase of one person per household.

4.2.2.2 Switching of VCs towards Competitors

The VC of WCOMUL are decreased by number two means switched towards New Competitors but there is increase in number of 14 VCs in sample villages from 2005-2009 of which 3 supplying milk to ECMU (Gokul) and 11 supplying milk to NCMUs (Prachiti and Siddhart). This means this increase in total number of VCs is due to formation of new VCs. At the same time the number of MPs of VC supplying milk to WCOMUL decreased by 28% (see Fig.10), to ECMUs (Gokul and Rajarambapu) remained same and increased to 1450 of NCMUs (Prachiti and Siddhart). It means MPs of WCOMUL have switched to New Competitors and to some extent Existing Competitors by forming new VCs. The old VCs as such have not been switched to other competitors (only 3 have switched) because of their deposit money with WCOMUL and they will lose that money if they switch to other competitors.

4.2.3 Factors Responsible for Switching of VCs towards other Competitors

4.2.3.1 Milk Prices and Bonus Prices

Although milk prices of all the MUs are same the bonus milk rates are different and bonus milk price of WCOMUL and ECMU No.1 (Gokul) is high and same but bonus milk price paid by ECMU No.2 (Rajarambapu) is lower than WCOMUL while NCMUs are not giving any bonus milk price (See Table: 4) This is the main strong positive point of WCOMUL which is keeping VCs and MPs more attached with WCOMUL.

4.2.3.2 Milk Rejection by Milk Union on the basis of Quality

The frequency of milk rejection of WCOMUL is very high, average 8.4 times per year per VC, 3.5 times in ECMUs and 0.5 times in NCMUs during the last five years (See Fig.11). Here the quality of milk is more concerned with milk SNF and Fat; the cow milk below 7.5% SNF and 3% fat and buffalo milk below 8% SNF and 5% fat is not accepted by WCOMUL. Once the milk is rejected by the WCOMUL, the VC has to bear those losses and if they don't accept the milk of those MPs whose milk is below that standard on that day it creates a conflict because those MPs are not always delivering low quality milk and low quality milk is delivered daily by different MPs so if VC decide not accept low quality milk most of the MPs cannot deliver daily milk to VC including members of Board of Director of that VC which makes it a complex issue. Also this causes heavy losses to VC and they have to face the MPs. The VCs have to cover those losses either from their commission received from WCOMUL or by cutting payment from the MPs which makes MPs unsatisfied as a result they look for other alternative market and groups of MPs gets separated to from new VC and switches to other competitor.

Though average frequency of milk rejection in WCOMUL seems 8.4 times per year per VC, in some VC frequency is very high more than 12 times per year per VC which makes difficult for VC to make milk payment of MPs according to quality.

On other hand this is not a big problem for VC of other competitor MUs as frequency of rejection is very low.

4.2.3.3 Milk Collection time

There is a complaint about time of milk collection by VCs and MPs of WCOMUL and ECMU No 1 (Gokul) while no complain from VCs of NCMUs. This complains are from VCs in villages situated comparatively at long distance (more than 30 km) from the processing plant. The milk collection vehicle goes early in the morning and early in evening for milk collection in those villages at long distance so as to cover the time of transportation and to reach in time to next village as this milk collection vehicles collects milk from more than 4-5 villages. So MPs have to deliver milk to the VC very early in the morning and early in the evening making them difficult to manage their other works.

4.2.3.4 Dairy Inputs and Services

All the dairy inputs of concentrate, fodder, fodder seeds, chaff cutter and mineral mixture are provided by MUs in the Valley except some inputs like mineral mixture, fodder and fodder seeds are not presently provided by new competitors. The veterinary and A.I services are also provided by all the MUs in Valley. There is no difference in prices of input and subsidy on inputs by WCOMUL and ECMUs. Only difference is some inputs are not presently provided by new competitors but according to interview with Assistant Milk Procurement Managers they have plan to provide these inputs soon.

4.2.3.5 Quality of Concentrate

The quality of concentrate provided by WCUMUL is of low quality compared to other MUs as 77% MPs are saying quality is fair and 23% are saying poor while the quality of concentrate provided by ECMUs (Gokul and Rajarambapu) is excellent and those of NCMUs (Prachiti and Siddhart) is excellent according to 50% and good according to 50% VCs.

4.2.3.6 Financial Assistance

All the MUs are providing financial assistance (Loan) for dairy animal purchase. There is no any subsidy for purchasing dairy animals from WCOMUL and ECMU No.1 (Gokul) but from ECMU No.2 (Rajarambapu) and NCMUs (Prachiti & Siddhart) are providing subsidies for dairy animal purchase. The rate of interest for the financial assistance provided by WCOMUL is high 11.5% compared to other MUs which is 0% by all other competitors (See Table 7). This is also an important factor influencing MPs for attracting towards existing and new competitors. Bandyopadhyay (1996) did comparative study of dairy cooperative and rural development between Amul in Gujarat and Himul in West Bengal states of India and he found that MPs deliver milk to Amul because of fair prices they receive for milk while MPs deliver milk to Himul because of facilities and services they receive from Himul which means some MPs of WCOMUL might have been switched to new competitors due to facility of interest free loan and subsidy for dairy animal purchase.

4.3 Milk Production in Warana Valley at MP level

4.3.1 Trend in Milk Production

The average milk production per animal has decreased by 20% in cow and by 31% in buffalo during five years from 2005 to 2009. The average decrease in milk production of cow and buffalo is 25% which means there is a trend of decreasing milk production in the Valley.

4.3.2 Causes of Decreasing Milk Production

4.3.2.1 Change in Breed Composition

There is drastic decrease in murrha buffaloes from 2.74 to 2.18 per household and increase in ND buffaloes from 0.66 to 1.14 per household and cross breed cows from 1.46 to 1.70 per household (See Table 9). Murrha buffaloes are the high yielders than ND buffalo so decreasing production impact per buffalo is high. Even though there is increase in number of cross breed cows, average milk production per cow has been decreased by 20%. Which means trend of decreasing milk production is due to replacement of murrha buffalo by ND buffalo. The murrha buffaloes are large in size and weight need more fodder and concentrate for maintenance and production otherwise produce low amount of milk and will show fertility problems which is not economical while ND buffaloes are small and can survive on low quality crop residues with or without small quantity of concentrate but produce low amount of milk. Patil et al (2009) studied similar constraints faced by the dairy farmer in Nagpur district of Maharashtra state in India and in this study they found one of the reason of low milk production is low yielding local breeds (ND breeds) of cattle coupled with shortage of fodder and its low nutritive value.

The average per liter price of cow and buffalo milk was Rs. 9 and 14 in 2005 which rise to Rs. 14 and Rs. 23.50 in 2009 means increase of 55% and 68% respectively during five years. (See Figure 13)

4.3.2.2 Low Rise in Prices of Milk

The average milk price (cow and buffalo) have rise from Rs 12 to Rs.19.70 and average cost price rise from Rs.10.88 to Rs.24.84 from 2005 to 2009. The average milk price: cost price ratio was 1:0.9 in 2005 and 1:1.26 in 2009. It means cost of production was slightly less than milk price in 2005 but cost of production is more than milk price in 2009.

4.3.2.3 High Rise in Prices of Dairy Inputs and Services

The high rise in price of fodder and concentrate has resulted in increase in cost price of per liter of milk production (See Table 14). Sharma et al (2002) observed and showed similar condition that dairy inputs particularly oil cakes, fodder and concentrate have increased relatively faster than milk prices. The cost price of milk production has been increased almost double than the rise in milk price. From the cost price analysis at present production level, it is seen that milk production is no more profitable business. The cow milk production is not profitable while buffalo milk production was partially profitable in 2005 but is not profitable in 2009 (see Table 10 and Figure 16). This could be the major reason of decreased milk production per animal and changing breed composition by replacing murrha buffalo by ND buffalo.

4.3.2.4 Low Quality Fodder

The land under fodder cultivation is not increasing even after running extension programs for long course of period. This is because of low land holding per household and good price they are receiving for sugarcane since last couple of years. The crop residues like sugarcane tops, paddy straw and wheat straw are fed to the animals which are of very poor nutritive quality. Rao and Hall (2003) studied importance of crop residue in crop-livestock systems in India and they showed quite similar situation like Warana Valley that for the majority of small scale farmers crop residue constitute 40-60% of total dry matter intake and the rest comes from homegrown feeds and grasses.

4.3.2.5 Increased Opportunity Cost of Labor

The average labor cost per day has been increased tremendously during last five years from Rs. 61 in 2005 to Rs.105 in 2009 (73% increase). In the cost price analysis, the opportunity cost of labor is 12% of the total cost. Patil (2004) studied the cost of milk production in Dhule district of Maharashtra state of India and he also found that the major cost is variable costs of which 70% cost is of feed stuff cost and 15% cost is of hired labor or opportunity cost for labor here he considered the hired labor cost as variable cost. The increase in labor cost could be the result of increasing industrialization in the districts. The opportunity cost of labor is even higher if he goes to work in industry so the average age of MP in the Valley is high 42.76 years. The youths are finding jobs in industry and middle age and older members of family are looking at dairy and agriculture farming.

4.4 Procurement Strategy

The requirement of milk for WCOMUL is double than it procures so WCOMUL's strategy is to supplement milk from other MUs in Maharashtra and neighboring state of Karnataka while milk requirement of ECMU No. 1(Gokul) is also increasing but procurement strategy is to increase procurement not by expanding area but by enhancing productivity of existing animals. Nubern and Kilmer (1995) discussed different milk procurement strategies in Florida of which one of the strategy is to supplement milk from regional dairy cooperatives which is presently used by WCOMUL.

The strategy of ECMU No.2 (Rajarambapu) is to expand procurement area in other part of district and to increase production in the jurisdiction area by providing financial assistance and subsidy for purchase of dairy animal.

Both the New Competitor's strategy is similar to ECMU No.2 (Rajarambapu) only difference is their focus of expansion area is Warana Valley and also hidden strategy is to divert VCs and MPs of other MUs towards them.

The milk is procured through milk cans by all the MUs in the Valley except ECMU No.2 (Rajarambapu) and NCMU No.2 (Siddhart) who have set up some BMC at certain villages on experimental basis. Ghosh et al (2009) have shown the importance of strengthening infrastructure in dispersed and unconnected areas by establishing BMC by which they built organized milk procurement system in inaccessible areas due to distance and risk of spoilage. This is more essential for WCOMUL and ECMU 1 (Gokul) as they are collecting milk from very dispersed and unconnected mountainous area. There is 75% financial assistance on grants-in aid

basis means (Subsidy) from Indian government under the scheme of Strengthening Infrastructure for Quality and Clean Milk Production.

The area of milk collection of WCOMUL and ECMU No.1 (Gokul) is within the radius of 50 km while those of all other MUs are 25-30 km.

The total time transportation since milking till it goes for chilling is 3-3.5 hours for WCOMUL and Gokul MU and for other MUs it is less than 2.5 hours. The longer time of 3-3.5 hours is affecting the bacteriological quality of milk.

Chapter 5: Conclusion and Recommendations

5.1 Conclusion

5.1.1 Dairy Sub Sector in Valley

The informal dairy chains have almost disappeared and only formal dairy chains existing in the Valley. All the MUs in the Valley have established good brands in domestic market moreover WCOMUL and Gokul have good brand names in export market. WCOMUL is receiving premium price for its products due to quality in domestic market and more prices in export market.

5.1.2 Milk Procurement at VC level in the Valley

The procurement of new competitors is increasing while there is declining trend of milk procurement of WCOMUL in the Valley due to two main reasons as switching of newly formed VCs towards new competitors and decreased milk production at MP level in the valley. The reasons of switching VCs towards new competitors are the high frequency of rejection of milk by WCOMUL on quality basis, force for buying low quality concentrate to the VCs, unsuitable time of milk collection especially villages at longer distance and offer of interest free loan with subsidy by the new competitors. It seems that there is need for motivation of quality milk production and scope for establishing BMC in villages at longer distance to avoid problem of unsuitable milk collection time and to improve milk quality as Government of India is giving 75% subsidy to establish BMC in rural area at VC level.

5.1.3 Milk Production at Milk Producer Level

There is a trend of decreasing milk production at MP level in the Valley due to relatively high rise in cost price than milk price. The high rise in cost price is mainly due to high rise in prices of concentrate and fodder which urge the need of fodder cultivation and proper use of crop residues.

5.1.4 Procurement Strategy

The present strategy of WCOMUL is making it more dependent on outside sources of milk by purchasing milk from other MUs and is more quality sensitive in the Valley but at the same time neglecting most important factor of dairy input that is concentrate of which quality is very poor compared to other competitors in the Valley. This quality of concentrate could be improved as it is not a very difficult and impossible thing for WCOMUL. The new competitor's strategy is focused more on Warana Valley by accepting low quality milk and providing interest free loan with subsidy for animal purchase leading to attract new VCs and MPs of WCOMUL. It states that new competitors may prove risky if enough attention is not given to the VCs and MPs in the Valley.

Finally it can be concluded that both the hypothesis of switching VCs towards new competitors and decreased milk production at MP level are true.

5.2 Recommendations

5.2.1 For Milk Union

WCOMUL should offer extra incentive per liter of milk delivered according to quality of that milk to the MPs in the Valley rather than giving just bonus milk price on volume basis

WCOMUL should improve the quality of concentrate and supply at reasonable rate (comparable to other competitors) to the MPs through VCs without force to buy it.

WCOMUL should prepare special plan for “Improvement of Milk Production and Quality” which includes training of members of VCs and MPs about strategy of feeding dairy animals, motivation of MPs for fodder cultivation, clean milk production and implement it on priority basis, effectively and efficiently by extension department of WCOMUL.

WCOMUL should establish Bulk Milk Cooler (BMC) at every village level or one for 3-4 small villages. In first phase villages in the periphery means at longer distance and in next phase nearer villages can be selected.

WCOMUL should provide low interest or interest free loan to MPs for dairy animal purchase to counter act the Competitors procurement strategy.

5.2.2 For Village Cooperatives

VCs should organize training workshops for MPs to implement WCOMUL plan of “Improvement of Milk Production and Quality “with the help of Extension Department of WCOMUL.

5.2.3 For Milk Producers

Increase the land under fodder cultivation especially cultivation of improved varieties of fodder for more yield. Plantation of Napier grass and marvel grass on the borders of the field.

Use of feeding method of Total Mixed Ration (TMR) means feeding the mixture of chaffed fodder crops, dry & green crop residues, concentrate and mineral mixture so as to increase dry matter intake, maintain rumen ph, increase milk production and improve milk quality.

For further study- WCOMUL may study the possibility to expand milk procurement area in neighboring districts.

References

- Anwar, M., Bakht, B.K., Gill, R. A., Khan M.A and Arshad, I., 1991. Effect of silage feeding on milk production and composition of Nili-Ravi buffaloes. Pak. J. Agri. Sci. Vol.28,pp13-15.
- Ashrafuzzaman, A.K.M., 1995. Economic of Milk Production: A Study of Two Villages in Sirajganj District. Bangladesh Academy for Rural Development. Kotbari, Comilla.
- Bandyopadhyay, M. K., 1996, Dairy Cooperative and Rural Development (With Special Reference to comparative Study Between the Khaira District Cooperative Milk Producers Union Limited and Himalayan Cooperative Milk Producers Union Limited). Finance India, Vol. 10, No.2, pp 406-411.
- Bohara, B., Singh, M., Kumar, A and Singh, V., 2003. Milk Production, Marketing and Consumption Pattern at Peri urban Dairy Farms in the Mountains : A Case from Lohaghat in Uttanranchal. ENVIS Bulletin: Himalayan Ecology, Vol.12, No.1.
- Chaddad, F. B., 2007. The Evaluation of Brazilian Dairy Cooperatives : A Life Cycle approach. Paper presented in XLV Society Conference on Brazilian Economic Administration and Rural Sociology, London.
- Dairy India 1997, Fifth Edition, New Delhi, India.
- De, K., Mukherjee, J., Prasad, S and Dang, A. K., 2010. Effect of Different Physiological Stages and Managemental Practices on Somatic Cell Counts of Murrah Buffaloes. Paper presented in Proceedings of ninth World Buffalo Congress, Argentina.
- Dhaka, J. P and Rangasamy, N., 2007. Milk Procurement Cost of Cooperative and Private Dairy Plants in Tamil Nadu- A Comparison. Indian Journal of Agriculture Economics, Vol. 62, Issue 4, pp 679-693.
- Ghanekar, D. V., 2008. Dairy Development in Maharashtra and National Perspective. Mahanand Silver Jubilee Issue, pp 82-85.
- Ghosh, A. K and Maharjan, K. I., 2004. Development of Dairy Co-operative and Its Impact on Milk Production and Household Income: A Study on Bangladesh Milk Producers Co-operative Union Limited. Journal of International Development and Cooperation, Vol.10, No. 2, pp 193-208.
- Ghosh, S., Das, S.S and Khan, A., 2009. Rajasthan: Milking Profits from Dairy Farming. South Asia Rural Livelihoods- The people Sector, Series 2, Note No.1. The World Bank, Washington D. C.
- Gokul (Gokul District Cooperative Milk Union Limited), 2005-09. Annual Reports of Gokul District Cooperative Milk Union limited. Kolhapur, India.
- Javed, K., Afzal, M., Sattar, A and Mirza, R. H., 2004. Environmental factors affecting milk yield in Friesian cows in Punjab, Pakistan. Pakistan Vet. Journal, Vol.24 pp 58-61.

Karmakar, K. G and Banerjee, G. D., 2006. Opportunities and Challenges in The Indian Dairy Industry. Technical Digest, Issue 9.

Millogo, V., Quedraogo, G. A., Agenas, S. and Svennersten-Sjanunja, K., 2008. Survey on Dairy Cattle Milk Production and Milk Quality Problems in Peri-Urban Areas in Burkina Faso. African Journal of Agricultural Research, Vol.3, No.2, pp 215-224.

MoC, 2007. Evaluation of cost of cow milk production and quality of milk produced by commercial dairy farms located within radius of 100 km from Guwahati city, Asam, Gol, New Delhi.

MoA, 2009. Annual Report, Department of Animal Husbandry, Dairying and Fisheries. Ministry of Agriculture, Gol, New Delhi, India.

Nubern, C. A and Kilmer, R. L., 1995. Alternative Fluid Milk Procurement Systems for Florida dairy Farmers. Journal of Agriculture and Applied Economics, Vol. 27, No.2, pp 460-474.

Patil, A. P., Gawande, S. H., Nande, M. P., Gobade, M. R., 2009. Constraints Faced by the Dairy Farmers in the Nagpur District while Adopting Animal Management Practices. Veterinary World, Vol. 2, No.3, pp 111-112.

Patil, G. V., 2004 Marketing Analysis of Milk Production in Shirpur Tahsil of Dhule District of Maharashtra (India). Thesis PhD. YCMU Nasik, India.

Rajarambapu (Rajarambapu Cooperative Milk Union Limited), 2005-09. Annual Reports of Rajarambapu Cooperative Milk Union Limited. Islampur, India.

Rao, P. P and Hall, A. J., 2003. Importance of Crop Residue in Crop-Livestock Systems in India and Farmers Perceptions of Fodder Quality in Course Serials. Field Crop Research, Vol. 84, pp 189-198.

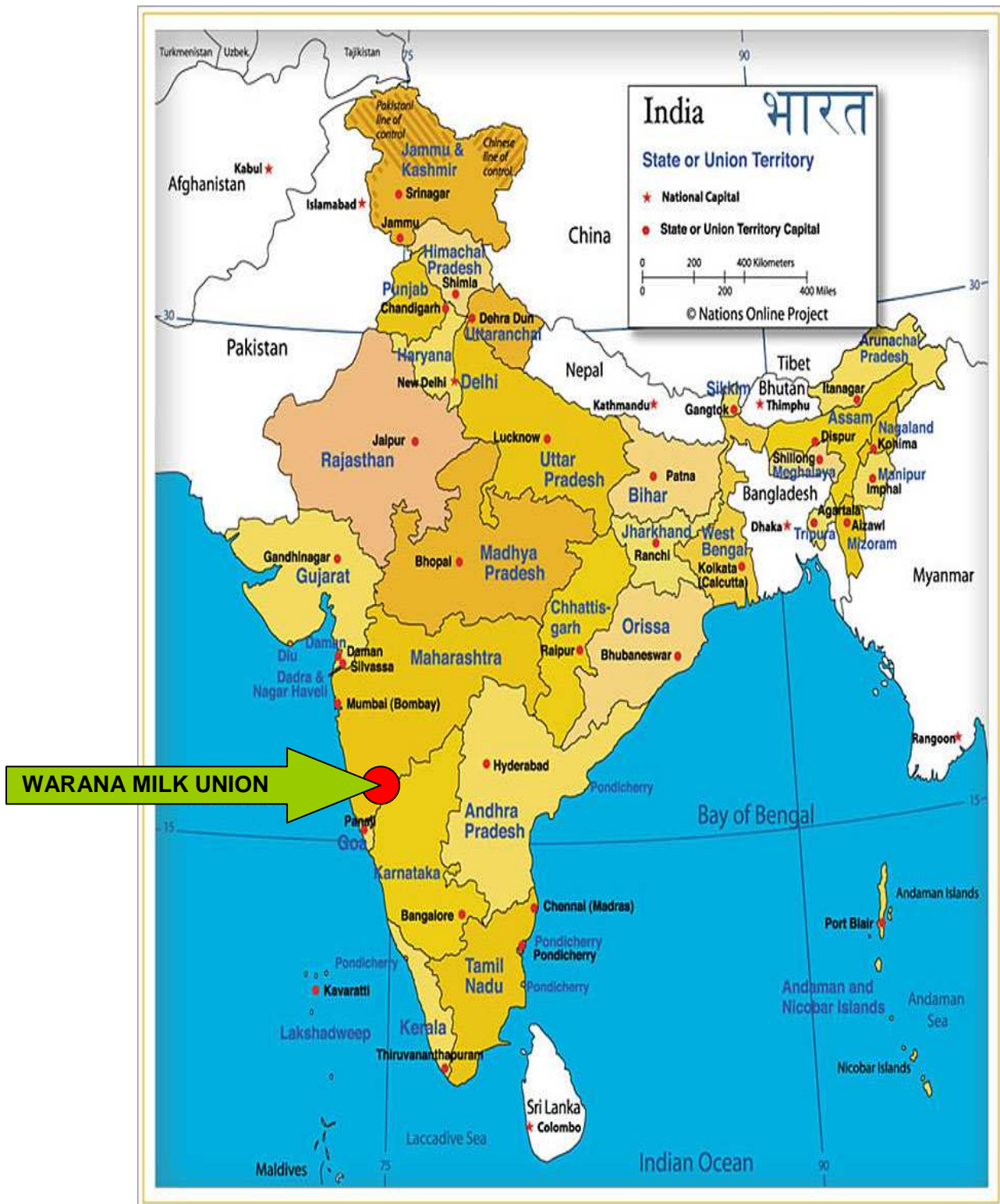
Sarwar, M., Khan, M.A., Mahr-Un-Nisa and Zafar, I. 2002. Dairy Industry in Pakistan, A scenario. International journal of agriculture & biology Vol.4, pp 420-428.

Sharma, V.P., Singh, R. V., Staal, S and Delgado, C. L., 2002. Critical Issues for Poor People in the Indian Dairy Sector on the Threshold of a New Era. FAO.

Udo, H.J.M., Aklilu, H.A., Phong, L.T., Bosma, R.H., Budisatria, I.G.S., Patil, B.R., Samdup, T., Bebe, B.O., 2007. Livestock intensification in mixed farms; benefits and trade-offs, In: Fish ponds in Farming Systems (Eds. A.J. van der Zijpp, J.A.J. Verreth, Le Quang Tri, M.E.F. van Mensvoort, R.H. Bosma, M.C.M. Beveridge), Wageningen Academic Publishers, The Netherlands, pp 271-280.

WCOMUL (Warana Cooperative Milk Union Limited), 2005-09. Annual Reports of Warana Cooperative Milk Union Limited. Warananagar, India.

Annex 1 Map of India



Annex 2 Map of Maharashtra



Annex 3 Questionnaires

3.1 Questionnaire for Village Co-operative

Respondent's Name:

Name of VDCS:

Name of Milk Union:

Name of Village

Type of VDCS: A. Large B. Small

.....
.....

1. How much is the Milk Procurement in last five years?

Year	Total Milk Procurement
2005	
2006	
2007	
2008	
2009	

2. Where do you sell your milk?

- a. Warana Union
- b. Existing competitor
- c. New competitor
- d. Other market

3. How many milk producers deliver the milk?

2005	
2006	
2007	
2008	
2009	

4. Do you produce milk by products?

- a. Yes
- b. No

5. How frequently you receive milk payment?

.....

6. Do you receive milk payment regularly?

- a. Yes
- b. No

7. Do you get milk bonus price?

- a. Yes
- b. No

8. Are you satisfied with bonus milk price?

- a. Yes
- b. No

9. Do your Milk Union reject milk on quality standards?

- a. Yes
- b. No

10. If yes, how many times in year?

Year	2005	2006	2007	2008	2009
How many times/year					

11. What is the reason of rejecting milk by Milk Union?

- a. Low fat
- b. Low SNF
- c. Acidity
- d. Adulteration
- e. Other

12. Is the time of milk procurement vehicle suitable?

- a. Yes
- b. No

13. Do you receive veterinary service from milk Union?

- a. Yes
- b. No

14. Do you receive AI service from Milk Union?

- a. Yes
- b. No

15. How is the quality of those services?

- a. Excellent
- b. Good
- c. Fair
- d. Bad

16. Which inputs your Milk Union provides?
- Milko Tester
 - Computer
 - Travice
 - Other
17. Does your Milk Union provide cattle feed (Concentrate)?
- Yes
 - No
- If yes, what is the rate of cattle feed?
-
18. What is the quality of cattle feed depending on palatability, taste, odor and actual result?
- Excellent
 - Good
 - Fair
 - Bad
19. Do you purchase cattle feed from Milk Union?
- Yes
 - No
20. Does your Milk Union provide following inputs?
- Chaff cutter
 - Mineral Mixture
 - Fodder seed
 - Fodder
21. Are you satisfied with services and inputs provided by Milk union?
- Yes
 - No
22. Do you receive loan from Milk Union for cattle purchase?
- Yes
 - No
- If yes, what is the rate of interest?
23. Do you receive subsidy for cattle purchase?
- Yes
 - No
- If yes, how much?
-
24. Is there any change in cattle purchase policy of Milk Union?
- Yes
 - No
- If yes, what is the change?
25. On what basis you supply milk to Milk Union?
- Political
 - Financial
 - Social
 - Other

7. How much quantity of milk you keep for home consumption?

a. 2005-

b. 2009-

8. What is the average milk price you get for last five years?

Year	Cow milk (In Rs.)	Buffalo Milk (In Rs.)
2005		
2009		

9. What is the average price of fodder in last five years?

Year	Green fodder (In Rs.)	Dry fodder (In Rs.)
2005		
2009		

10. What is the average cattle feed (Concentrate) price per kg during last five years?

Year	Price in Rs.
2005	
2009	

11. What is the average rate of mineral mixture per kg in last five years?

Year	Rate in Rs.
2005	
2009	

12. What is the average cost of per artificial insemination in last five years?

Year	Cost per A.I.in Rs.
2005	
2009	

13. What is the average cost of medicine and veterinarian per animal per year during last five years?

Year	Av. Cost of Medicine and Veterinarian/year/animal (In Rs.)
2005	
2009	

14. What is the average cost of labor per day during last five years?

Year	Av. Cost of labor per day (In Rs.)
2005	
2009	

15. What is the main roughage you feed to your animals and is there any change in roughage during last five years?

a. Yes

If yes, what?

.....

16. Is there any change in milk production due to environmental change?

.....

17. Is there any improvement in management during last five years?

a. Yes

18. How much is the distance of milk collection center from your farm?

.....

19. Is the milk procurement time suitable for you?

a. Yes

20. Are you satisfied with milk price you received from Milk Union?

a. Yes

If not, what is expected milk price?

Cow milk with 3.5% fat –

Buffalo milk with 7% fat-.....

21. How frequently you receive milk payment from your village DCS?

22. Do you receive milk payment in time and regularly?

a. Yes

b. No

23. Do you receive bonus milk price from your Milk Union or Village DCS?

a. Yes

b. No

If yes, how much?

For cow milk-

For buffalo milk-

24. Are you satisfied with bonus milk price you received?

a. Yes

b. No

3.3 Checklist for Interview with Milk Procurement manager/supervisor of competitors

Question1. What is the trend in milk procurement/production in Warana Valley?

Question2. What are the reasons of decreased/increased milk production/procurement?

Question3. What is the present procurement strategy and what are the future plans to increase procurement and production?

Question4. What is the marketing strategy of your Milk Union?